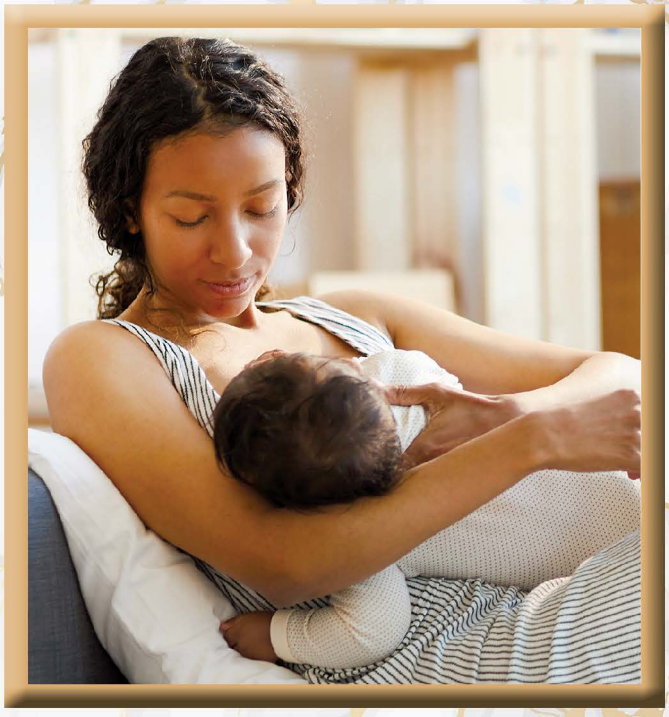
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Breastfeeding Handbook for Physicians

3rd Edition



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Preface

As with prior editions, this third edition of the *Breastfeeding Handbook for Physicians* is written to provide physicians in all specialties with a concise and inexpensive teaching and reference aid on breastfeeding and human lactation. The overall goal of the handbook is to enhance physicians' knowledge of lactation physiology and clinical practice so that they become comfortable promoting and supporting breastfeeding.

The *Breastfeeding Handbook for Physicians* can be used as a guide to teach breastfeeding and lactation theory and practice to medical students, residents, and fellows. Similarly, postgraduate continuing medical education programs can be built around its contents. It is hoped that this handbook will encourage physicians to become teachers of breastfeeding and lactation medicine.

Because this handbook is written jointly, to represent the collaborative efforts of the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, it addresses collaboration among physicians and between physicians and other health care professionals—especially lactation specialists. To recognize the physician as the coordinator of a health care team that consists of a large number of other professionals, the concept of a medical home for baby and mother is stressed in the book, to help provide a framework on which to build hospital and office policies.

While the book is designed primarily for physicians, use by other health care professionals, including nurses, dietitians, and lactation specialists, is welcomed; its use may serve as a bridge between these health care professionals and physicians in achieving coordinated and optimal care.

This edition of the handbook contains updates on important evidence for breastfeeding, as well as clinical practices. The first chapters deal with the evidence behind the rationale for breastfeeding and the epidemiology of breastfeeding in the United States. Risk reduction data are provided to give readers estimates of effects. The section on milk composition has been enhanced with a separate chapter on nonnutritive components in human milk, to provide physicians with additional information on how bioactive factors and the microbiome may explain some of the protective effects of breastfeeding. The chapters that follow are organized in a life-cycle format to allow for quick reference. These chapters contain expanded sections on contemporary issues in breastfeeding management, such as the recently revised World Health Organization/United Nations Children's Fund Ten Steps to Successful Breastfeeding, skin-to-skin contact and safe sleep, assessment of newborn and infant weight changes,

medications and vaccine use during lactation, and plans for return to work and workplace lactation.

Breastfeeding awareness is increasing in the United States. Current data indicate that 83.9% of women initiate breastfeeding in the hospital, which just surpassed national targets set for 2020. The proportion of women delivering their newborns in a breastfeeding-friendly facility has more than tripled over set targets, and nearly one-half of all women have a lactation program at their workplace. The US Centers for Disease Control and Prevention data (Breastfeeding Report Card, National Immunization Surveys, and Maternity Practices in Infant Nutrition and Care Survey data) remain extremely useful in guiding clinical approaches to breastfeeding and emphasize the need to continue working toward eliminating disparities in breastfeeding rates among women.

The data provided in the handbook underscore the importance of breastfeeding as a public health imperative, and clinicians should support attempts to remove barriers to its success. The recommendations for exclusive breastfeeding for about 6 months, followed by the addition of complementary foods and continued breastfeeding for 2 years or beyond as mutually desired by mother and child, should be advocated with a knowledge base that can be found in these chapters.

The development of the *Breastfeeding Handbook for Physicians* is the product of numerous experts in the field of breastfeeding and human lactation. We hope you will find the reference useful for breastfeeding education.

The Editors

CHAPTER 1

Evidence for Breastfeeding: Importance for Newborns and Infants, Mothers, and Society

A woman's decision to breastfeed has far-reaching effects, not only for her newborn and infant and her own health but also for the economic and environmental benefits to society. These short- and long-term effects are secondary to the dynamic composition of human milk, which contains anti-infective and anti-inflammatory factors, oligosaccharides that promote a healthy gut microbiome, growth factors, microRNA that are important in modulating epigenetic regulators, and cells such as neutrophils, leukocytes, stem cells, and bacteria—including *Bifidobacterium* and *Lactobacillus* (see Chapter 4, Nonnutritive Components in Human Milk). These factors establish the neonatal immune system and gut microbiome, which serve to decrease the incidence and severity of infections and inflammatory reactions. Recent studies emphasize the importance of the "early critical window" in the first year after birth, during which establishing a healthy gut microbiome through breastfeeding can induce long-term effects.[1]

Given the well-documented short- and long-term medical and neurodevelopmental advantages, breastfeeding should be considered a public health priority. This chapter outlines the risk reductions for acute and chronic illness for baby and mother, as well as the economic effects of breastfeeding.

Risk Reductions in Breastfeeding Newborns and Infants

Extensive evidence continues to accumulate and confirm that many acute and chronic pediatric conditions, such as otitis media, acute diarrheal disease, lower respiratory illnesses, sudden infant death syndrome (SIDS), inflammatory bowel disease, childhood leukemia, diabetes mellitus, obesity, asthma, and atopic

dermatitis, occur less frequently among children who were breastfed as newborns and infants and more frequently in those who are not breastfed.

The newest published evidence, including meta-analyses and systematic reviews, is included in this chapter (**Tables 1-1** and **1-2**); however, these studies are only as reliable as the individual studies they are based on and the outcome measures selected. The most recently updated information is highlighted in the US Department of Agriculture (USDA) Pregnancy and Birth to 24 Months (P/B-24) project systematic review, which was conducted to evaluate selected newborn, infant, and child outcomes with breastfeeding,[26] and the Agency for Healthcare Research and Quality (AHRQ) systematic review, which was performed to evaluate maternal health outcomes.[27]

Acute Illness

Breastfeeding provides numerous immunologic and biochemical factors that prevent infections and enhance the newborn's and infant's host defenses (see Chapter 3, Composition of Human Milk, and Chapter 4, Nonnutritive Components in Human Milk). At the population level, not only are rates of acute illness lower in breastfed infants, but the duration and severity of illness are shortened as well. Breastfed newborns and infants experience the same infections but are generally asymptomatic or have milder symptoms than formula-fed newborns and infants. These effects are observed in upper- and lower-income/resource countries. Breastfed newborns and infants also have significantly higher responses to bacille Calmette-Guérin, *Haemophilus influenzae* type b, poliovirus, tetanus, and diphtheria toxoid immunizations.[28]

Gastrointestinal Infection

The severity of gastrointestinal infection is attenuated if not prevented in breastfed newborns and infants, with specific effects against enteric pathogens such as rotavirus, *Giardia, Shigella, Campylobacter,* and enterotoxigenic *Escherichia coli*. The recent Millennium Cohort Study in the United Kingdom demonstrated that exclusive breastfeeding for 6 months provided a 30% reduced risk of severe/persistent diarrhea, while adjusting for confounding factors.[7]

Respiratory Illnesses

Wheezing and lower respiratory tract disease, among other respiratory illnesses, are reduced in frequency and duration in breastfed newborns and infants. It has been estimated that 21,000 hospitalizations and 40 deaths caused by lower respiratory tract infections could be prevented through breastfeeding if 90% of babies were exclusively breastfeeding through 6 months of age.[29] The incidence rate of lower respiratory tract infection from respiratory syncytial virus has been shown

Table 1-1. Breastfeeding and Infant Outcomes[a]

Outcome and Reference	% Lower Risk	Breastfeeding[a]	Compared to	Comments[b]	OR, RR, or HR	95% CI
SIDS[2]	40%	2–4 mo	None	Breastfeeding at least 2 mo to reduce SIDS	OR 0.60	0.44-0.82
	60%	4–6 mo	None		OR 0.40	0.26-0.63
	64%	> 6 mo	None		OR 0.36	0.22-0.61
Infant mortality, US[3]	19%	Ever	Never	US cohort	OR 0.81	0.68-0.97
Neonatal mortality (8-27 d)[3]	51%	Ever	Never	US cohort	OR 0.49	0.34-0.72
Postneonatal mortality[4]	21%	Ever	Never	US nationally representative sample	OR 0.79	0.67-0.93
	38%	> 3 mo	Never		OR 0.62	0.46-0.82
Infant mortality (7-365 days)[77]	26%	Ever	Never	US national cohort	OR 0.74	0.70-0.79
Neonatal mortality (7-27 days)[77]	40%	Ever	Never	US national cohort	OR 0.60	0.54-0.67
Postneonatal mortality (28-364 days)[77]	19%	Ever	Never	US national cohort	OR 0.81	0.76-0.87
Infant mortality, limited-income countries[5]	33%	Exclusive	Predominant		RR 0.67	0.52-0.88
	79%	Exclusive	Partial		RR 0.21	0.20-0.22
	93%	Exclusive	None		RR 0.07	0.03-0.16
Infant mortality, limited-income countries[6]	25%	Initiated in first h	> first h		RR 0.75	0.64-0.88
Lower respiratory tract infection[7]	19%	Exclusive 6 mo	Exclusive < 4 mo	Cohort	RR 0.81	0.69-0.95

(*continued*)

Table 1-1 (*continued*)

Outcome and Reference	% Lower Risk	Breastfeeding[a]	Compared to	Comments[b]	OR, RR, or HR	95% CI
Severe/persistent diarrhea[7]	30%	Exclusive 6 mo	Exclusive < 4 mo	Cohort	RR 0.70	0.52-0.94
Otitis media[8]	33%	Ever	Never		OR 0.67	0.56-0.80
	33%	More	Less		OR 0.67	0.59-0.76
	43%	Exclusive 6 mo	None		OR 0.57	0.44-0.80
Asthma, 5–18 y[9]	10%	More	Less		OR 0.90	0.84-0.97
	12%	Ever	Never		OR 0.88	0.82-0.95
Asthma, ever, all ages[10]	22%	Longer	Shorter	Most protective for wheezing in first 2 y	OR 0.78	0.74-0.84
Eczema, first 2 y[9]	26%	Exclusive 3–4 mo	Shorter		OR 0.74	0.57-0.97
Crohn disease[11]	29%	Ever	Never		OR 0.71	0.59-0.85
	80%	12 mo	3–6 mo		OR 0.20	0.08-0.50
Ulcerative colitis[12]	22%	Ever	Never		OR 0.78	0.67-0.91
	79%	12 mo	3–6 mo		OR 0.21	0.10-0.43
Childhood obesity[12]	22%	Ever	Never		OR 0.78	0.74-0.81
	10%	< 3 mo	Never		OR 0.90	0.84-0.95
	12%	3–5 mo	Never		OR 0.88	0.79-0.97
	17%	5–7 mo	Never		OR 0.83	0.76-0.90
	21%	> 7 mo	Never		OR 0.79	0.70-0.88

Table 1-1 (*continued*)

Outcome and Reference	% Lower Risk	Breastfeeding[a]	Compared to	Comments[b]	OR, RR, or HR	95% CI
Childhood and adult obesity[13]	23%	Ever	Never		OR 0.77	0.69-0.86
	26%	Greater	Less		OR 0.74	0.68-0.80
	31%	Exclusive	Nonexclusive		OR 0.69	0.61-0.79
Childhood obesity[14]	18%	> 6 mo	Never	European pooled analysis	OR 0.82	0.78-0.86
	11%	> 6 mo			OR 0.89	0.86-0.93
	20%	Exclusive 6 mo	Nonexclusive		OR 0.8	0.74-0.85
Type 1 DM[15]	57%	Full breastfeeding 6 mo	Never	Cohort	HR 0.43	0.21-0.90
	56%	12 mo	Never	Cohort	HR 0.44	0.22-0.88
Type 2 DM[16]	33%	Ever	Never		OR 0.67	0.56-0.80
Leukemia[17]	11%	Ever	Never		OR 0.89	0.84-0.94
	19%	6 mo	None or shorter		OR 0.81	0.73-0.89

Abbreviations: CI, confidence interval; DM, diabetes mellitus; HR, hazard ratio; OR, odds ratio; RR, relative risk; SIDS, sudden infant death syndrome.
[a] Not necessarily exclusively breastfed unless specifically indicated.
[b] Data are from meta-analyses, unless another type of study is indicated.
From Meek JY, Noble L; American Academy of Pediatrics Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics.* 2022;150(1):e2022057988.

Table 1-2. Breastfeeding and Maternal Outcomes (From Meta-analyses)

Condition and Reference	% Lower Risk	Breastfeeding[a]	Compared to	OR or RR	95% CI
Type 2 DM[18]	32%	Longer	Shorter	RR 0.68	0.57-0.82
DM[19]	30%	> 12 mo	Less	RR 0.70	0.62-0.78
Gestational DM and type 2 DM[20]	78%	Longer	Shorter	OR 0.22	0.13-0.36
	58%	Exclusive	None	OR 0.42	0.22-0.81
Hypertension[21]	8%	None		OR 0.92	0.88-0.96
	11%	6–12 mo	None	OR 0.89	0.86-0.92
	12%	> 12 mo	None	OR 0.88	0.84-0.93
Hypertension[19]	13%	> 12 mo	Less	RR 0.87	0.78-0.97
Premenopausal breast cancer[22]	14%	Any	None	RR 0.86	0.80-0.93
Postmenopausal breast cancer[22]	11%	Any	None	RR 0.89	0.83-0.95
Breast cancer[22]	28%	Exclusive	None	RR 0.72	0.58-0.90
Breast cancer[23]	22%	Any	None	OR 0.78	0.74-0.82
	7%	< 6 mo	None	OR 0.93	0.88-0.99
	9%	6–12 mo	None	OR 0.91	0.87-0.96
	26%	> 12 mo	None	OR 0.74	0.69-0.79
Ovarian cancer[23]	30%	Ever	Never	OR 0.70	0.64-0.77
	17%	< 6 mo	None	OR 0.83	0.78-0.89
	28%	6–12 mo	None	OR 0.72	0.66-0.78
	37%	> 12 mo	None	OR 0.63	0.56-0.71
Endometrial cancer[24]	11%	Ever	Never	OR 0.89	0.81-0.98
Thyroid cancer[25]	9%	Ever	Never	RR 0.91	0.83-0.99

Abbreviations: CI, confidence interval; DM, diabetes mellitus; OR, odds ratio; RR, relative risk.
[a] Not necessarily exclusively breastfed unless specifically indicated.
From Meek JY, Noble L; American Academy of Pediatrics Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 2022;150(1):e2022057988.

to be doubled in infants who were not breastfed.[30] The Millennium Cohort Study also indicated that infants who exclusively breastfed for 6 months had a decreased risk of lower respiratory tract infections when compared with infants who exclusively breastfed for fewer than 4 months.[7]

Otitis Media

A recent meta-analysis of 24 studies from the United States and Europe demonstrated a protective effect of breastfeeding over the first 2 years after birth in a dose-response fashion. Exclusive breastfeeding for the first 6 months after birth showed a risk reduction of 43%, whereas "more versus less" breastfeeding and "ever versus never" breastfeeding were associated with a 33% risk reduction.[8]

Sudden Infant Death Syndrome and Infant Mortality

Breastfeeding is associated with a reduced risk of SIDS. Breastfeeding for longer than 2 months has been associated with a reduction in SIDS by 40%, by 60% if breastfeeding duration was at least 4 months, and by 64% if breastfeeding duration was longer than 6 months.[2] Exclusive breastfeeding was tracked and similarly showed a duration-dependent effect, with the greatest protection for 4 to 6 months, a 63% reduction. However, data were insufficient to analyze the effects of 6-month exclusive breastfeeding. Public health messaging should therefore stress the importance of breastfeeding for at least 2 months for the risk reduction of SIDS and highlight that longer durations will result in even lower incidence rates of SIDS and infant mortality. Statistical modeling indicates that optimizing breastfeeding in the United States could prevent 492 infant deaths from SIDS every year.[29]

By using US national data linking birth and death certificates, it is estimated that ever breastfeeding is associated with a 26% lower risk of infant mortality (7–365 days) and 40% lower risk of neonatal mortality (7–27 days), and 19% lower risk of postneonatal mortality (28–364 days). The major causes of infant mortality lowered by breastfeeding initiation in these adjusted models included infections, sudden unexpected infant death, and necrotizing enterocolitis. In terms of infant mortality in lower-income/resource countries, exclusive breastfeeding and early breastfeeding in the first hour after birth are especially important.[5,6] It has been estimated that improving global breastfeeding could prevent 823,000 annual deaths in children younger than 5 years.[31]

Chronic Diseases of Childhood

Diabetes

A recent Scandinavian population cohort study noted a 200% increase in risk of developing type 1 diabetes in children who were never breastfed, compared with

those breastfeed for 12 months or longer, as well as a similar increase in risk when compared with those fully breastfed for at least 6 months.[15] In the USDA P/B-24 project, the systematic review of infant feeding and the development of diabetes showed that never being fed human milk is associated with a higher risk of type 1 diabetes mellitus, and a shorter duration of breastfeeding is also associated with an increased risk, when compared with a longer duration of breastfeeding.[32] The putative mechanism in the development of type 1 diabetes mellitus is postulated to be the infant's exposure to cow milk β-lactoglobulin, which stimulates an immune-mediated process that cross-reacts with pancreatic β cells.[33]

The USDA P/B-24 systematic review had insufficient evidence to determine whether or not there is a relationship between ever and never feeding human milk and the development of type 2 diabetes mellitus, insulin resistance, and other associated metabolic abnormalities.[32] However, another meta-analysis did find a protective effect of breastfeeding for the development of type 2 diabetes, which was even higher for adolescents, with a 51% risk reduction, and extended to adulthood, with a 23% risk reduction.[16]

Cardiovascular Disease

The USDA P/B-24 review indicated that breastfeeding decreased blood pressure at 6 to 7 years of age but was not associated with other cardiovascular disease outcomes.[26]

Obesity

A mounting body of evidence indicates that breastfeeding provides some level of protection against overweight and obesity.[34] Because breastfeeding may lower the risk of obesity, national campaigns to prevent obesity should begin with breastfeeding support. Although complex factors may confound studies of obesity, there is a modest reduction in adolescent and adult obesity rates if any breastfeeding occurred in infancy, compared with no breastfeeding. A 22% reduced risk of obesity has been shown with breastfeeding, as well as a dose-response effect with breastfeeding duration (breastfeeding for < 3 months reduced risk by 10%; 3–5 months, 12%; 5–7 months, 17%; and ≥ 7 months, 21%).[12] Additionally, a 26% reduced risk of both overweight and obesity with breastfeeding has been demonstrated in children and adults.[13] In another meta-analysis, breastfed and non-breastfed infants were compared, and a 15% decrease in the odds of childhood overweight was found.[35] A European pooled analysis confirms these findings.[14] Investigators also evaluated breastfeeding promotion efforts, and although they did not find significant changes in child weight or length, they did find a reduction in body mass index (BMI), which highlights the importance of adding breastfeeding promotion to public health strategies for obesity prevention.[36] The Early Nutrition Project recently concluded that breastfeeding should be promoted, protected,

and supported, because—in addition to many other benefits—breastfeeding may contribute to risk reduction for later overweight and obesity.[37]

The protective effect of breastfeeding against overweight and obesity appears to be greater for exclusively breastfed newborns and infants, when compared with those who are fed formula or who receive combined breastfeeding and formula feedings. Mothers who use combined breastfeeding and formula feeding or exclusive formula feeding may be less attuned to feeding and satiety cues in their newborns and infants. Other postulated mechanisms for this association relate to how nursing newborns and infants self-regulate milk intake volume, irrespective of maneuvers that increase available milk volume; the early programming of self-regulation, in turn, affects adult weight gain. This concept is supported by the observations that infants who are fed by bottle, who are fed formula, and who are fed expressed breast milk will demonstrate increased bottle emptying, poorer self-regulation, and excessive weight gain in later infancy (> 6 months) when compared with infants who only nurse from the breast.[38]

Asthma

Recent studies continue to highlight the importance of breastfeeding to reduce the risk of asthma. An asthma risk reduction of 10% has been shown in more breastfeeding versus less; similarly, a 12% asthma risk reduction was found in any breastfeeding versus never breastfeeding in children 5 to 18 years of age.[9] It has also been shown that a longer duration of breastfeeding is associated with a 22% decreased risk of developing asthma across all age groups and is most protective against asthma for the first 2 years after birth and until at least 3 to 6 years of age.[10] Moreover, the American Academy of Pediatrics (AAP) recently concluded that breastfeeding for at least 3 to 4 months is protective against wheezing in the first 2 years after birth. There is also some evidence that longer versus shorter duration of any breastfeeding is associated with a reduced risk of asthma, even after 5 years of age. The USDA P/B-24 systematic review indicated that any breastfeeding is associated with lower risk of childhood asthma.

Allergic Rhinitis and Eczema

Breastfeeding has been shown to reduce the risk of allergic rhinitis for children up to 5 years of age, and exclusive breastfeeding has been shown to reduce the risk of eczema within the first 2 years after birth.[9] However, according to the P-B/24 systematic review, limited evidence did not indicate an association between breastfeeding and atopic dermatitis or allergic rhinitis.[39] More research in this area is clearly needed.

Exclusive breastfeeding for at least 3 to 4 months decreases the cumulative incidence of eczema in the first 2 years after birth.[40] There was no evidence that

breastfeeding or hydrolyzed formula decreased food allergies; however, studies may be imprecise in combining exclusive breastfeeding at the breast versus feeding human milk, because direct breastfeeding may be important in the mechanism of protection. The USDA P/B-24 systematic review also indicated that longer durations of breastfeeding offered more protection, but no relationship was found with atopic dermatitis or food allergies.[26]

For the prevention of allergic disease, the AAP continues to endorse exclusive breastfeeding for about 6 months, followed by the introduction of complementary foods, with the only possible exception being infants at high risk for peanut allergy, in whom introduction of peanut protein at 4 to 6 months of age may confer protection.[40]

Inflammatory Bowel Disease

A meta-analysis showed that breastfeeding is associated with a reduced risk of Crohn disease by 29% and for ulcerative colitis by 22%. This association is dose dependent in that the strongest decrease in risk occurs when breastfeeding duration is at least 12 months for Crohn disease (80% reduced risk) and 79% for ulcerative colitis, compared with only 3 or 6 months of breastfeeding.[11] The USDA systematic review indicates that longer duration of breastfeeding is also associated with lower rates of inflammatory bowel disease.[26] The protective effect may result from the interaction of the immune-modulating effect of human milk and the underlying genetic susceptibility of the newborn or infant or from an altered microbiome in formula-fed newborns and infants.

Celiac Disease

Although it has not been shown that breastfeeding or introducing gluten while breastfeeding reduces the risk of celiac disease,[41,42] the USDA P/B-24 project yielded limited evidence to suggest that never being fed human milk is associated with a higher risk of celiac disease, when compared with ever being fed human milk.[26]

Childhood Leukemia

When compared with no breastfeeding or shorter duration of breastfeeding, any breastfeeding for at least 6 months after birth is associated with a 20% lower risk of childhood leukemia, and any breastfeeding when compared with never breastfeeding is associated with a 9% lower risk of childhood leukemia.[17] Indeed, 14% to 20% of all childhood leukemia cases may be prevented by breastfeeding for 6 months or more. The evidence for prevention of childhood lymphomas, however, is inconclusive.[17,43] The investigators of the P/B-24 project similarly concluded that never being breastfed is associated with a slightly higher risk of

childhood leukemia when compared with ever being breastfed and that a longer duration of breastfeeding (≥ 6 months) was the most protective.[44]

Neurodevelopmental Outcomes

IQ

According to 16 observational studies that controlled for several confounding factors, being breastfed in early life is associated with a higher mean IQ of 3.44 points (95% CI, 2.30–4.58). Even after controlling for maternal IQ, the relationship was maintained, although somewhat attenuated (mean difference, 2.62 points [95% CI, 1.25–3.98]).[45] A prospective, population-based birth cohort study of neonates in Brazil followed participants for 30 years. In the adjusted analysis, participants who were breastfed for 12 months or longer had higher IQ scores (mean difference, 3.76 points [95% CI, 2.20–5.33]), more years of education (mean, 0.91 years [95% CI, 0.42–1.40]), and higher monthly incomes than those who were breastfed for less than 1 month. This analysis also indicated that adult IQ was responsible for 72% of the effect of breastfeeding on income.[46]

Attention-Deficit/Hyperactivity Disorder

A recent meta-analysis demonstrated that children with attention-deficit/hyperactivity disorder had significantly less breastfeeding duration than control subjects (mean, −2.44 months [95% CI, −3.17 to −1.71]) and were 31% less likely to have been breastfed for 6 to 12 months and 42% less likely to have been breastfed for longer than 12 months. They were 48% less likely to have been exclusively breastfed for longer than 3 months and were 3.7 times more likely to not have been breastfed at all.[47]

Autism Spectrum Disorder

A meta-analysis of 7 studies showed that children with autism spectrum disorder were 39% less likely to have been breastfed. Subgroup analyses showed that results remained significant for children who were breastfed with additional supplementation.[48] In both attention-deficit/hyperactivity disorder and autism spectrum disorder, there may be a possibility of reverse causality, in that infants with these diagnoses may have poor oral motor skills, have difficulty with social-emotional interaction, and be inattentive at breastfeeding skills, which can lead to earlier weaning.

Neglect and Abuse

According to the National Longitudinal Study of Adolescent to Adult Health, when compared with adolescents who were never breastfed, adolescents who

were breastfed for 9 months or longer had a 46% reduced risk of having experienced neglect and a 53% reduced risk of sexual abuse, after controlling for covariates.[49]

Dental Health

It has been well documented that breastfeeding decreases the development of malocclusion.[50–52] Additionally, breastfeeding for up to 12 months has also demonstrated a reduced risk of infant caries, but breastfeeding for longer than 12 months has shown an increased risk of caries when compared with children who were breastfed for fewer than 12 months. For children who were breastfed for longer than 12 months, those who fed nocturnally or more frequently had a 7-times increased risk of caries. In addition, children who are breastfed for 24 months or longer have a 2.4-times higher risk of having severe early childhood caries than those who are breastfed up to 12 months of age, while breastfeeding between 13 and 23 months of age has no effect on dental caries.[53] In summary, there is a benefit of decreased caries with breastfeeding up to 12 months, but more caries occur in children who are breastfed for longer than 2 years, or longer than 1 year if there is a higher rate of feeding at night.

Preterm Newborns and Infants

Neonatal Morbidity

Providing human milk to neonates with very low birth weight (≤ 1,500 g) in the neonatal intensive care unit offers short- and long-term health benefits and should be considered lifesaving medical therapy (see Chapter 12, Breastfeeding and Human Milk for Preterm Newborns and Infants). A mother's own milk contains macronutrients, micronutrients, and an array of active biological components, such as immunoglobulins, cytokines, growth factors, hormones, antimicrobial agents, probiotic bacteria, immune cells, stem cells, and prebiotics such as oligosaccharides (see Chapter 3, Composition of Human Milk, and Chapter 4, Nonnutritive Components in Human Milk).

A clear protective effect in human milk has been found against necrotizing enterocolitis (NEC), as well as decreased incidence of late-onset sepsis, severe retinopathy of prematurity, and bronchopulmonary dysplasia (BPD).[54] Particularly for NEC, receiving any volume of human milk is better than none, and the higher the dose of human milk received, the greater the protection afforded.[55] A diet of exclusive human milk reduces BPD by 23%, and a diet of partial human milk reduces BPD by 17%.[56]

A mother's own milk should be the primary diet of preterm neonates and infants. Pasteurized donor human milk should be provided when a mother's own

milk is not available or when it is contraindicated. Fortification of a mother's own milk or pasteurized donor human milk with bovine-based or human milk–based fortifiers is necessary for growth optimization.

Very premature neonates and infants who are fed donor milk as a sole diet or as a supplement to their mother's own milk have been shown to receive protection against NEC, have slower in-hospital growth, and have no difference in long-term growth or neurodevelopment, when compared with very premature neonates and infants who are fed formula.[57] The use of donor milk has been associated with increased use of a mother's own milk, possibly because of heightened awareness of the importance of human milk.[58]

Risk Reductions of Breastfeeding for the Mother

Bonding and Stress Reduction

For the mother, the psychological advantages to breastfeeding include creating a quiet time for the nursing mother and fostering bonding with her newborn or infant. It has been shown that lactating women have decreased levels of steroid hormones. The blunted response of stress hormones is thought to be an adaptive mechanism for negotiating the stressful time of the puerperium. In addition to decreasing the stress response, oxytocin also may foster maternal-infant bonding and play a role in blunting the perception of pain via the dopaminergic pathway.

Postpartum Weight Retention

Postpartum weight loss may be facilitated in breastfeeding women. However, studies of the overall effect of breastfeeding on the return of mothers to their prepregnancy weight are inconclusive, given the large numbers of confounding factors on weight loss (ie, diet, activity, baseline BMI, and ethnicity). It has been shown that mothers who breastfed had significantly lower postpartum weight retention of −0.38 kg (95% CI, −0.64 to −0.11). However, subgroup analysis showed that breastfeeding for fewer than 3 months did not show a significant effect, breastfeeding for 3 to 6 months had a minimal decrease (−0.20 kg), breastfeeding for 6 to 12 months the largest decrease (−1.58 kg), and breastfeeding for longer than 1 year a smaller decrease (−0.97 kg).[59] In addition, breastfeeding may be more effective in promoting weight loss for lactating women who are younger than 30 years, those who are primipara, or those who have a normal prepregnancy BMI. The AHRQ review of 16 cohort studies showed an unclear association between breastfeeding and postpartum weight change but also noted that postpartum weight change varied according to exposure to breastfeeding.[27]

Cancer

Breast Cancer

Breastfeeding has long been associated with a decrease in the risk of breast and ovarian cancers. Breastfeeding has been shown to decrease breast cancer rates by 16% when compared with parous and nulliparous women who never breastfed, in both premenopausal (14%) and postmenopausal women (11%). Exclusive breastfeeding had a stronger protective effect against breast cancer, with a reduced risk of 28%.[22] Breastfeeding duration is likewise very important. A meta-analysis of 24 studies involving 13,907 breast cancer cases demonstrated that breastfeeding decreased breast cancer rates by 39% and longer breastfeeding durations decreased breast cancer rates more than shorter breastfeeding durations (with 53% reduced risk).[60] Indeed, breastfeeding for fewer than 6 months decreased breast cancer rates by 7%; 6 to 12 months, 9%; and longer than 12 months, 26%.[23] Maximum protection is offered by longer than 24 months of continuous or sequential breastfeeding.

It is also important to consider breast cancer subtype when evaluating the association between breast cancer and breastfeeding. Breastfeeding decreases the risk of developing estrogen receptor (ER)–negative and progesterone receptor (PR)–negative breast cancer subtypes by 10% and reduces the risk of developing triple-negative breast cancer by 12%, but it does not decrease the risk of developing ER+/PR+ or ER+ and/or PR+ breast cancers.[61] Breastfeeding has also been associated with a 23% reduced risk of developing luminal subtype cancer and a 21% reduced risk of triple-negative subtype cancer.[62] Among *BRCA1* mutation carriers, breastfeeding for at least 1 year is associated with a 32% reduction in risk (OR, 0.68; 95% CI, 0.52–0.91; $P = .008$); breastfeeding for 2 years or longer confers a greater reduction in risk (OR, 0.51; 95% CI, 0.35–0.74). Among *BRCA2* mutation carriers, there is no significant association between breastfeeding for at least 1 year and breast cancer risk (OR, 0.83; 95% CI, 0.53–1.31; $P = .43$).[63]

Likewise, the AHRQ systematic review demonstrated a consistent association between ever breastfeeding and lower rates of breast cancer with a reduced risk by 22% when compared with never breastfeeding; longer durations of breastfeeding were associated with lower rates of breast cancer. An unclear association was noted between breastfeeding and breast cancer mortality.[27] However, other investigators have estimated that improving global breastfeeding rates could prevent 20,000 annual deaths from breast cancer.[31]

Ovarian Cancer

Breastfeeding decreases the risk of ovarian cancer by 30% to 34%, and for every 1 month increase in breastfeeding duration, the risk of ovarian cancer decreases by 2%.[23,64] A dose-dependent association has been noted, as breastfeeding for fewer than 6 months decreases ovarian cancer rates by 17%; breastfeeding for 6 to 12 months decreases ovarian cancer rates by 28%; and breastfeeding for longer than 12 months decreases ovarian cancer rates by 37%.[23] Breastfeeding for longer than 12 months is associated with a 38% reduced risk of ovarian cancer for carriers of the *BRCA1* mutation and a 50% reduced risk for carriers of the *BRCA2* mutation.[65] The anovulation associated with lactation also may protect against ovarian cancer, which has been shown to increase with greater frequency of ovulation.

Endometrial Cancer

Breastfeeding reduces the risk of endometrial cancer by 26%. A linear relationship has been found to indicate that cancer risk decreased by 1.2% for every 1-month increment of breastfeeding.[66] In addition, according to the Epidemiology of Endometrial Cancer Consortium, any breastfeeding is associated with an 11% reduction in endometrial cancer, and longer durations are associated with lower risks of endometrial cancer.[24]

Thyroid Cancer

Breastfeeding has been found to decrease thyroid cancer incidence rates by 9%, and a linear relationship has been noted; an increment of 1-month of breastfeeding decreased the risk of thyroid cancer by 2%.[25] A longer duration of breastfeeding has been found to decrease the risk of thyroid cancer by 30%.[67]

Type 2 Diabetes, Cholesterol, and Blood Pressure

A meta-analysis of 4 studies demonstrated that breastfeeding for longer than 12 months decreased diabetes rates by 30%, compared with breastfeeding for a shorter duration.[19] Breastfeeding (longer vs shorter duration) has been shown to decrease the risk of type 2 diabetes by 32% in mothers who breastfeed.[18] Every year of lifetime breastfeeding decreases the risk of type 2 diabetes by 4% to 12%. In mothers with gestational diabetes, longer lactation (> 4–12 weeks vs shorter duration of lactation) reduces the risk of type 2 diabetes in the next 5 years by 78%, and exclusive lactation for longer than 6 to 9 weeks lowers the risk of type 2 diabetes when compared with exclusive formula feeding by 58%.[20] The AHRQ review demonstrated a consistent association between any breastfeeding and longer durations of breastfeeding with a decreased risk of type 2 diabetes

among women with and without gestational diabetes, with the magnitude varying according to breastfeeding exposure.[27]

Cholesterol

The nationally representative Korea National Health and Nutrition Examination Survey showed that breastfeeding duration of longer than 24 months decreased the risk of having a low-density lipoprotein cholesterol disorder by 16% and decreased the risk of having a non–high-density lipoprotein cholesterol disorder by 25%.[68]

Blood Pressure and Cardiovascular Disease

Breastfeeding offers a reduced risk of hypertension, which varies according to the number of months of breastfeeding: longer than 0 to 6 months, 8% reduced risk; longer than 6 to 12 months, 11% reduced risk; and longer than 12 months, 12% reduced risk, when compared with non-breastfeeding mothers.[21] A meta-analysis of 5 studies showed that breastfeeding for longer than 12 months decreased rates of hypertension by 13%, when compared with breastfeeding for a shorter duration.[19] A consistent association has also been found between a longer duration of breastfeeding (> 6–12 months) and lower rates of hypertension. There is an unclear association between breastfeeding duration and lower cardiovascular disease rates, however. Likewise, an unclear association has been found between breastfeeding and cardiovascular-related mortality.[27]

Osteoporotic Fractures

Losses in bone density (of approximately 5%) are seen during lactation, with remineralization occurring during weaning of the infant. Breastfeeding does not increase the risk of osteoporotic and forearm fractures in women and may reduce the risk of hip fracture by 28%. In a subgroup analysis, the beneficial effect of breastfeeding on hip fracture was remarkable, with a 48% reduced risk among postmenopausal women. In dose-response analysis, hip fracture risk decreased by 1.2% for each 1-month increment of breastfeeding.[69]

Rheumatoid Arthritis

Breastfeeding has been reported to decrease the risk of maternal rheumatoid arthritis by 32% in a meta-analysis of 6 studies. In subgroup analysis, breastfeeding for 1 to 12 months was found to decrease the risk of rheumatoid arthritis by 22% and decrease the risk by 48% when breastfeeding for longer than 12 months.[70] However, a more recent Swedish epidemiological investigation with 2,641 cases and 4,251 control subjects demonstrated no association between breastfeeding and rheumatoid arthritis.[71]

Societal Effects of Breastfeeding

Breastfeeding has been called the most environmentally friendly food available. It is a natural, renewable food that produces no pollution or greenhouse gases and requires no packaging or transportation. By contrast, human milk substitutes require energy to produce, packaging materials, fuel for transport, water for use, and cleaning solutions for daily preparation and use—all of which generate pollution. A report on the carbon footprint of baby formula in the Asia-Pacific region noted that the total greenhouse gas emissions from milk formula sold in just 6 countries in 2012 was 2.89 million tons, which is roughly the equivalent of a car driving 6.9 billion miles or burning 3,107 million pounds of coal.[72] In the United States, 550 million cans, 86,000 tons of metal, and 364,000 tons of paper used annually to package infant formula ends up in landfills.[73] The contribution of breastfeeding to environmental sustainability and food security year-round should be considered in development goals at national and global levels.

It has been estimated that lost income potential due to lower IQ scores from not being universally breastfed for 6 months results in a global economic loss of $300 billion a year or 0.49% of world gross national income.[74] In addition, a 10% increase in IQ with exclusive breastfeeding for up to 6 months or continued breastfeeding for up to 1 to 2 years after birth would reduce treatment costs of childhood disorders by at least $312 million every year in the United States. According to an analysis of maternal and childhood treatment costs in the United States, it has been estimated that if 90% of newborns and infants were breastfed according to medical recommendations, treatment costs would decrease by $3.0 billion a year—79% of which are maternal treatment costs. In addition, the cost of premature maternal and infant death every year totals $14.2 billion.[29] Keith Hansen, the former vice president of the World Bank, has stated: "If breastfeeding did not already exist, someone who invented it today would deserve a dual Nobel Prize in medicine and economics. For while 'breast is best' for lifelong health, it is also excellent economics."[75]

The economic advantages of breastfeeding can be calculated at the personal level. The obvious personal advantage is in the savings accrued by not purchasing infant formula, a figure conservatively estimated to range from $750 to $1,200 per year, per infant.[76] Studies conducted by managed care organizations indicate that breastfeeding for 3 months significantly reduces the direct costs of medical care (for medicines and doctor visits) when compared with no breastfeeding.

In summary, breastfeeding results in reduced burden of acute and chronic infant illnesses; reduced burden of maternal illness; reduced annual health care costs; reduced Special Supplemental Nutrition Program for Women, Infants, and Children costs for formula; reduced employer costs and parental employee absenteeism (with associated loss of family income); reduced environmental burden for disposal of formula cans and bottles; and reduced energy demands for production and transport of artificial feeding products. Breastfeeding is more than simply a lifestyle choice—it is a public health priority, and families need our support to make breastfeeding a success.

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CHAPTER 2



The Scope of Breastfeeding

Breastfeeding is the normative standard for newborn and infant feeding and nutrition. More than 80% of women initiate breastfeeding in the United States (according to US Centers for Disease Control and Prevention National Immunization Surveys data) and both federal and state laws protect a woman's right to breastfeed, as well as the right to breastfeed in public and to continue breastfeeding or expression of milk in the workplace. With the vast majority of women choosing to breastfeed, it is clear that breastfeeding has been established as the cultural norm in the United States. Furthermore, breastfeeding, or the provision of human milk, should be considered the reference standard when compared to all forms of infant feeding from a biological, medical, and scientific standpoint. As such, it should be considered a national and international public health priority and not only a lifestyle choice.

Physicians of all specialties benefit by understanding the biology and physiology of breastfeeding, as well as the prevalence and social behaviors associated with breastfeeding. The American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) recommend that all mothers and infants, with rare exceptions, breastfeed exclusively for about 6 months after birth. Furthermore, the AAP supports continued breastfeeding, along with the appropriate introduction of complementary foods at about 6 months, as long as mutually desired by mother and child for 2 years or beyond. The United States has been tracking rates of breastfeeding among different populations and uses these data to set national goals. The United States also tracks multiple process indicators for breastfeeding protection, promotion, and support. These indicators help health care professionals design interventions to overcome persistent disparities in breastfeeding within the United States.

Successful breastfeeding requires education, support, and an environment that values and understands breastfeeding. This need for support may derive from the fact that our modern culture has evolved a series of messages that inhibit automatic and natural behaviors related to breastfeeding. Because breastfeeding

is rarely observed in our society, health care professionals must supply the appropriate education, support, and encouragement necessary for breastfeeding to occur and to help mothers meet their breastfeeding goals. In addition, there is a growing database for defining the beneficial effects of the use of human milk for preterm neonates and infants. These effects are reviewed in Chapter 1, Evidence for Breastfeeding: Importance for Newborns and Infants, Mothers, and Society, and Chapter 14, Lactation Support Technology.

Categories of Breastfeeding

Breastfeeding *intensity* (exclusivity) has been categorized in various ways, and clarity with regard to these terms can facilitate teaching, research, and clinical evaluation (**Box 2-1**). The term *any breastfeeding* may be confusing, although it is often used to describe a population that includes those who exclusively breastfeed and those who combine formula feeding and breastfeeding. Furthermore, the actual prevalence of exclusive breastfeeding for 6 months in the United

Box 2-1. Breastfeeding Categories

Exclusive breastfeeding: Human milk is the only food provided. Medicines, minerals, and vitamins may also be given in this category, but no water, juice, or other preparations are given to the neonate or infant. Neonates and infants who are fed expressed breast milk from their own mothers or from a milk bank via gavage tube, cup, or bottle also can be included in this category if they have no nonhuman milk or foods.

Almost or predominantly exclusive breastfeeding: Human milk is the predominant food provided in this category, with rare feeding of other milk or foods. The neonate or infant may have been given a volume of 1 to 2 oz or 20 to 40 mL/day of formula during the first few days after birth but none after that.

Partial or mixed breastfeeding: This diet may vary, from neonates and infants receiving mostly human milk with small amounts or infrequent feedings of nonhuman milk or foods (a *high-partial diet*), to neonates and infants receiving significant amounts of nonhuman milk or foods, as well as human milk (a *medium-partial diet*), to neonates and infants receiving predominantly nonhuman milk or food with some human milk (a *low-partial diet*).

Token breastfeeding: The neonate or infant is fed almost entirely with nonhuman milk and foods but has had some breastfeedings shortly after birth or continues to breastfeed occasionally. This type of breastfeeding may be seen late in the weaning process.

Any breastfeeding: This category includes all of the above categories.

Never breastfed: This neonate or infant has *never* received *any* human milk, either via direct breastfeeding or via expressed milk with artificial means of delivery.

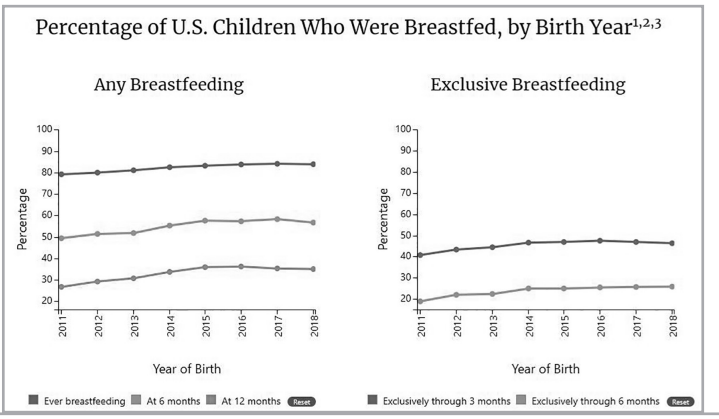
States is low and accounts for the difficulties in interpreting health outcomes that are tied to exclusivity of human milk (ie, the absence of any other food or fluid intake). Many women may be exclusively breastfeeding for some or even most of the first 6 months, although there may be temporary interruptions when formula or foods are given. Yet, these mothers may report at any point that they are exclusively breastfeeding, thereby confusing the actual prevalence of exclusive breastfeeding and rendering the health research outcomes difficult to interpret.

It is also important to define the *duration* of breastfeeding to best understand health outcomes, as well as to fully describe the experience of the mother and baby. Other factors, such as the number of feedings in a 24-hour period, help identify the adequacy of feeding schedules and support the analysis of weight patterns in the newborn. There has been a shift away from describing the frequency of feeding (eg, every so many hours) and the length of feedings at each breast toward supporting the concept that babies feed in irregular patterns and are best supported by *cue-based,* or on-demand, feeding. Some feedings may be very short and others long, and this variable pattern is unique to the behaviors and needs of each baby. This pattern also reflects the variability in mothers' milk production throughout the days, weeks, or months of lactation.

Breastfeeding in the United States

The United States tracks breastfeeding rates by using the National Immunization Surveys, a national surveillance system of the Centers for Disease Control and Prevention (CDC) National Center for Immunization and Respiratory Diseases, in partnership with the CDC National Center for Health Statistics. The National Immunization Surveys use random-digit dialing to survey households with children aged 19 to 35 months about breastfeeding. Mothers are asked a series of retrospective questions that include whether the child was ever breastfed or fed breast milk, when the child stopped breastfeeding or being fed breast milk, and the age at which formula was first given to the child, if the child was not exclusively breastfed.

Initiation rates are improving, and in 2018 the initiation rate of **83.9%** exceeded the Healthy People 2020 goal (**Figure 2-1**). Other measures, such as the rate of supplementation in the first 2 days after birth, were lower in 2015 (**16.9%**) than in 2009 and went up again in 2018 (**19.4%**) and have not met the 2020 goal of 14%. Being born at a United Nations Children's Fund (UNICEF)/World Health Organization (WHO)–designated Baby-Friendly Hospital provides the best opportunity to decrease formula supplementation, and as of June 2020, the percentage of US hospitals acheiving this designation has risen to more than



[1] Data from 2011 to 2015 births were based on landline and cellular telephone sampling and data for 2016 births were based on cellular telephone sampling only.
[2] Data from US territories are excluded from national breastfeeding estimates to be consistent with the analytical methods for the establishment of Healthy People 2030 targets on breastfeeding.
[3] Exclusive breastfeeding is defined as *only* breast milk—*no* solids, water, or other liquids.

From Centers for Disease Control and Prevention. Breastfeeding among U.S. children born 2011–2018, CDC National Immunization Survey. https://www.cdc.gov/breastfeeding/data/nis_data/results.html. Accessed May 16, 2022.

Figure 2-1. Breastfeeding rates among US children born from 2011 to 2018, according to the Centers for Disease Control and Prevention National Immunization Surveys.

28%, exceeding the 2020 goal of 8% and accounting for almost 30% of births in the United States in 2020. Employers report that nearly 50% of mothers have provisions for breastfeeding support in the workplace, which is largely due to the federal legislation in the Patient Protection and Affordable Care Act (PPACA).

Rates of any breastfeeding and exclusive breastfeeding continue to slowly increase in infants at 3 months of age (47.5%) and 6 months of age (25.4%), as well as 64.7% of newborns who are exclusively breastfeeding at 7 days of age. Moreover, the continuation of breastfeeding in infants at 12 months of age (36.2%) in 2016 surpassed the 2020 goal of 34.1%. However, there was a slight downward trend from 2017 to 2018 for 6- and 12-month breastfeeding rates.

Healthy People goals for breastfeeding have been met for all but 3 measures, as have *an*y breastfeeding and *exclusive* breastfeeding at 6 months and supplementation within the first 2 days (**Table 2-1**). There has also been a resurgence of exclusive breastfeeding at initiation. Compared with 2003, when 62.5% of US newborns were exclusively breastfed at 7 days of age, merely 53.9% were exclusively breastfeeding at 7 days of age in 2009; in 2015 this figure increased to

Table 2-1. Breastfeeding Rates in 2016-2017 According to Healthy People 2020 Goals

Healthy People 2020 Objectives		Target	Current Rates[a]
MICH-21.1	Increase the proportion of infants who are breastfed: **Ever**	81.9%	83.2% ✔
MICH-21.2	Increase the proportion of infants who are breastfed: **At 6 mo**	60.6%	57.6%
MICH-21.3	Increase the proportion of infants who are breastfed: **At 1 y**	34.1%	35.9% ✔
MICH-21.4	Increase the proportion of infants who are breastfed: **Exclusively through 3 mo**	46.2%	46.9% ✔
MICH-21.5	Increase the proportion of infants who are breastfed: **Exclusively through 6 mo**	25.5%	24.9%
MICH-22	Increase the proportion of employers that have work site lactation support programs.	38.0%	49.0% ✔
MICH-23	Reduce the proportion of breastfed newborns who receive formula supplementation within the first 2 days after birth.	14.2%	17.2%
MICH-24	Increase the proportion of live births that occur in facilities that provide recommended care for lactating mothers and their babies.	8.1%	26.1% ✔

Abbreviation: MICH, maternal infant and child health.

[a] MICH-21 and MICH-23 current rates represent babies born in 2015, National Immunization Survey 2016–2017; MICH-22 current rates represent employers providing an on-site lactation/mother's room, Society for Human Resource Management, 2018 survey; MICH-24 current rates represent babies born in Baby-Friendly Hospitals and Birth Centers designated as of June 2018, Baby-Friendly USA.

Reported in Centers for Disease Control and Prevention. Breastfeeding report card. United States, 2018. https://www.cdc.gov/breastfeeding/data/reportcard.htm. Reviewed December 31, 2019. Accessed June 3, 2020.

There is only one breastfeeding objective in the Healthy People 2030 proposal, proposed as of July 2019, comment period open with this publication.

MICH-2030–15 increases the proportion of infants who are breastfed exclusively through 6 months.

64.7% (**Table 2-2**). Despite this increase, less than 50% of infants were exclusively breastfed through 3 months of age, and about 25% of infants were exclusively breastfed through 6 months of age. The CDC continually updates its website for most recent breastfeeding data (https://www.cdc.gov/breastfeeding/data/index.htm), and each year a Breastfeeding Report Card is produced (https://www.cdc.gov/breastfeeding/data/reportcard.htm).

Table 2-2. Provisional Rates of Any and Exclusive Breastfeeding by Age Among Children Born in 2018

Child Age	Any Breastfeeding (n = 21,428)[a]	Exclusive Breastfeeding (n = 20,760)[a]
At birth	83.9 ± 0.9	—
7 d	83.1 ± 0.9	63.3 ± 1.2
14 d	82.4 ± 1.0	61.0 ± 1.2
21 d	80.9 ± 1.0	58.9 ± 1.2
28 d	80.2 ± 1.0	58.2 ± 1.2
1 mo	79.9 ± 1.0	57.8 ± 1.2
2 mo	75.6 ± 1.0	51.9 ± 1.2
3 mo	70.9 ± 1.1	46.3 ± 1.2
4 mo	64.5 ± 1.2	39.4 ± 1.2
5 mo	59.3 ± 1.2	31.2 ± 1.1
6 mo	56.7 ± 1.2	25.8 ± 1.0
7 mo	49.1 ± 1.2	—
8 mo	46.4 ± 1.2	—
9 mo	42.9 ± 1.2	—
10 mo	39.5 ± 1.2	—
11 mo	36.9 ± 1.1	—
12 mo	35.0 ± 1.1	—
18 mo	14.8 ± 0.8	—

[a] Data are percentage ± half 95% CI. According to the National Immunization Surveys. Exclusive breastfeeding is defined as *only* human milk—*no* solids, water, or other liquids.

Adapted from Centers for Disease Control and Prevention. Breastfeeding rates. National Immunization Survey (NIS). https://www.cdc.gov/breastfeeding/data/nis_data/results.html. Accessed May 16, 2022.

Disparities in Breastfeeding

Despite the seemingly impressive increase in breastfeeding rate in the United States, there are still considerable disparities in breastfeeding rates among racial and ethnic groups, as well as several other important sociodemographic variables. The breastfeeding initiation rate for the Hispanic or Latino population in 2015 was 84.6%, but for the non-Hispanic Black or African American population, it was 58.1%. Disparities improved by 2018, with 85% of the Hispanic or Latino populations initiating breastfeeding and 75.5% of the non-Hispanic Black population initiating breastfeeding. Among mothers in low-income households (ie, participants in the Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]), the breastfeeding initiation rate was 69.4%, but for those in a higher-income household who were ineligible for WIC, the initiation rate was 91.7%. The breastfeeding initiation rate was 37% for low-income non-Hispanic Black mothers. Similar disparities are age related, because mothers younger than 20 years initiated breastfeeding at a rate of 60%, as compared with the rate of 83.5% in mothers older than 30 years. Exclusive breastfeeding and continuation of breastfeeding are also low among mothers younger than 20 years, in whom the exclusive breastfeeding rate at 6 months was only 7.3% and for any breastfeeding at 12 months was 8.7% (**Tables 2-3** and **2-4**).

In 2011, the US Surgeon General issued a call to action to support breastfeeding to address obstacles and strategies to overcome in the United States (**Table 2-5**).

Obstacles identified include

- Lack of experience or understanding among family members on how to best support mothers and babies
- Not enough opportunities to communicate with other breastfeeding mothers
- Lack of up-to-date instruction and information from health care professionals
- Hospital practices that make it hard to get started with successful breastfeeding
- Lack of accommodation to breastfeed or express milk at the workplace

Opportunities for health care professionals to help include

- More hospitals can incorporate the recommendations of the UNICEF/WHO Baby-Friendly Hospital Initiative.
- Provide breastfeeding education for health care practitioners who care for women and children.
- Ensure access to lactation specialists, such as those credentialed as International Board Certified Lactation Consultants (IBCLCs) or Fellows of the Academy of Breastfeeding Medicine (FABM).

(*continued on page 36*)

Table 2-3. National Prevalence of Breastfeeding Initiation, Exclusive Breastfeeding Through 6 Months of Age, and Duration of Breastfeeding at 12 Months of Age[a] Among Children 19 Through 35 Months of Age, According to Selected Demographic Characteristics[b]

Characteristic	No. of Respondents[c]	Initiated Breastfeeding % (95% CI)	Breastfed Exclusively Through 6 Mo % (95% CI)	Breastfed at 12 Mo % (95% CI)
Total	88,436–90,692	79.2 (78.7–79.7)	20.0 (19.5–20.5)	27.8 (27.2–28.4)
Child's Race/Ethnicity[d,e]				
White, non-Hispanic	49,868–51,359	81.5 (80.9–82.1)	22.5 (21.9–23.1)	30.8 (30.1–31.5)
Black, non-Hispanic	9,091–9,255	64.3 (62.7–65.9)	14.0 (12.7–15.3)	17.1 (15.8–18.4)
Hispanic	17,775–18,075	81.9 (80.8–83.0)	18.2 (17.0–19.4)	26.3 (24.9–27.7)
Percentage of Poverty Level[f]				
< 100	22,840–23,232	70.7 (69.6–71.8)	14.7 (13.8–15.6)	20.3 (19.3–21.3)
100–199	17,735–18,184	77.6 (76.5–78.7)	18.9 (17.9–19.9)	26.0 (24.8–27.2)
200–399	22,579–23,193	84.9 (84.1–85.7)	23.9 (22.9–24.9)	33.1 (32.0–34.2)
400–599	13,727–14,149	88.0 (87.1–88.9)	26.5 (25.1–27.9)	36.7 (35.2–38.2)
≥ 600	11,555–11,934	90.1 (89.2–91.0)	25.8 (24.1–27.5)	36.8 (35.0–38.6)
Recipient of WIC				
Yes	40,182–40,925	72.1 (71.3–72.9)	14.5 (13.8–15.2)	19.7 (18.9–20.5)
No (but eligible)	6,265–6,461	81.9 (79.9–83.9)	27.6 (25.6–29.6)	37.9 (35.7–40.1)
No (not eligible)	41,576–42,865	89.6 (89.1–90.1)	27.2 (26.4–28.0)	38.3 (37.4–39.2)

Table 2-3 (*continued*)

Characteristic	No. of Respondents[c]	Initiated Breastfeeding % (95% CI)	Breastfed Exclusively Through 6 Mo % (95% CI)	Breastfed at 12 Mo % (95% CI)
Mother's Education Level				
Less than high school diploma or GED	9,329–9,496	68.8 (67.2–70.4)	14.5 (13.1–15.9)	21.8 (20.2–23.4)
High school diploma or GED	16,317–16,651	69.7 (68.5–70.9)	16.0 (15.0–17.0)	19.7 (18.6–20.8)
Some college	23,230–23,809	80.5 (79.6–81.4)	17.8 (16.8–18.8)	23.4 (22.3–24.5)
College graduate	39,560–40,736	91.1 (90.7–91.5)	27.7 (26.9–28.5)	40.3 (39.4–41.2)
Mother's Age (y)[d]				
< 20	760–768	60.1 (53.7–66.5)	7.3 (4.1–10.5)	8.7 (5.4–12.0)
20–29	32,148–32,841	74.0 (73.1–74.9)	16.4 (15.6–17.2)	19.8 (19.0–20.6)
≥ 30	55,528–57,083	83.5 (82.9–84.1)	23.1 (22.4–23.8)	34.3 (33.5–35.1)

Abbreviations: CI, confidence interval; GED, General Education Development; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

[a] Breastfeeding initiation was determined on the basis of the response to the question, "Was [child] ever breastfed or fed breast milk?" Breastfeeding duration was assessed by asking, "How old was [child's name] when [child's name] completely stopped breastfeeding or being fed breast milk?" Exclusive breastfeeding was defined as only breast milk (no solids, no water, and no other liquids). To assess the duration of exclusive breastfeeding participants were asked 2 questions about age: (1) "How old was [child's name] when they were first fed formula?" and (2) "How old was [child's name] when they were first fed anything other than breast milk or formula?" (including juice, cow's milk, sugar water, baby food, or anything else that [child] might have been given, even water). Breastfeeding duration and exclusivity rates are estimated among all infants included in the survey and not only infants whose mothers started breastfeeding.
[b] According to National Immunization Survey, United States, 2011–2015. Among children born during 2010–2013.
[c] The number of respondents varies, depending on the indicator.
[d] Differences in initiation, exclusive through 6 months, and at 12 months' duration by demographic variables are statistically significant ($P < .05$, chi-square test). Race/ethnicity test of significance was limited to non-Hispanic Black and non-Hispanic white populations.
[e] All racial/ethnic groups are included in the total in all other demographic breakdowns, but only the largest groups are presented here.
[f] Ratio of self-reported family income to the federal threshold value, defined by the US Census Bureau.

Adapted from Anstey EH, Chen J, Elam-Evans LD, Perrine CG. Racial and geographic differences in breastfeeding—United States, 2011–2015. *MMWR Morb Mortal Wkly Rep.* 2017;66(27):723–727 PMID: 28704352

Table 2-4. Rates of Any and Exclusive Breastfeeding by Sociodemographic Factors Among Children Born in 2018 (Percentage ± Half 95% Confidence Interval)[a,b]

Sociodemographic Factors	Any Breastfeeding				Exclusive Breastfeeding		
	n	Ever Breastfed	Breastfed at 6 Months	Breastfed at 12 Months	*n*	Exclusive Breastfeeding Through 3 Months	Exclusive Breastfeeding Through 6 Months
US national	21,428	83.9±0.9	56.7±1.2	35.0±1.1	20,760	46.3±1.2	25.8±1.0
Gender							
Male	11,222	82.9±1.3	56.0±1.7	34.4±1.6	10,867	44.7±1.7	25.0±1.4
Female	10,206	84.9±1.3	57.4±1.7	35.6±1.6	9,893	48.0±1.7	26.6±1.5
Race/Ethnicity							
Hispanic	4,336	85.0±1.9	52.8±2.8	32.3±2.6	4,222	42.6±2.8	23.3±2.3
Non-Hispanic White	12,032	85.3±1.2	60.0±1.5	37.6±1.5	11,616	50.6±1.6	28.8±1.4
Non-Hispanic Black	1,996	75.5±3.0	49.3±3.5	27.9±3.2	1,955	39.3±3.5	19.8±2.8
Non-Hispanic Asian	951	92.4±2.4	75.6±4.2	51.2±4.9	914	50.0±5.1	33.3±4.8
Non-Hispanic Hawaiian/ Pacific Islander	113	NA	NA	NA	112	NA	NA
Non-Hispanic American Indian/Alaska Native	279	NA	NA	NA	268	NA	NA
2 or more races	1,721	82.4±3.3	52.9±4.0	32.8±3.5	1,673	44.5±3.9	23.7±3.3
Maternal Education							
Less than high school	1,662	74.9±3.3	45.0±4.0	27.5±3.4	1,620	33.4±3.7	19.7±3.1
High school graduate	3,723	75.8±2.3	43.4±2.7	25.4±2.4	3,615	40.2±2.7	19.9±2.2

Table 2-4 (*continued*)

Sociodemographic Factors	Any Breastfeeding				Exclusive Breastfeeding		
	n	Ever Breastfed	Breastfed at 6 Months	Breastfed at 12 Months	*n*	Exclusive Breastfeeding Through 3 Months	Exclusive Breastfeeding Through 6 Months
Maternal Education *(continued)*							
Some college or technical school	5,377	84.5±1.7	53.5±2.4	30.6±2.2	5,238	44.8±2.4	23.8±1.9
College graduate	10,666	92.1±0.9	71.7±1.5	46.9±1.7	10,287	55.8±1.7	33.1±1.6
Maternal Age (y)							
Under 20	188	NA	NA	NA	181	NA	NA
20–29	6,470	81.2±1.7	49.1±2.1	28.3±1.9	6,272	43.7±2.1	23.0±1.7
30 or older	14,770	85.9±1.0	61.5±1.5	39.2±1.4	14,307	48.1±1.5	27.6±1.3
Poverty Income Ratio[c]							
Less than 100	4,237	76.8±2.1	44.6±2.6	26.3±2.2	4,131	37.2±2.5	20.4±2.1
100–199	4,169	81.2±2.1	49.8±2.7	30.6±2.4	4,059	43.8±2.7	22.2±2.1
200–399	5,563	87.2±1.6	62.8±2.3	39.7±2.3	5,386	50.8±2.4	29.5±2.1
400–599	3,703	89.0±2.1	67.2±2.8	42.1±2.9	3,572	53.2±3.0	30.4±2.6
600 or greater	3,756	90.9±1.9	69.6±2.9	43.5±2.9	3,612	53.4±3.0	30.9±2.8
Marital Status[d]							
Married	15,260	89.0±0.9	65.9±1.4	42.7±1.4	14,725	52.2±1.5	30.2±1.3
Unmarried	6,168	76.1±1.8	42.5±2.1	23.3±1.9	6,035	37.4±2.1	19.1±1.7

(*continued*)

Table 2-4 (*continued*)

Sociodemographic Factors	Any Breastfeeding				Exclusive Breastfeeding		
	n	Ever Breastfed	Breastfed at 6 Months	Breastfed at 12 Months	*n*	Exclusive Breastfeeding Through 3 Months	Exclusive Breastfeeding Through 6 Months
Geographic Location[e]							
Metropolitan	17,873	84.5±1.0	57.5±1.3	35.5±1.2	17,315	46.7±1.3	26.0±1.1
Non-metropolitan	3,555	78.2±2.5	49.6±2.9	30.5±2.6	3,445	42.3±2.9	23.6±2.3
Birth Order							
First born	8,230	85.8±1.4	56.4±1.9	33.4±1.8	7,970	43.3±1.9	23.0±1.6
Not first born	13,198	82.7±1.2	56.8±1.6	36.0±1.4	12,790	48.1±1.6	27.4±1.3
Receiving WIC[f]							
Yes	7,907	76.9±1.6	42.9±1.9	24.5±1.6	7,717	37.0±1.9	18.4±1.5
No, but eligible	1,826	83.3±3.0	60.7±4.1	41.7±3.9	1,773	51.8±4.2	33.1±3.7
Ineligible	11,553	91.6±1.0	70.7±1.5	44.9±1.6	11,144	55.3±1.7	32.3±1.5

NA, Estimate not available because the 95% CI was mostly greater than 10 in these subgroups.

[a] Data from the U.S. territories are excluded from the national breastfeeding estimates to be consistent with the analytical methods for the establishment of Healthy People 2030 targets on breastfeeding.
[b] Exclusive breastfeeding is defined as only breast milk—no solids, no water, and no other liquids.
[c] Poverty income ratio is the ratio of self-reported family income to the federal poverty threshold value, depending on the number of people in the household.
[d] Unmarried includes never married, widowed, separated, divorced, and living with partners.
[e] Metropolitan area is defined by the Census Bureau.
[f] WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. Individuals who did not provide information on WIC status were excluded from analysis of this variable.

Source: National Immunization Survey, Centers for Disease Control and Prevention, Department of Health and Human Services. Reprinted from Centers for Disease Control and Prevention, US Department of Health and Human Services. Rates of any and exclusive breastfeeding by sociodemographics among children born in 2018 (percentage ± half 95% confidence interval). https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-socio-dem-2018.html. Accessed May 17, 2022.

Table 2-5. Recommended Strategies for Health Care Professionals in Response to *The Surgeon General's Call to Action to Support Breastfeeding*

Strategies	Settings and Potential Actors	Examples
Improve the breastfeeding content in health professional education (undergraduate and graduate).	Faculty in medical schools and other health professional schools	Implement the Breastfeeding Residency Curriculum available on the AAP website; integrate breastfeeding and human lactation into basic courses such as anatomy, physiology, nutrition, and health promotion/disease prevention.
Establish and incorporate minimum competencies in breastfeeding for health care professionals.	Health care organizations such as the AAP, ACOG, and AAFP, as well as credentialing boards such as the ABP	AAP endorsement of the USBC Core Competencies; ABP and other credentialing boards add content to certifying examinations, add structure assessments for medical students and residents to ensure skills.
Increase opportunities for continuing education and MOC that focuses on breastfeeding.	Health professional organizations, academic medical centers, and board-certifying entities	AAP NCE educational opportunities, ABM annual meeting and summit, university-based courses and online learning opportunities, MOC offered by ABP. ACOG also offers educational activities and board certification materials.
Define standards for clinical practice that ensure continuity of care, especially for the first 4 weeks after birth.	Physicians providing maternal and pediatric care and community support groups working with federal partners and quality improvement entities to adopt standards	Support initiatives such as pay for performance and accountable care that define optimal and evidence-based breastfeeding care to reduce unnecessary expenditures on health care while supporting continued exclusive breastfeeding.
Study the comparative effectiveness of different models of care integrating skilled support for breastfeeding by maternal and pediatric care professionals.	Physicians, US Department of Health and Human Services, and quality improvement entities such as AHRQ	Study the cost and effectiveness of learning collaboratives in making breastfeeding support more comprehensive and efficient.

Abbreviations: AAFP, American Academy of Family Physicians; AAP, American Academy of Pediatrics; ABM, Academy of Breastfeeding Medicine; ABP, American Board of Pediatrics; ACOG, American College of Obstetricians and Gynecologists; AHRQ, Agency for Healthcare Research and Quality; MOC, Maintenance of Certification; NCE, National Conference & Exhibition; USBC, US Breastfeeding Committee.

Adapted from US Department of Health and Human Services. Appendix 1. In: *The Surgeon General's Call to Action to Support Breastfeeding*. Washington, DC: US Department of Health and Human Services, Office of the Surgeon General; 2011.

Moreover, it is important to address the racial, ethnic, cultural, and linguistic diversity of the United States. Traditional practices and beliefs can and do influence the way breastfeeding is practiced and how families respond to promotional and educational efforts and medical advice about breastfeeding. Health care professionals will be most successful in supporting breastfeeding if they learn and understand the basis of these traditional practices.

Breastfeeding Education

Education is necessary for mothers to meet their breastfeeding goals and may be targeted for a variety of audiences, including health care professionals, parents, and the general public. Several studies have documented the need to improve the education and skills necessary to support breastfeeding. Furthermore, generations of low breastfeeding rates have led to a population that lacks confidence in the support and management of breastfeeding. Recognition of this deficiency has led to the development of new curricula, including breastfeeding education in schools, from kindergarten to medical school. In addition, core competencies for health care professionals have been delineated by the US Breastfeeding Committee (USBC) (**Box 2-2**) and endorsed by the AAP.

Specific Audiences

Physicians

Deficiencies in residency preparation for primary care residency programs were identified in the mid-1990s. To address these deficiencies, the AAP, in collaboration with ACOG and the American Academy of Family Physicians (AAFP), developed a multispecialty Breastfeeding Residency Curriculum for residents and published findings from the pilot implementation of the program. Not only did systematic education and training of residents improve their knowledge, confidence, and practice patterns, but implementation of the curriculum resulted in higher rates of breastfeeding. The most dramatic effect was seen in increased exclusive breastfeeding rates at 6 months.

The most recent AAP Periodic Survey of Fellows reported that pediatricians' recommendations and practices became more closely aligned with AAP policy over the past 10 years in that more reported affiliated hospitals had applied for the Baby-Friendly designation and more reported exclusive breastfeeding in their practices. However, the attitudes about the likelihood of breastfeeding success have worsened; certainly, there is a better understanding that breastfeeding can be challenging for mothers.

Box 2-2. US Breastfeeding Committee Core Competencies

At a minimum, every health professional should understand the role of lactation, human milk, and breastfeeding in

- The optimal feeding of infants and young children
- Enhancing health and reducing
  - Long-term morbidities in infants and young children
  - Morbidities in women

All health professionals should be able to facilitate the breastfeeding care process by

- Preparing families for realistic expectations
- Communicating pertinent information to the lactation care team
- Following up with the family, when appropriate, in a culturally competent manner after breastfeeding care and services have been provided

The US Breastfeeding Committee proposes to accomplish this by recommending that health professional organizations

- Understand and act on the importance of protecting, promoting, and supporting breastfeeding as a public health priority.
- Educate their practitioners to
  - Appreciate the limitations of their breastfeeding care expertise.
  - Know when and how to make a referral to a lactation care professional.
  - Regularly examine the care practices of their practitioners and establish core competencies related to breastfeeding care and services.

Adapted from US Breastfeeding Committee. *Core Competencies in Breastfeeding Care and Services for All Health Professionals.* Rev ed. Washington, DC: US Breastfeeding Committee; 2010.

The inclusion of breastfeeding questions on board examinations has also been a standard for more than a decade, and more activities are available for physicians to achieve Maintenance of Certification by completing online activities to enhance the quality of breastfeeding care provided. Physicians are also being educated as a result of increased activity among hospitals and health systems that are seeking designation as Baby-Friendly facilities. One mandatory component of the designation process is that physicians must be educated and trained in breastfeeding to acquire the same level of knowledge and clinical skills as their nurse colleagues. In a 2019 publication, Meek et al outline the specifics of necessary breastfeeding education, beginning at the undergraduate level through medical school, residency, and beyond, through continuing medical education. As a result, record numbers of physicians associated with these facilities are being educated and trained in modules that are specific for physicians to be able to provide basic breastfeeding support and management skills.

Midwives, Advanced Practice Nurses, and Perinatal Nurses

All nurses and midwives have become increasingly effective members of the perinatal health team, practicing within an obstetric group, a hospital, or an

independent practice. Many have been educated and trained in lactation and breastfeeding and can provide excellent support for the breastfeeding mother. Some have additional training and are certified lactation specialists. Their specialized skills may be used as part of an obstetric team, and they can provide the additional breastfeeding help many mothers need.

Lactation Professionals: IBCLCs, CLCs, CLEs, and Peer Counselors

Lactation specialists who are IBCLCs are those who have had required educational courses, had supervised training in clinical settings, and have taken the board examination. They are required to update this certification every 5 years and provide evidence of ongoing education in the form of Continuing Education Recognition Points. Certified Lactation Counselors (CLCs), also called Certificated Lactation Educators (CLEs), have all taken a 5-day breastfeeding course. Peer counselors, such as those in WIC or in hospital settings, are usually laypersons who have breastfed their own children and have had specialized training. They have been proven to be effective in that they are relatable and can provide practical support because they are often in socioeconomic situations similar to those of the mothers they are supporting, as well as being from similar ethnicities or cultures. ACOG, in conjunction with the USBC, has provided guidance to delineate the unique roles of the physician in breastfeeding support and the background, training, and capabilities of other lactation support providers.

Parents

Because it is no longer assumed that parents and families are prepared with basic knowledge about breastfeeding, and because there are many myths surrounding breastfeeding, it is incumbent on all parts of the health system to provide prenatal and continuing education about the benefits and management of breastfeeding. The education should be culturally sensitive and conducted, when possible, in relation to the understandings and misunderstandings that individuals bring with them. Motivational interviewing is a useful strategy to gather information and guide families through the decision pathways that enable optimal feeding behaviors. Every health care contact, prenatal and postnatal, is an opportunity to educate parents about breastfeeding.

Although there are many considerations for potential influences in a mother's decision to breastfeed, one important person—the partner or spouse—should not be overlooked. Breastfeeding education programs, particularly in the prenatal period, are most effective when they include the partner or spouse to be able to provide critical encouragement and emotional support. The knowledgeable partner or spouse can often provide direct assistance in the breastfeeding process by helping with positioning, evaluating latch and milk transfer, and taking

responsibility for baby and household duties, which frees the mother to give more of her attention to breastfeeding. Although partners and spouses may fear their exclusion from baby care when the mother is breastfeeding, physicians can encourage the partner or spouse to be an active partner in the nurturing of the baby.

The mother-baby dyad may be best supported by others in the community. Grandmothers, friends, and even strangers may act on behalf of a breastfeeding mother to provide encouragement, assist with building confidence, and even supply answers to simple questions that may not be addressed in the clinical setting. Peer-to-peer support is facilitated by the establishment of community-based support groups. These support groups have been shown to enhance breastfeeding exclusivity and duration.

Legislators, Business Leaders, and the Public

Government officials, legislators, judges, and public administrators are uniquely positioned in their role of overseeing the health and general welfare of the population in support of breastfeeding through the creation and enforcement of laws, program funding, and education. Over the past few years, many state and local health departments have made funds available for special projects that increase breastfeeding rates. Two main initiatives funded through the American Recovery and Reinvestment Act of 2009 and the CDC have involved maternity care practices in hospitals and workplace support programs. In addition, the PPACA requires workplace accommodations for breastfeeding women. Human resource departments are just now becoming educated about how to comply with this legislation and support their employees' efforts to continue breastfeeding after returning to work. Implementation of such programs decreases employees' absenteeism, enhances employee satisfaction and productivity, and saves industry money. Because most women in the United States work and return to work within 3 months of delivery on average, providing support for breastfeeding after returning to work is necessary to be able to meet the Healthy People 2030 goals for breastfeeding (see Chapter 10, Maintenance of Breastfeeding: The Mother). The Maternal and Child Health Bureau (MCHB), together with the Office on Women's Health, produced the Business Case for Breastfeeding, along with a toolkit to help businesses achieve compliance with the PPACA. It should be noted that state legislation and insurance-mandated supports of lactation often disappear for working mothers after the first year, yet additional support may be needed.

Medical Offices and Staff

Physicians function as individual providers of breastfeeding care and managers in the operations of their medical practices or clinics. In their role as manager, they have a unique opportunity to develop an office setting that supports breastfeeding patients, eliminates the marketing of human milk substitutes, and provides employee support for breastfeeding (see Chapter 17, Contraception and the Breastfeeding Mother). The ability to provide complete support, however, is limited by the constraints of the clinical setting—including time.

Physicians may influence members of a mother's support system, give lectures to educate other physicians and child care providers, add breastfeeding to the curriculum for residents and medical students, help create and adopt policies or regulations supportive of breastfeeding in the hospital or health department, testify on behalf of fair payment for breastfeeding management to third-party payers or employers, advocate for inclusion of breastfeeding in credentialing, and help implement recommendations set forth by The Joint Commission, the National Academy of Medicine, and other national organizations and agencies. In addition, pediatricians can identify their role in implementing *The Surgeon General's Call to Action to Support Breastfeeding* by mapping their own influences among 20 identified strategies (see **Table 2-5**).

Hospitals

The environment in which a mother delivers her baby is strongly associated with that mother's breastfeeding outcomes, including the rate of supplementation and overall likelihood of any breastfeeding. Hospitals that follow the Ten Steps to Successful Breastfeeding (see Box 7-1 in Chapter 7, Breastfeeding Initiation) and uphold the International Code of Marketing of Breast-milk Substitutes may become designated as a Baby-Friendly Hospital, and this designation is associated with increased rates of overall and exclusive breastfeeding among healthy newborns, as well as increased breastfeeding and use of human milk in preterm neonates and infants. Hospitals should establish policies and practices to support breastfeeding that are based on evidence and should eliminate policies and practices that are known to disrupt or interrupt breastfeeding.

Supportive hospitals involve key administrators, managers, nursing staff, physicians, allied health, and all ancillary support staff that may interact with the mother and her baby during this critical time in establishing breastfeeding (see Chapter 6, Breastfeeding: Management Before and After Conception). Hospitals should convene a multidisciplinary task force, involving leaders, community partners, and families who have experienced deliveries there, to meet on a

regular basis and establish a culture of breastfeeding support and ongoing quality improvement, such as skin-to-skin contact and no supplementation without medical indication. Hospitals can establish support groups linked to the hospital, to which patients can be referred. Provision of safe skin-to-skin care guidance has been published by the AAP Task Force on SIDS and Committee on Fetus and Newborn (see 10.1542/peds.2016-1889).

Managed Care Organizations

Breastfeeding is associated with improved health outcomes and can reduce the health care costs of infants during the first year after birth. Thus, some health insurance companies, including managed care organizations, have adopted extensive programs to promote and support breastfeeding among their enrollees. Physicians who participate with managed care organizations have incentives to enhance their support of breastfeeding and develop strong programs for health and economic reasons (see Chapter 1, Evidence for Breastfeeding: Importance for Newborns and Infants, Mothers, and Society).

Federal and State Governments

WIC serves about 9 million mothers and young children, 1.5 million pregnant and breastfeeding mothers, and 2.17 million neonates and infants. The program has significant effects on the protection, promotion, and support of breastfeeding offered to women and families in the United States. A major revision to the program since 2010 has allowed for mothers who are exclusively breastfeeding to receive 100% of their nutrient needs in the form of an enhanced food package, which is recommended by the National Academies of Sciences, Engineering, and Medicine, Health and Medicine Division, to support the exclusively breastfed newborn and infant. The food package includes milk, juice, cereal, eggs, fruits and vegetables, whole-grain bread, legumes, and peanut butter. In addition to providing food for the mother, WIC, although variable by state, offers breastfeeding support in providing lactation consultations, peer support, telephone advice call-in lines, and equipment, such as breast pumps. When compared with the historical operations of WIC, in which mothers had access to free infant formula, these provisions have resulted in substantial increases in the rates of breastfeeding among WIC clients. Nevertheless, there continue to be disparities between mothers who receive WIC benefits and those who do not, and these disparities transcend the predicted racial and economic disparities that also result in lower rates of breastfeeding. In 2017, among the 2+ million neonates and infants who participated in WIC, merely 19.2% were breastfed, with 13.1% breastfed exclusively. The Healthy, Hunger-Free Kids Act of 2010 was enacted to prevent states from restricting the use of WIC

funds despite budgets constraints, effectively preserving the functions of WIC. Thus, breastfeeding support may be enhanced by the continued coordination of WIC personnel, such as lactation specialists and peer counselors, with health system and hospitals. The US Surgeon General, US Department of Health and Human Services, Office on Women's Health, Health Resources and Services Administration, MCHB, US Food and Drug Administration, and CDC have all contributed to the education and support of breastfeeding by the publication of multiple reports, documents, and programs, such as *The Surgeon General's Call to Action to Support Breastfeeding,* the CDC August 2011 Vital Signs *Hospital Support for Breastfeeding: Preventing Obesity Begins in Hospitals* and research related to the longitudinal Infant Feeding Practices Study, the MCHB Business Case for Breastfeeding toolkit for work site lactation support, the Health Resources and Services Administration education and grants programs that led to education and training about breastfeeding (including the AAP Breastfeeding Residency Curriculum, the CDC-funded Physician Education and Training focused on Breastfeeding and Infant Feeding project, the Office on Women's Health National Women's Health and Breastfeeding Helpline, websites, and magazines for new moms in multiple languages, such as *Your Guide to Breastfeeding*).

Given the number of free publications aimed at educating health care professionals and consumers produced by the federal government, there is essentially no need to use industry-sponsored materials any longer. Furthermore, ongoing federally sponsored published materials permit enhancements to existing knowledge about how best to support breastfeeding, manage complications of breastfeeding, and increase breastfeeding among populations least likely to try. In 2012, the Institute of Medicine (now the National Academies of Sciences, Engineering, and Medicine, Health and Medicine Division) publication *Accelerating Progress in Obesity Prevention: Solving the Weight of the Nation* identified employers and health care professionals as key change agents for obesity prevention. The recommendation is for health care professionals to encourage healthy weight gain during pregnancy and breastfeeding and to promote breastfeeding-friendly environments, including, but not limited to, adopting policies consistent with the Baby-Friendly Hospital Initiative. Other publications from the USBC include

- *Best Practices Guide for Implementation of Newborn Exclusive Breast Milk Feeding in Electronic Health Records* (2014)
- "Recommended Guidance for Governors, Mayors, and Other Public Officials Considering Partnerships with Private Sector" (2014)
- *Implementing The Joint Commission Perinatal Care Core Measure on Exclusive Breast Milk Feeding* (revised 2013)

Nongovernmental Organizations

The USBC is an advisory organization to the US government composed of representative organizations in the United States. Along with its initial national agenda and its latest 5-year strategic plan, the USBC mission is to improve the nation's health by working collaboratively to protect, promote, and support breastfeeding and to do so via collaboration, leadership, and advocacy. In addition, the *Core Competencies in Breastfeeding Care and Services for All Health Professionals* were developed to delineate the core minimum standards for all health care professionals in their ability to provide breastfeeding-related care (see **Box 2-2**).

Additionally, the perinatal care core measure set developed by The Joint Commission and the Centers for Medicare & Medicaid Services includes 5 measures, one of which is exclusive breast milk feeding. The Joint Commission has defined who should be counted in the numerator and denominator for delivery hospitals to collect data with the concept that tracking these data may result in greater rates of initiation of exclusive human milk feeding. The USBC followed with the publication of a toolkit to educate health care professionals on ways to implement and collect these data (www.usbreastfeeding.org/tjc-measure-ebmf). The implementation of processes necessary to collect accurate data on exclusive human milk feeding in all US hospitals will require considerable education and resources, yet it provides tremendous opportunity in terms of eliminating unnecessary supplementation. As a companion to the development of The Joint Commission core measures, the *Speak Up: What You Need to Know About Breastfeeding* campaign and brochure were created to enhance consumer awareness and support for hospital practices that support breastfeeding, including the Ten Steps to Successful Breastfeeding. The brochure is ideal for distribution in prenatal settings to augment education about the benefits and management of breastfeeding.

The WHO and UNICEF have been among the most effective organizations worldwide in supporting breastfeeding, through education, direct services, and development of special programs, such as the Baby-Friendly Hospital Initiative.

The AAP also has resources for mothers (*Breastfeeding Your Baby: Answers to Common Questions* patient education brochure and *New Mother's Guide to Breastfeeding* parent manual, both available in English and Spanish) and books for health care professionals who give advice to breastfeeding mothers (*Breastfeeding Telephone Triage and Advice*).

Professional physician organizations that provide and/or advocate for breastfeeding support and education include the AAP, ACOG, AAFP, and Academy of Breastfeeding Medicine (ABM), an international physician organization dedicated to professional breastfeeding education and translation of research

into practice. The ABM recognizes physicians who distinguish themselves in lactation as fellows, with a FABM designation. In addition, research in the field has been advanced and advocated by the multidisciplinary International Society for Research in Human Milk and Lactation. There are also multiple nonphysician-based organizations that coordinate in a multidisciplinary fashion to advocate for and educate about breastfeeding. These include the Academy of Nutrition and Dietetics (formerly the American Dietetic Association), the American Public Health Association, and multiple nursing organizations, such as the National Association of Pediatric Nurse Practitioners; the Association of Women's Health, Obstetric and Neonatal Nurses; the American Association of Colleges of Nursing; and the National Database of Nursing Quality Indicators.

Wellstart International has a history of providing physician education in breastfeeding and lactation worldwide and has developed a physician curriculum. Wellstart has created multiple levels of curricula to train health care professionals at all levels of care, from the minimum standard to the consultative level of tertiary breastfeeding care. Additional curricula have been developed to enhance physician knowledge in breastfeeding and have been summarized in the landscape analysis for physician education. Breastfeeding experts may be recognized by the IBCLC credential and are represented by the International Lactation Consultant Association (ILCA), as well as the newer ILCA affiliate, the US Lactation Consultant Association.

Ethics

As with all medical care, ethical issues must be considered in the field of breastfeeding promotion and management. These include informed choice, the medical home, workplace rights, breastfeeding in public places, duration of breastfeeding, and formula marketing. For many of these ethical concerns, there are no simple answers—only questions.

Informed Choice

It is incumbent on the physician and all health care professionals to inform a pregnant woman and new mother of the risks of formula feeding in terms of health outcomes, for herself and her baby. With this knowledge, the mother can then make a choice appropriate to her own circumstances (see Chapter 1, Evidence for Breastfeeding: Importance for Newborns and Infants, Mothers, and Society).

Medical Home

The patient-centered medical home is recognized by the National Committee for Quality Assurance with strong evidence to support providing care with this philosophy and standards. The management of breastfeeding is often a shared responsibility with participation by the obstetric and pediatric health care professionals and lactation specialists. To provide this coordination, it is important for the mother and baby to have an identified medical home. The *medical home* is defined as an approach to providing health care services that are accessible, continuous, comprehensive, family centered, coordinated, compassionate, and culturally effective. Health care professionals and parents act as partners in a medical home to identify and access the medical and nonmedical services needed. Through this structure, communications among all involved are conveyed effectively.

Workplace Rights

For a mother who is returning to work, her right to maintain her breastfeeding has been the subject of much discussion and legislative efforts. The PPACA contains 2 provisions that directly affect breastfeeding mothers: (a) Employers need to provide reasonable break time and a private space that is not a bathroom to express breast milk for 1 year after the baby's birth, and (b) insurers need to provide coverage of breastfeeding supplies and support services, such as breast pumps and commonly prenatal education and 2 to 3 postpartum lactation specialist visits, on an outpatient basis. While these provisions are indeed a positive step toward the promotion of breastfeeding, the provisions are not without limitations. For example, employers are not required to compensate nursing mothers during the breaks they take to express milk, but if an employee has compensated breaks and she uses them to express milk, she must be compensated in a similar way. In addition, the initial legislation only covered hourly employees, not women in salaried positions. Legislation has been introduced to expand these benefits to all employed women. Additionally, these protections and provisions should be available to breastfeeding women beyond the first year.

Child care policies at work have also been addressed (see Chapter 10, Maintenance of Breastfeeding: The Mother).

Family and Medical Leave Act and States With Paid Parental Leave

Under the Family and Medical Leave Act of 1993, employers must let new parents take up to 12 weeks off, but the parents do not get paid unless their employer agrees. Currently, only 6 states—Massachusetts, California, New Jersey, Rhode Island, New York, and Washington—and the District of

Columbia have paid family leave programs. Some large companies, including Microsoft, IBM, Netflix, and American Express, all offer paid family leave. There appears to be a patchwork of laws in the United States, and leave is for significantly less time than other higher-income/resources countries, such as Denmark and Sweden.

Breastfeeding in Public Places

The right of the mother to breastfeed in a public location in which she is legally entitled to be has been ensured by legislation in most states and at US federal sites. These laws either eliminate indecent exposure restrictions from the breastfeeding situation or provide a specific right of the mother to breastfeed in public.

"Extended" Breastfeeding

The question of whether there is an upper limit to the duration of breastfeeding has been asked. Data on the scientific foundation for an age above which it is inappropriate or harmful to the child to continue breastfeeding do not exist. Nor are there reported risks to this method of social and nutritional interaction. Questions may arise as to the ethics of allowing a mother to put her child to the breast for as long as they both wish (see Chapter 9, Maintenance of Breastfeeding: The Infant). Although these questions may be raised, cultural norms exist and should be supported.

Cultural Sensitivity, Humility, and Awareness

Although there are commonalities in terms of cultural practices as they relate to breastfeeding, there are even more differences between cultures. For example, many cultures observe the 40-day period postpartum as a critical time of recovery for the mother, and they believe that the dyad needs to be nurtured during this time. The health of baby and mother and the milk supply may be compromised if the family does not abide by this practice. Colostrum is viewed by some cultures as yellow and unclean, such as urine, and to be avoided; yet, by others, it is considered "liquid gold." The management of breastfeeding should always include a query: "Please tell me about any cultural values and beliefs around breastfeeding or other aspects of your baby's care that I should be aware of."

Formula Marketing

Marketing practices that have been shown to adversely affect the choice of breastfeeding or continuation of breastfeeding should be recognized by physicians and other health care professionals. No subject in the ethical realm of breastfeeding has received as much attention as the issues related to the marketing of human

milk substitutes. The International Code of Marketing of Breast-milk Substitutes (https://www.who.int/nutrition/publications/infantfeeding/9241541601/en) and a subsequent WHO resolution provide detailed guidelines on the marketing of formula to ensure that it does not diminish breastfeeding initiation or continuation. Although virtually all countries in the world (including the United States) have endorsed the code of marketing, many (including the United States) have not enacted legislation to give the force of law to these guidelines. Despite this absence of legal authority, the principles of the code provide a sound ethical basis for examination of marketing practices by manufacturers and distributors of infant formulas. A recent review by the WHO has determined the extent to which code violations and the marketing of infant formula can undermine breastfeeding (see https://www.who.int/publications/i/item/9789240044609). Physicians should work toward eliminating policies and practices that discourage breastfeeding in the hospital and office (see Chapter 6, Breastfeeding: Management Before and After Conception, and Chapter 15, Supporting Breastfeeding During Mother-Infant Separation).

Custody Rights

Some of the most difficult and intense controversies surrounding breastfeeding occur in the course of marital separation and divorce proceedings, when a breastfeeding newborn, infant, or child is involved. Separate visitation with the parent who is not breastfeeding is the issue that leads to confrontation over breastfeeding, particularly when the child is older than 1 year. The health and welfare of the child should be given the highest priority in these situations, including the maintenance of breastfeeding. Determining whether the breastfeeding is a legitimate need or is being used inappropriately to deny visitation rights is extremely difficult, with experts supporting both sides.

Box 2-3. Obstacles to Breastfeeding in the United States

- Insufficient prenatal education
- Disruptive hospital policies and practices
- Inappropriate interruption of breastfeeding
- Early hospital discharge among some populations
- Lack of timely routine follow-up care and postpartum home health visits, including the fragmentation between hospital care and pediatric follow-up care
- Maternal employment
- Lack of family and broad-based societal support
- Media portrayal of bottle-feeding as normative
- Commercial promotion of infant formula
- Misinformation and lack of health care professional concern and involvement

Box 2-4. Recommended Breastfeeding Practices

1. **Exclusive breastfeeding for about 6 months.**
   - Breastfeeding is preferred; alternatively, expressed mother's milk or donor milk is preferred.
   - Continue breastfeeding as long as mutually desired by mother and child for 2 years or beyond.
   - Complementary foods rich in iron and other micronutrients should be introduced at about 6 months of age.
2. **Peripartum policies and practices that optimize breastfeeding initiation and maintenance should be compatible with the American Academy of Pediatrics Sample Hospital Breastfeeding Policy for Newborns and Academy of Breastfeeding Medicine Model Maternity Policy Supportive of Breastfeeding and include**
   - Direct skin-to-skin contact with mothers immediately after delivery, until the first feeding is accomplished, and encouraged throughout the postpartum period.
   - Consider delay in routine procedures (ie, weighing, measuring, bathing, blood tests, vaccines, vitamin K, and eye prophylaxis) until after the first feeding is completed.
   - Ensure a minimum of 8 but up to 10 feedings at the breast every 24 hours.
   - Ensure formal evaluation and documentation of breastfeeding by trained caregivers (including position, latch, milk transfer, and examination) in the birth hospital.
   - Give no supplements (ie, water, glucose water, commercial infant formula, or other fluids) to breastfeeding newborns unless medically indicated by using standard evidence-based guidelines for the management of hyperbilirubinemia and hypoglycemia.
   - Avoid routine pacifier use in the early postpartum period.
   - Begin daily oral vitamin D drops (400 IU) at hospital discharge or choose to supplement the breastfeeding mother with 6,400 IU of vitamin D.
3. **All breastfeeding newborns should be seen by a pediatrician at 3 to 5 days of age, which is within 48 to 72 hours after discharge from the hospital.**
   - Evaluate hydration (elimination patterns).
   - Evaluate body weight gain (body weight loss of no more than 10% from birth and no further weight loss by day 5 after birth; if further weight loss occurs, consider early iatrogenic weight loss from peripartum fluids and diuresis, assess feeding, and consider more frequent follow-up).
   - Discuss maternal/newborn issues.
   - Observe feeding.
4. **A separate sleep space for the newborn nearby the mother facilitates frequent feeding and response to feeding cues and return of the baby to that location after a feeding.**

Adapted from American Academy of Pediatrics Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 2020.

Box 2-5. Role of the Pediatrician in Supporting Breastfeeding

1. Promote breastfeeding as the norm for newborn and infant feeding.
2. Become knowledgeable in the principles and management of lactation and breastfeeding.
3. Develop the skills necessary for assessing the adequacy of breastfeeding.
4. Support training and education for medical students, residents, and postgraduate physicians in breastfeeding and lactation.
5. Promote hospital policies that are compatible with the American Academy of Pediatrics and the Academy of Breastfeeding Medicine model hospital policy and the World Health Organization/United Nations Children's Fund.
6. Encourage maternity care practices known to support breastfeeding initiation and exclusivity, such as the Ten Steps to Successful Breastfeeding.
7. Collaborate with the obstetric community to develop optimal breastfeeding support programs.
8. Coordinate with community-based health care professionals and certified breastfeeding counselors to ensure uniform and comprehensive breastfeeding support.
9. Promote the breastfeeding-friendly office practice.

Box 2-6. Role of the Obstetrician in Supporting Breastfeeding

Antepartum

1. Ask about breastfeeding early and often.
   - At each annual gynecologic examination
   - At the first prenatal visit
   - During subsequent visits
   - In the predelivery pediatrician visit
2. Examine the breasts, noting the following:
   - Inverted nipples
   - Prior surgery
   - Asymmetry
   - Tubular breasts
3. Offer resources for prenatal education.

Intrapartum

4. Delay routine postpartum procedures.
   - Limit unnecessary interventions.
   - Place the baby skin-to-skin with the mother.
   - Initiate breastfeeding in the first hour after birth.
   - Delay the administration of vitamin K and routine eye prophylaxis until after skin-to-skin contact and first breastfeeding have occurred.
   - Avoid traumatic interventions, such as suctioning.
5. Encourage the Ten Steps to Successful Breastfeeding (see Box 7-1).

Postpartum

6. Offer resources.
   - Refer the patient to a lactation specialist if needed.

In the Office

7. Remove formula advertising from the office.
8. Know the medical management of common breastfeeding issues.
   - Perceived insufficient supply
   - Breast engorgement
   - Mastitis or candidal infection
   - Breast pain
9. Know what products and medications are safe for breastfeeding women.
   - Contraception products and medications
   - LactMed for medications and other substances used during breastfeeding
10. Educate yourself.
    - The Academy of Breastfeeding Medicine journal, *Breastfeeding Medicine*
    - The Academy of Breastfeeding Medicine protocol on the breastfeeding-friendly office practice
    - American Academy of Pediatrics resources and learning modules
    - American College of Obstetricians and Gynecologists resources, including the bulletin on the special role for the obstetric practitioner (https://www.acog.org/topics/breastfeeding)

Table 2-6. Lactation Support Providers

Category	Descriptions	Training	Credentials and Programs
Lactation consultants	Referral to these health care professionals is appropriate for the full range of breastfeeding care, particularly involving high-acuity breastfeeding situations.	90 didactic hours and additional training requirements and examination for each title; lactation consultants often work in clinical settings as part of the health care team, yet they are also found in outpatient care and private practice. Competency verification is achieved via examination.	International Board Certified Lactation Consultant (IBCLC) • Health care professionals or individuals with 14 college-level health science courses • 90 didactic hours and 300–1,000+ hours of clinical practice with breastfeeding families, depending on training pathway Advanced Lactation Consultant (ALC) • Certification as a CLC (see next entry) or IBCLC and also o 2 college credits in maternal and infant assessment o 3 college credits in advanced issues in lactation practice Advanced Nurse Lactation Consultant (ANLC) • Current registered nurse license and certification as a CLC or IBCLC • 3 college credits in advanced issues in lactation practice
Breastfeeding counselors	Individuals who hold these or similar certifications have the skills to provide breastfeeding counseling, address normal breastfeeding in healthy term newborns and infants, and conduct maternal and newborn/infant assessments of anatomy, latch, and positioning while providing support.	45–52 hours of classroom training and examination, providing support to families in the hospital and community settings. Counselors may have additional competencies to assist families with breastfeeding difficulties.	Certified Lactation Counselor (CLC) • 52 didactic hours and examination, earning 3 college credits
Breastfeeding peer counselors	Peer support organizations equip these lactation support providers to meet the needs of the families they serve, focusing primarily on individual and community support.	Personal breastfeeding experience and approximately 20 hours of training through various community models	Examples of national breastfeeding peer counselor organizations encountered in the United States include • Breastfeeding USA • HealthConnect One • La Leche League International (LLLI) • Reaching Our Sisters Everywhere (ROSE) • Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)
Lactation educators	A breastfeeding educator is qualified to support and educate the public on breastfeeding and related issues but does not perform clinical care.	Generally 20 hours of training	Childbirth and Postpartum Professional Association (CAPPA)

Recommended Practices

Box 2-3 summarizes obstacles to breastfeeding identified in *The Surgeon General's Call to Action to Support Breastfeeding*. Barriers, including lack of knowledge, inconsistent social norms, poor family and social support, embarrassment, lactation problems, employment, and health services, may all be offset by improving the knowledge, attitudes, and skills among physicians who are in ideal positions to support breastfeeding. **Box 2-4** summarizes the recommended practices for breastfeeding identified in the 2020 AAP policy statement; **Box 2-5** presents the pediatrician's role in supporting breastfeeding; **Box 2-6** summarizes the obstetrician's role; and **Table 2-6** shows the lactation support providers' role.

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CHAPTER 3

Composition of Human Milk

There is no other stage in life in which a single food serves as the sole source of adequate nutrition, as human milk does for us in early infancy. Human milk is a dynamic, complex fluid that contains nutrients and bioactive factors needed for newborn and infant health and development. This chapter outlines the unique nutritional and other nonnutritive protective components found in human milk.

Nutritional Components

Human milk has a changing nutrient composition that may vary through lactation, over the course of a day, within a feeding, and from woman to woman. The variable composition of human milk provides nutrients specifically adapted to the changing needs of the newborn and infant and also provides an array of flavors and tastes to stimulate sensory integration. It is important to understand that human milk has unique specificity for human babies. Many components in human milk serve dual roles; a single component may enhance nutrition and host defense or nutrition and neurodevelopment.

Colostrum is the milk produced in the first few days after birth. It is a relatively dense milk characterized by high concentrations of protein, sodium, chloride, magnesium, and antibodies. The transition to mature milk, described in some references as lactogenesis stage 2, and accompanied by an increase in milk volume, begins around 2 to 3 days' postpartum. Sodium and chloride concentrations decrease, while potassium, glucose, lactose, and fat concentrations increase, all stabilizing to level concentrations by about 60 hours, or 2½ days, after birth. If the transition to lactogenesis stage 2 does not begin by day 3 postpartum, it is defined as *delayed,* and the newborn is at risk for complications related to insufficient milk intake, such as jaundice, hypoglycemia, hypernatremia, and dehydration. Intermammary epithelial cell junctions are wide at birth but begin to close during lactogenesis stage 2, and lactose concentrations

increase. Breast milk is mostly mature anywhere from 5 to 14 days' postpartum and is fully mature at around 6 weeks' postpartum. Mature human milk contains approximately 20 kcal/oz or 0.67 kcal/mL. Caloric requirements for healthy term newborns are approximately 107 kcal/kg/d for girls and 113 kcal/kg/d for boys in the first month after birth, on average. This trends down to 82 to 84 kcal/kg/d by 3 to 4 months of age, 78 to 79 kcal/kg/d by 7 to 8 months of age, and 79 to 81 kcal/kg/d by 11 to 12 months of age. **Table 3-1** lists representative values for the constituents of mature human milk.

Table 3-1. Nutrient Content of Human Milk[a]

Nutrients (per Liter)[b]	Early Milk (0–0.5 mo)	Mature Milk (0.5–1.5 mo)
Energy (kcal)		650–700
Carbohydrate		
Lactose (g)	20–30	67–70
Glucose (g)	0.2–1.0	0.2–0.3
Oligosaccharides (g)	22–24	12–14
Nitrogen/Protein		
Total nitrogen (g)	3.05 ± 0.59	1.93 ± 0.24
Nonprotein nitrogen (g)	0.53 ± 0.09	0.45 ± 0.03
Protein nitrogen[c] (g)	2.52	1.48
True protein[d] (g)	15.75 ± 4.2	9.25 ± 1.8
Casein (g)	3.8	5.7
β-Casein (g)	2.6	4.4
κ-Casein (g)	1.2	1.3
α-Lactalbumin (g) (present in whey fraction)	3.62 ± 0.59	3.26 ± 0.47
Lactoferrin (g) (present in whey fraction)	3.53 ± 0.54	1.94 ± 0.38
Serum albumin (g)	0.39 ± 0.06	0.4 ± 0.07
sIgA (g)	2.0	1.0
IgM (g)	0.12	0.20
IgG (g)	0.34	0.05

Table 3-1 (*continued*)

Nutrients (per Liter)[b]	Early Milk (0–0.5 mo)	Mature Milk (0.5–1.5 mo)
Lipids		
Total lipids (g)	20	35
Triglyceride (% total lipids)	97–98	97–98
Cholesterol[e] (% total lipids)	0.7–1.3	0–0.5
Phospholipids (% total lipids)	1.1	0.6–0.8
Fatty acids (weight %)	88	88
Total saturated (weight %)	43–44	44–45
C12:0 Lauric acid		5
C14:0 Myristic acid		6
C16:0 Palmitic acid		20
C18:0 Stearic acid		8
Monounsaturated (weight %)		40
C18:1n-9 Oleic acid	32	31
Polyunsaturated fatty acid (weight %)	13	14–15
Total n-3 (weight %)	1.5	1.5
C18:3n-3 Linolenic acid	0.7	0.9
C22:5n-3 Eicosapentaenoic acid	0.2	0.1
C22:6n-3 Docosahexaenoic acid	0.5	0.2
Total n-6 (weight %)	11.6	13.06
C18:2n-6 Linoleic acid	8.9	11.3

(*continued*)

Table 3-1 (*continued*)

Nutrients (per Liter)[b]	Early Milk (0–0.5 mo)	Mature Milk (0.5–1.5 mo)
Lipids (*continued*)		
C20:4n-6 Arachidonic acid	0.7	0.5
C22:4n-6 Docosatetraenoic acid	0.2	0.1
Water-soluble Vitamins		
Ascorbic acid (mg)		100
Thiamin (μg)	20	200
Riboflavin (μg)		400–600
Niacin (mg)	0.5	1.8–6.0
Vitamin B_6 (mg)		0.09–0.31
Folate (μg)		80–140
Vitamin B_{12} (μg)		0.5–1.0
Pantothenic acid (mg)		2.0–2.5
Biotin (μg)		5–9
Fat-soluble Vitamins		
Retinol (mg)	2	0.3–0.6
Carotenoids (mg)	2	0.2–0.6
Vitamin K (μg)	2–5	2–3
Vitamin D (μg)		0.33
Vitamin E (mg)	8–12	3–8
Major Minerals		
Calcium (mg)	250	200–250
Magnesium (mg)	30–35	30–35
Phosphorus (mg)	120–160	120–140

Table 3-1 (*continued*)

Nutrients (per Liter)[b]	Early Milk (0–0.5 mo)	Mature Milk (0.5–1.5 mo)
Major Minerals (*continued*)		
Sodium (mg)	300–400	120–250
Potassium (mg)	600–700	400–550
Chloride (mg)	600–800	400–450
Trace Minerals		
Iron (mg)	0.5–1.0	0.3–0.9
Zinc (mg)	8–12	1–3
Copper (mg)	0.5–0.8	0.2–0.4
Manganese (μg)	5–6	3
Selenium (μg)	40	7–33
Iodine (μg)		150
Fluoride (μg)		4–15

Abbreviation: sIgA, secretory IgA.

[a] Data from Jensen RG, ed. *Handbook of Milk Composition.* New York, NY: Academic Press; 1995; and Picciano MF. Representative values for constituents of human milk. *Pediatr Clin North Am.* 2001;48(1):263–264.
[b] All values are expressed per liter of milk with the exception of lipids that are expressed as a percentage of weight of total lipids. All values are expressed as a mean or a range of concentrations.
[c] Protein nitrogen = total nitrogen (g) minus nonprotein nitrogen (g).
[d] Total (true) protein = total protein nitrogen × 6.25.
[e] The cholesterol content of human milk ranges from 100 to 200 mg/L in most samples of human milk after day 21 of lactation.

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Nitrogen

Nitrogen is provided by protein (80%) and by nonprotein nitrogen-containing compounds (20%). In the first few weeks postpartum, the protein nitrogen content of milk from mothers who have preterm newborns (preterm milk) is greater than the milk of women who have term newborns (term milk). The content of protein nitrogen declines over 2 to 4 weeks' postpartum and then remains relatively constant until 8 to 12 weeks' postpartum. The content of nonprotein nitrogen, such as free amino acids, nucleotides, carnitine, creatinine, and urea, remains relatively constant throughout lactation and accounts for a larger fraction of total nitrogen (20%) than in bovine milk (5%).

Whey and Casein

The protein quality of human milk differs greatly from that in bovine milk. Human milk is 70% whey and 30% casein. This amount approximates to nearly 50% whey and 50% casein by about 3 months after birth, with whey still slightly predominant. Bovine or cow milk is 18% whey and 82% casein. The caseins are proteins with low solubility in acid media. Whey proteins are soluble and remain in solution after acidification. Generally, the whey fraction is more easily digested and associated with more rapid gastric emptying.

The protein constituents of human milk serve many functions, including a diversity of host defenses. The major human whey protein is α-lactalbumin, which is notably distinct from the major whey protein in bovine milk, β-lactoglobulin. Human milk lactoferrin, lysozyme, and secretory immunoglobulin A (IgA) are specific whey proteins, present only in human milk, and are all involved in host defense. For example, lactoferrin and lysozyme are shown to work synergistically to disrupt bacterial outer cell membranes, ultimately destroying the organism. Secretory IgA represents about 30% of all human milk protein. Because these host defense proteins resist proteolytic digestion, they serve as a first line of defense by lining the gastrointestinal tract. More information on the role of human milk as host defense is detailed in Chapter 4, Nonnutritive Components in Human Milk.

Carbohydrates

The major carbohydrate in human milk is lactose, a disaccharide that increases in content as lactogenesis progresses from colostrum to mature milk. The lactose content of mature milk remains relatively constant. A small proportion of the lactose is not absorbed. This unabsorbed lactose promotes a softer stool consistency, reduced pathogenic bacterial fecal flora, and improved absorption of minerals. Oligosaccharides are carbohydrate polymers that comprise approximately 5% to 10% of total carbohydrates in human milk. There are more than 100 different oligosaccharides in human milk. In addition to their role in nutrition, oligosaccharides exert an important role in host defense of the newborn or infant by stimulating beneficial intestinal colonization of bacteria and reducing colonization with pathogens.

Lipids

Lipids comprise the major energy-yielding fraction of human milk, approximately 50% of the calories in the milk.

Variability of Fat Content

Of all the components of human milk, the total fat content is the most variable. Milk fat content increases slightly throughout lactation, changes over the course of one day, increases during a feeding (as foremilk progresses to hindmilk), and varies from mother to mother. During a feeding, the lipid content of milk increases 2- to 3-fold from beginning (foremilk) to end (hindmilk). Despite this variability, human milk retains its ability for optimal growth of newborns and infants. Nearly one-half (mean, 44%) of a fully breastfed newborn's or infant's caloric intake is from lipid, with an average estimated intake of 21.4 g/d from birth to 6 months. Upon standing in a container, the fat in human milk may separate from the other components because it is not homogenized. This nonhomogeneity in human milk has implications for the collection and storage of milk (see Chapter 14, Lactation Support Technology).

Components of the Lipid System

The lipid system in human milk is composed of an organized milk fat globule, a bile salt-stimulated lipase (BSSL), and an abundance of essential fatty acids (linoleic [C18:2 ω6] and linolenic [C18:3 ω3] acids). The fatty acids exist in the form of triglycerides; these comprise 98% of all fat in human milk.

Fat Absorption

The resulting products of lipase action on the triglyceride molecule in the proximal small intestine are free fatty acids and 2-monoglycerides. Palmitic acid is the predominant fatty acid esterified in the 2-position of the triglyceride molecule. As such, after hydrolysis it remains bound to the 2-position of the glycerol molecule, which prevents it from interacting with minerals to form soaps. Thus, this structural relationship enhances net fat and mineral absorption. Fat and mineral absorption from human milk are highly efficient and superior to bovine milk, notably because of this interaction.

Bile Salt-Stimulated Lipase

Newborn fat digestion is impaired by the delay in pancreatic triglyceride lipase, compared to later in life. This delay is offset by the presence of human milk BSSL, which enhances fat absorption and, therefore, growth of the newborn or infant. The preterm newborn or infant has greater delay in endogenous lipase activity, so the benefit of BSSL is more pronounced.

Fatty Acids

The pattern of fatty acids in human milk is unique in its composition of long-chain polyunsaturated fatty acids. Arachidonic acid (C20:4 ω6) and docosahexaenoic acid (C22:6 ω3), derivatives of the essential fatty acids linoleic and linolenic acids, respectively, are found only in human and not bovine milk. Docosahexaenoic acid in young newborns and infants is important not only as an energy source for growth but also for its specific function in the retinas and the brain. The supplementation of bovine milk with docosahexaenoic acid is associated with improved visual and cognitive functioning, which is better than the unsupplemented bovine milk but not better than human milk.

Too Much Foremilk

At the onset of feeding, human milk contains a relatively higher amount of foremilk than hindmilk. The ratio of hindmilk to foremilk increases throughout the feeding at the breast. The hindmilk fraction predominately contains fat. A newborn or infant may receive a lesser amount of hindmilk if the mother limits breastfeeding time and doesn't drain one breast before nursing on the second breast. As a result, her newborn or infant will consume a lower-calorie milk and, thus, feed more frequently. This may stimulate more milk production, but the baby appears hungry despite good milk volume and transfer. With continued feeding of only foremilk (not emptying the breast completely), the baby is receiving less fat and proportionally more carbohydrate, so the baby will have frequent frothy stools and irritability due to frequent stool production. Lengthening the nursing period to ensure adequate draining of the breast may solve the problem. Similarly, incomplete breast draining during breast milk pumping might not provide sufficient fat from the hindmilk.

Minerals and Trace Elements

Although relatively constant through lactation, human milk content of calcium and phosphorus is significantly lower than that in bovine milk and infant formula. The macroelements in human milk are more bioavailable than those in infant formula because they are bound to digestible proteins, are less bound to fatty acid, and are present in complexed and ionized states, which are more readily absorbed. Despite lower mineral intake, the bone mineral content of breastfed infants is considered the norm on which bone mineralization in formula-fed infants is based.

The concentration of iron is low in human milk, whereas that of zinc is initially several-fold higher and sharply declines throughout lactation. For the first several months after birth, newborns and infants are primarily dependent on their iron endowment at birth, which is enhanced by delayed cord clamping, to meet their physiological iron needs. Delayed cord clamping beyond 1 minute after birth has been shown to increase iron stores in newborns, compared to infants who experienced immediate cord clamping. For healthy, term infants, by approximately 6 months of age, the stores of iron are typically expended, and the demands for iron to support erythropoiesis dictate that other sources will be necessary to avoid deficiency. The physiological decline in zinc concentrations in the milk also results in dependence on complementary foods to meet zinc requirements after about 6 months of age.

Vitamins

In general, the vitamin content in human milk is affected by maternal vitamin intake and nutritional status. For example, mothers who do not consume meat or animal-based products may not carry sufficient vitamin B_{12} in their milk and may thus warrant vitamin supplementation with water-soluble vitamins.

Vitamin K

Deficiencies of vitamin K with resulting abnormalities in blood coagulation and hemorrhagic disease can occur in the newborn without supplementation. The content of vitamin K in human milk is low. Therefore, to ensure adequate vitamin K status until production of vitamin K increases in the colon, all neonates more than 1,500 g within 6 hours of birth should receive a single intramuscular dose (1.0 mg) of vitamin K_1 (phytonadione). A single dose of oral vitamin K is inadequate to prevent hemorrhagic disease of the newborn.

Vitamin D

Because the vitamin D content in human milk is low, there are limited natural dietary sources of vitamin D for breastfed newborns and infants. To maintain an adequate serum vitamin D concentration, all infants consuming less than 28 ounces of commercial infant formula per day routinely should receive an oral supplement of vitamin D, 400 IU per day, beginning at hospital discharge and throughout breastfeeding. This applies to both exclusively and partially breastfed infants. An alternative strategy to vitamin D supplementation of the infant is to supplement the mother who is breastfeeding with 6,400 IU of vitamin D.

Achieving adequate sunshine exposure for the cutaneous synthesis of vitamin D is not easily determined for a given individual; nor is excess sunlight exposure appropriate. Providing oral vitamin D supplementation to the newborn, infant, or breastfeeding mother is, therefore, the best way to ensure adequate vitamin D intake.

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CHAPTER 4

Nonnutritive Components in Human Milk

The neonate and infant possess an immature immune system, with significant deficiencies in the innate and adaptive arms of the immune system, as well as a relatively permeable and nearly sterile gastrointestinal (GI) tract. These developmental factors play a prominent role in the increased risk of infection in the first year after birth. Fortunately, human milk possesses a diverse microbiota and a multitude of substances and components that immediately compensate, in part, for these immunologic and anatomical factors. Moreover, continued exposure to the combination of cells, numerous bioactive factors, and microbiota present in human milk induces lifelong effects not only in the newborn's or infant's immune system but also in nearly every other organ system.

Bioactive Proteins

Specific factors, such as secretory immunoglobulin A (sIgA), lactoferrin, and lysozyme, reside in the whey fraction of human milk (**Table 4-1**). Secretory IgA is the most common immunoglobulin in human milk. It is synthesized by maternal intestinal lymphoid tissue in response to challenge by specific antigens and rapidly transfers into milk. Data suggest that maternal vaccination during pregnancy, such as vaccinating for influenza, meningococcus, and pneumococcus, is associated with significantly higher levels of pathogen-specific sIgA in the breast milk of those women. It acts to neutralize foreign antigens, and anti-idiotypic sIgA may act to stimulate the immune system, as with an antigen, to generate an immune response. The concentration of sIgA is greatest in colostrum and declines in the first 4 weeks' postpartum. The lowest content is observed at 6 months after birth, and thereafter the values increase slightly to levels that remain relatively constant through 2 years of lactation. Immunoglobulin M,

Table 4-1. Selected Bioactive Factors in Human Milk

Factor	Bioactive Property
Secretory immunoglobulin A	Specific antigen-targeted anti-infective action
Lactoferrin	Inhibits growth of bacterial pathogens, decreases intestinal permeability, aids in cell wall breakdown, immune modulation, antiviral trophic for intestinal growth
α-Lactalbumin	Bactericidal, immunostimulant, prebiotic
Lysozyme	Antibacterial via cell wall and membrane breakdown and antiviral
κ-Casein	Antiadhesive for bacterial flora
Lactadherin (in milk fat globule membrane)	Antiviral, immunostimulant
Milk fat globule membrane (MFGM)	Antibacterial, antiviral
Oligosaccharides	Prebiotic, stimulate beneficial bacterial colonization and block attachment of bacterial pathogens
Cytokines, chemokines	Modulate intestinal epithelial barrier function, immune modulation?
Interleukins (IL-4, IL-10)	Antiinflammatory
Interleukins (IL-6, IL-8)	Proinflammatory
Interferon (IFN)	Proinflammatory
Tumor necrosis factor (TNF)	Stimulates inflammatory immune activation
Epidermal growth factor (EGF)	Gut luminal surveillance, repair of intestine
Transforming growth factor (TGF)	Promotes epithelial cell growth, suppresses lymphocyte function
Nerve growth factor (NGF)	Growth of neuronal, hepatic, and intestinal cells and tissues
Insulin-like growth factors (IGF)	Growth and development of the GI tract
Granulocyte colony-stimulation factor (G-CSF)	Enhances intestinal integrity by regulating neutrophil production
Vascular endothelial growth factor (VEGF)	Promotes angiogenesis and tissue repair
Bile salt-stimulating lipase (BSSL)	Produces free fatty acids, antibacterial activity
Platelet-activating factor-acetylhydrolase	Blocks action of platelet-activating factor

Table 4-1 (*continued*)

Factor	Bioactive Property
Glutathione peroxidase	Prevents lipid peroxidation, anti-inflammatory
Nucleotides	Enhance T cell maturation, antibody responses, bacterial flora
Gangliosides	Pathogen inhibition, immune modulation
Vitamins A, E, and C	Antioxidants (scavenge oxygen radicals)
Glutamine	Intestinal cell fuel, immune response
Hormones	Anti-infective properties, immunomodulation
Leptin	Regulation of food intake and energy metabolism
Adiponectin	Reduction of proinflammatory cytokines, improves insulin sensitivity, increases fatty acid metabolism
Erythropoietin (EPO)	Stimulates production of red blood cells
MicroRNA (in exosomes)	Immune modulation, epigenetics
Osteopontin	Chemoattractant, immune modulation, antiviral, antibacterial
Immune cells (neutrophils, activated macrophages exhibiting HLA Class II antigens, lymphocytes, eosinophils)	Phagocytosis, T cell development and maturation, tolerance, and immune modulation?

Abbreviations: GI, gastrointestinal; HLA, human leukocyte antigen.

Derived from Hamosh M. Bioactive factors in human milk. *Pediatr Clin North Am.* 2001;48(1):69–86.

immunoglobulin G, immunoglobulin D, and immunoglobulin E are also present in human milk, albeit at lower levels.

Certain free amino acids may exert dual roles in newborns and infants. Taurine is trophic for intestinal growth, and glutamine is a fuel for the enterocyte and stimulates the intestinal immune system. Lysozyme has antibacterial effects through cleaving amino acids in bacterial cell walls.

Lactoferrin is an acute-phase protein that exhibits antimicrobial activity when not conjugated to iron (apolactoferrin). By binding excess iron, it prevents bacterial iron uptake and fosters nonpathogenic bacterial growth. Lactoferrin also functions with other host defense proteins to kill bacteria and viruses. A growth-promoting effect on intestinal epithelium has also been attributed to lactoferrin.

Lactoferrin is a versatile nonheme iron-binding glycoprotein that is a key component of the innate immune response to infection. It is the most abundant protein in the whey fraction of human milk and is also present in mucosal secretions. In fecal samples of breastfed newborns and infants, approximately 5% to 10% of ingested lactoferrin has been recovered. Through several mechanisms, lactoferrin also modulates immune function. After binding to its receptor on lymphocytes, macrophages, and dendritic cells, this glycoprotein is transported to the nucleus, where it acts as a transcription factor. Consequently, lactoferrin has been shown to influence immune cell proliferation and differentiation and cytokine production (eg, interleukin 1β, interleukin 18, transforming growth factor [TGF] β).

A lactoferrin receptor is also present on human intestinal enterocytes. In a piglet model, administration of bovine lactoferrin increased intestinal cell proliferation, crypt depth, and β-catenin expression, a protein involved in cell-to-cell-adhesion. In light of these effects on the GI tract in an animal model, human milk lactoferrin is thought to play an important role in intestinal growth and maturation in the newborn and infant. Enteral lactoferrin supplementation trials in preterm neonates and infants have had mixed results, with some studies showing lower rates of sepsis and necrotizing enterocolitis but others demonstrating no benefit.

Osteopontin

First identified in bone, osteopontin (OPN) is a glycoprotein found in almost all body fluids. By the third day of lactation, there are relatively high levels of OPN in human milk. This finding suggests that OPN may play a role in newborn and infant health and development.

Osteopontin is secreted by lymphocytes, macrophages, and natural killer cells and possesses numerous immune functions, including acting as a chemoattractant for a variety of white cells, development and proliferation of T cells, and induction of helper T cell 1 and suppression of helper T cell 2 immunity. In addition, OPN is involved in tissue remodeling and bone formation. In animal models, OPN affects intestinal development and enhances the host response to rotavirus, human herpesvirus 1, mycobacteria, and certain bacterial infections.

In the sole clinical trial published to date, researchers compared the levels of human OPN in the plasma of term exclusively breastfed infants to those fed formula supplemented with bovine OPN, as well as a control group whose formula did not contain additional bovine OPN. At 1 and 6 months of age, compared with breastfed infants, those fed the bovine OPN-fortified formula had similar

plasma levels of human OPN, while the control subjects had significantly lower levels. Moreover, an analysis of circulating lymphocyte subsets and monocytes yielded an increased proportion of circulating T cells and monocytes in the OPN-supplemented subjects, suggesting that OPN may favorably influence the infant's immune system.

Bioactive Lipids

The products of lipid hydrolysis, free fatty acids, and monoglycerides exhibit antimicrobial activity against a variety of pathogens by preventing their attachment and subsequent infection. The membrane of the human milk fat globule, laden with phospholipids, cholesterol, sphingomyelin, phosphatidylcholine, and phosphatidylethanolamine, contains bioactivity essential for neuronal growth and cognitive development. A specific human milk fat globule protein (MFG-E8) may diminish intestinal inflammation.

Bioactive Carbohydrates

Human milk oligosaccharides (HMOs), which are a class of complex short- and long-chain carbohydrate polymers, are synthesized by the mammary gland. After lactose and lipids, HMOs are the third most abundant component in human milk. They are not digested by the upper human GI tract but remain intact until they are fermented by colonic bacteria. More than 200 different HMOs have been identified. The composition and pattern of HMOs are genetically determined and vary between women and the stage of lactation. Interestingly, compared with a mother delivering at term, the milk of a mother who delivers a preterm neonate contains significantly higher HMO concentrations.

Once ingested by the newborn or infant, HMOs exert multiple effects and serve multiple functions in the body. One of the most well-known effects of HMOs is as a prebiotic, serving to modulate the growth of beneficial intestinal microbiota, such as strains of bifidobacteria. In addition, HMOs directly inhibit the adherence to the mucosal surfaces of several potential pathogenic strains, including *Campylobacter, Helicobacter,* and *Escherichia coli*. Moreover, encouraging the growth of a favorable population of bacteria helps prevent adhesion and colonization by less-favorable pathogenic species. Human milk oligosaccharides mimic bacterial epithelial receptors in the respiratory, gastrointestinal, and urinary tracts and, in doing so, prevent attachment of pathogenic agents. Human milk oligosaccharides, both in vivo and in vitro, have been observed to act as immunomodulators via the alteration of cytokine production by intestinal epithelial and T cells.

Human milk oligosaccharides may also play a role in infant growth, presumably by shaping the microbiome (see the Human Milk Microbiota section), although exact mechanisms are unknown. Certain HMOs, such as 2′-fucosyllactose, may lead to excess weight gain during the first 6 months after birth, and, interestingly, this is a predominant HMO added to infant formula. The geographic, genetic, and behavioral factors that can lead to wide variations in the composition of HMOs have broad implications on maternal and newborn/infant health and well-being. Until there is a better understanding of this variability and effects in vivo, adding selected HMOs to infant formula may result in unwanted outcomes.

Cellular Elements

Human milk contains living cells, including macrophages, lymphocytes, neutrophils, and epithelial cells. Colostrum contains the most cells, predominantly neutrophils. As the milk matures, the number of cells decreases and the type of cells changes to mononuclear cells, such as macrophages (90%) and lymphocytes (10%). The neutrophils in colostrum promote bacterial killing, phagocytosis, and chemotaxis. Some investigators view the neutrophil as a protector of the mammary gland in defense of inflammation, with less of a role in the newborn and infant. The macrophage in human milk functions in phagocytosis, secretion of lysozyme, bacterial killing, and interactions with lymphocytes to aid in host defense. Human milk stem cells, with maternal DNA, are able to cross the neonatal intestinal epithelium and be incorporated into the tissues of newborns. These pluripotent stem cells may play a role in host defense, protection from inflammation, and oxidative stress during infancy, including tissue repair. They may also have long-term effects on growth, metabolism, and disease protection.

Human Milk Microbiota

At birth, the newborn's gut is highly permeable, contains few if any bacteria, and possesses an underdeveloped immune system. Besides the mode of delivery, the first days of enteral nutrition are a key factor in the composition of the intestinal microbiota. By providing both bacteria and prebiotic factors, such as oligosaccharides, human milk is thought to play a prominent role in the establishment of the intestinal microbiome and the optimal development of gut mucosal immunity and barrier integrity. The newborn *microbiota* is defined as the sum of the microbial organisms found within a specific environment, whereas the *microbiome* is the sum of genetic material and microorganisms that are found in the environment. Both the bacteria

themselves and the genetic material function to provide optimal health and disease protection in the host.

Human milk possesses a robust microbiota that consists of several hundred bacterial species at an estimated concentration of 10^4 to 10^6 per milliliter. The most common species are *Streptococcus* and *Staphylococcus*, followed by *Bifidobacterium*, *Lactobacillus*, *Enterococcus*, and *Propionibacterium*. Compared with transitional and mature milk, colostrum has a higher degree of microbial diversity but a lower total bacterial content.

The origins of the human milk microbiota have not been firmly established. One source of organisms is the flora of the breast surface. However, the bacteria on the outside of the breast do not fully account for the diversity of the human milk microbiota. It has been postulated that the entero-mammary pathway is responsible for bringing bacterial species from the maternal GI tract to the mammary gland.

The effect of human milk on the makeup of a newborn's or infant's microbiota is illustrated by the similarity between the bacterial population of a breastfed baby's stool and that found in its mother's milk. The GI tract microbiota play a critical role in maintaining the integrity of the intestinal mucosa, enhancing the development of the baby's innate and adaptive immune responses, and resisting colonization by pathogenic bacteria. The newborn gut needs to differentiate between pathological versus commensal bacteria, as they share pathogen-associated molecular patterns. Human milk potentiates recognition and binding in concert with HMOs via toll-like receptors. The presence of a narrow repertoire of commensal microbes is an indication of immune modulation, as well as homeostasis in the unstable environment of the newborn's immature immune system.

Although the pathogenesis of asthma and allergies is multifactorial, mounting evidence points to the prominent role of one's microbiota in the development of these disorders. A combination of human milk–derived secretory IgA, TGF-β, and commensal microbiota influence development of the gut-associated isolated lymphoid follicle, leading to an appropriate balance of tolerogenic and inflammatory lymphocytes. Through these mechanisms, the newborn or infant is less susceptible to intestinal harm through exaggerated inflammatory responses, as well as less hyperimmune and autoimmune responses that can lead to allergy and disease; at the same time, the newborn or infant is provided protection against potential pathogens. In addition, it has been postulated that molecular components of human milk, such as oligosaccharides, assist the microbiota of the GI tract in carrying out these roles. Recent evidence points to direct

breastfeeding compared to feeding expressed milk as the optimal feeding strategy to provide a homeostatic microbiome.

Nucleotides

The immediate precursors for RNA and DNA synthesis, dietary nucleotides have been reported to affect immune function, iron absorption, intestinal flora, lipoprotein metabolism, and cellular growth of intestinal and hepatic tissues.

MicroRNA

Recently, it has become clear that, like other body fluids, human milk contains an abundance of extracellular vesicles. Extracellular vesicles possess a variety of substances and are involved in a wide array of biological processes, such as intercellular communication, gene regulation, and immune responses. One type of extracellular vesicle present in human milk that has garnered attention is the microRNA-containing exosome. MicroRNA are small biomolecules of 21 to 25 nucleotides with double-stranded noncoding RNA that regulate gene expression at the posttranscriptional level. MicroRNA are secreted from the mammary gland epithelial cell. These milk-derived microRNAs are kept stable in exosomes for circulation in the newborn's or infant's intestinal system.

In vitro, human milk exosome microRNA are taken up by cells and have been shown to have multiple effects, including inhibition of T-cell cytokine production and enhancement of regulatory T-cell function and bacterial killing. In both pigs and rats, administration of exosomes increases intestinal epithelial cell proliferation, suggesting that they promote GI tract development and function.

The role of milk as an epigenetic regulator for gene expression has been documented in the mammalian literature. As a modulator for DNA methylation, microRNA has regulatory capacity on signal transduction and on cell growth and maturation. Emerging research links microRNA to the development of cancerous tumors and to neurodegenerative diseases, such as Parkinson and Alzheimer diseases.

Hormones and Growth Factors

Many hormones (eg, cortisol, insulinlike growth factors, insulin, thyroid hormone), growth factors (eg, epidermal growth factor, nerve growth factor), and gastrointestinal mediators (eg, neurotensin, motilin) that may affect GI function

or body composition are present in human milk. Epidermal growth factor, for example, is a polypeptide that stimulates DNA synthesis, protein synthesis, and cellular proliferation and maturation of intestinal cells. Epidermal growth factor resists proteolytic digestion, and one of its functions is intestinal lumen surveillance, repairing any disruptions in intestinal integrity. Nerve growth factor may play a role in the innervation of the intestinal tract by promoting neuronal growth and maturation.

Leptin, ghrelin, and adiponectin are hormones produced in the breast and found in human milk. They may play important roles in the regulation of food intake, energy metabolism, insulin sensitivity, and fatty acid metabolism. Leptin and adiponectin levels in human milk vary with maternal adiposity, ethnicity, and duration of lactation. The effect of maternal phenotype on these and other bioactive compounds in human milk and their effects on newborn and infant growth are areas of active research.

Entero-mammary and Broncho-mammary Immune Pathways

The entero-mammary and broncho-mammary pathways are the functional connection between foreign antigen exposure in the maternal GI and respiratory tracts and the subsequent immunologic effects noted in the mother's breast milk. Exposure to foreign antigens stimulates plasma cells secreting sIgA specific to that antigen. The plasma cells traverse the lymphatic system and are secreted at mucosal surfaces and in the mammary gland. Ingestion of human milk, therefore, provides the newborn and infant with passive sIgA antibody against that antigen. This response is rapid; within hours to days after maternal exposure to a foreign antigen, antibodies appear in the milk. This response is also continuous, with antibody production occurring whenever there is exposure; sIgA antibody can be induced and deposited in human milk even before the newborn or infant has been exposed to the pathogen. The intimate contact of the breastfeeding mother and baby allows for such a system to operate. Skin-to-skin protocols for hospitalized preterm neonates facilitate this biological intimacy.

Changes in some of the immunomodulatory constituents of human milk have been measured in response to infection in the nursing newborn and infant. During active infection in nursing babies, both macrophages and tumor necrosis factor-α levels were increased in mother's milk, suggesting a dynamic interaction between a baby's health status and the mother's immunologic defenses in her milk.

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CHAPTER 5

Anatomy and Physiology of Lactation

The defining characteristic of mammals is the provision of milk, a fluid with a composition that exactly mirrors the needs of the young of the species. In the human breast, milk is produced and stored in differentiated alveolar units, often called *lobules*. These lobules contain small ducts, which coalesce into main ducts that drain sectors of the gland and open directly on the nipple. The amount of milk produced is regulated by prolactin and local factors. Removal of the milk from the breast is accomplished by a process called *milk ejection*, which is brought about by a neuroendocrine reflex. Afferent stimuli lead to the secretion of oxytocin from the posterior pituitary into the bloodstream, where it is carried to the myoepithelial cells that surround the ducts and alveoli. Contraction of these cells leads to milk ejection.

Anatomy of the Breast

The breast contains a tubuloalveolar parenchyma embedded in a connective and adipose tissue stroma. In the mature breast of the nonpregnant, nonlactating woman, there are usually about 9 branching ducts (although this number varies between women) that form a treelike pattern that extends from the nipple to the edges of a specialized fat pad on the anterior wall of the thorax. Lobules of varying complexity extend from these ducts. These lobules form the acinar structures that will become the milk-secreting organ. The milk-secreting unit is composed of a single layer of epithelial cells with surrounding supporting structures that include myoepithelial cells, contractile cells responsible for milk ejection, and a connective tissue stroma that contains a large number of adipocytes and a copious blood supply.

Stages in Breast Development

The breast, or mammary gland, like most reproductive organs, is not fully developed until sexual maturity. Development of the mammary gland can be divided into 5 major stages: embryogenesis, pubertal development, development in pregnancy, lactation, and involution.

Embryogenesis

From the first trimester, mammary-specific cells begin to develop into ridges to form the *milk line* or *mammary crest*, which differentiates into the *mammary bud*. By 18 to 19 weeks, a fetus will have a bulb-shaped mammary bud that extends from the epidermis into the dense subepidermal mesenchyme. At the same time, a loose condensation of mesenchyme extends subdermally to form the fat pad precursor. The ducts elongate to form a mammary sprout, invade the fat pad precursor, branch, and canalize to form the rudimentary mammary ductal system that is present at birth in the connective tissue just below the nipple. Limited milk secretion may take place at birth under the influence of changes in maternal hormones. After birth, the gland remains as a set of small branching ducts that grow in parallel with the child. The breast then remains inactive until puberty.

Pubertal Breast Development

Thelarche, which indicates the beginning of puberty, is the period during which breast development occurs. The initial stages are increase in size and pigmentation of the areola and development of a mass of tissue underneath the areola (breast bud). Thelarche typically begins at a mean age of 9.6 years but may begin as early as 8 years of age, with ethnic and environmental factors accounting for the variation. Normal breast development takes an average of 3 to 3½ years. Thelarche typically occurs approximately 2½ to 3 years before the onset of menstruation (menarche).

At puberty, estrogen and a pituitary factor that is probably growth hormone stimulate the growth of the mammary ducts into the preexisting mammary fat pad. In early puberty, bare ducts course through the fat. With the onset of the menses and ovulatory cycles, the progesterone secreted by the ovary during the luteal phase brings about some lobuloalveolar development. The alveolar clusters are dynamic structures that increase in size and complexity during each luteal phase but tend to regress with the onset of the menses and the loss of hormonal support. However, there is a gradual accretion of epithelial tissue with each successive cycle.

The Mature Mammary Gland

Each of the lobes of a mature mammary gland has a single opening (galactophore) in the nipple. Each mammary acinus consists of epithelial-lined ductules that form a round alveolus. Myoepithelial cells surround the cuboidal cells of the alveolus and contract under the influence of oxytocin during milk ejection. Multiple alveoli are clustered into lobules, which are then connected via lactiferous ducts to form a distinct mammary lobe. Each lobe is anatomically separate from other lobes. This is important to remember when examining the breast for abnormal nipple discharge. Ultrasonographic studies have shown that the number of mammary ducts is lower than thought previously, with a mean of 9 ducts in each breast, and that they do not dilate into small sinuses, but rather open directly at the galactophore at the nipple (**Figure 5-1**). The areola contains numerous small sebaceous glands, called *Montgomery tubercles*, which are usually not visible before pregnancy and lactation. Their function is to secrete a cleansing and lubricating fluid that is bacteriostatic.

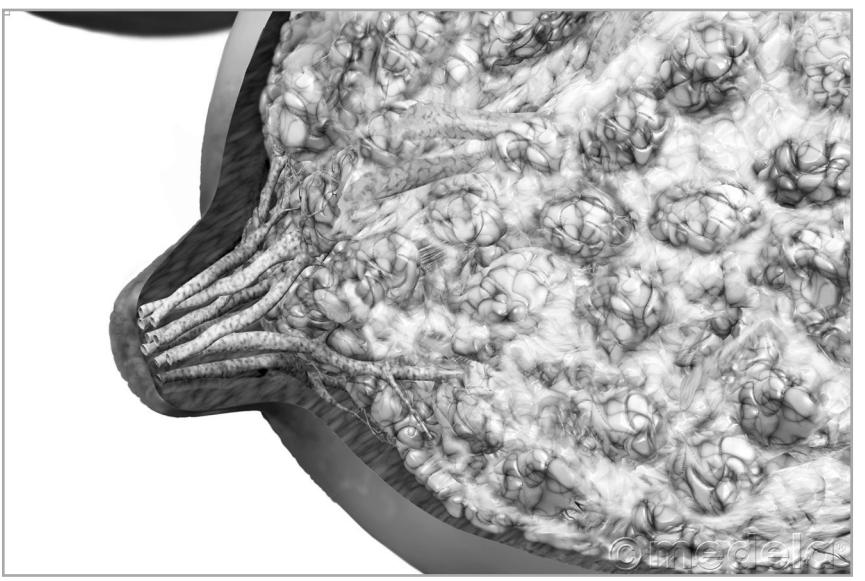


Figure 5-1. The ratio of glandular tissue to fat tissue increases to 2:1 in the lactating breast, compared with a 1:1 ratio in nonlactating women. Much of the glandular tissue is concentrated near the nipple. The milk is transported through the milk ducts to the nipple. The ducts near the nipple do not act as reservoirs for milk.

Used with permission from Medela.

The blood supply to the breast comes mainly through the internal mammary artery, but the lateral thoracic artery also supports the lateral aspect of the breast. The lymphatic system drains the breast to the axillary lymph nodes, which, if impaired, can cause significant increase in size and pain of the axillary region, which is an important physical finding. Innervation is provided by intercostal nerves IV, V, and VI. Because the areola is the most sensitive area of the breast, one can assess postoperative breast reduction ramifications by asking about areola sensation. Lack of sensation may affect the breastfeeding experience. Breast size does not affect volume of milk production, as breasts with smaller capacity are emptied more readily, followed by quicker milk synthesis, as compared with larger-capacity breasts. Milk volume is positively related to the newborn's or infant's demand and the amount of milk removal.

Breast Development in Pregnancy

Lactogenesis Stage 1

The breast undergoes marked changes during pregnancy. Physically, the breasts experience a doubling of weight, an increase in blood flow, lobular and alveolar growth, and increased secretory activity by specialized cells called *lactocytes*. Pregnancy hormones bring about full alveolar development. In addition to increasing levels of progesterone, a lactogenic hormone—either prolactin or human placental lactogen—is thought to be essential for the final stages of mammary growth and differentiation. By midpregnancy, the gland has developed extensive lobular clusters, small amounts of secretion product are formed, and lactose can be detected in the blood and urine. This maturation process is sometimes referred to as *lactogenesis stage 1*. Some women will notice a slight leakage of colostrum in the second half of the pregnancy, which is normal. Furthermore, women will begin to notice superficial veins as their breasts enlarge, as well as enlargement and darkening in pigmentation of the areola. The Montgomery tubercles will begin to protrude from the areola. The gland continues to develop until parturition, with the secretory process being held in check by the high circulating concentrations of progesterone.

Lactogenesis Stage 2

Lactogenesis stage 2, which is signaled by the change from small quantities of colostrum to copious amounts of human milk, occurs after delivery. It is primarily caused by a dramatic decrease in progesterone after the delivery of the placenta and augmented by removal of milk from the breast and elevation of prolactin levels. A major volume increase around 40 hours' postpartum is often referred to as the "coming in" of the milk. For most women, this change in the volume of the

breasts is noticeable between the second and fifth postpartum day, with the process occurring later in primiparous women than in multiparous women. Although milk volume is low during the first 2 days' postpartum, the amount of colostrum is usually sufficient to meet the nutritional and fluid needs of the term neonate. Note that colostrum is most notable for its immunologic properties.

Lactation is initiated regardless of whether the newborn breastfeeds, so even non-breastfeeding mothers experience breast fullness and leaking of milk. The process is marked by an increase in blood flow to the breasts, an increase in milk volume, and a change in composition so that the milk appears somewhat creamy in color and consistency, compared with the thick, yellow colostrum. Some women experience *engorgement,* or extreme fullness of the breasts, during this stage, especially if the newborn is not feeding frequently. During this stage and throughout the remainder of lactation, continued milk production becomes dependent on regular milk removal.

Delayed Lactogenesis Stage 2

Commonly defined as the maternal perception of lactogenesis occurring after 72 hours' postpartum, the prevalence of *delayed lactogenesis stage 2* is most often associated with primiparity but has been found to be greater in the United States than in lower-income/resource countries. For example, the prevalence of delayed lactogenesis stage 2 was 44% among first-time mothers in California but was 17% in first-time mothers in Peru. In the California study, significant independent risk factors were maternal body mass index in the overweight or obese range, maternal age older than 30 years, neonate birth weight of more than 3,600 g, and lack of effective breastfeeding in the first 24 hours. The latter may occur more frequently among mothers who give birth via cesarean delivery. The later onset of lactogenesis stage 2 seen in the United States may be related to a delayed time for first breastfeeding. It has been shown that nighttime cesarean deliveries have an increased risk of delayed lactogenesis when compared with daytime cesarean deliveries, even though the timing of initial breastfeeding was not different. These diurnal effects may result from disrupted sleep cycles and sleep deprivation. New evidence also supports an association between women who experience fragmented sleep and decreased sleep efficiency during gestational weeks 22 to 32 and delayed lactogenesis stage 2. Mothers of preterm neonates who express milk within the first hour of delivery experience earlier lactogenesis stage 2.

One study in rats that were fed a high-fat diet showed a reduction in the number of intact alveolar units needed for lactogenesis to occur normally. Factors associated with maternal glucose tolerance are also important; 56% of the variation in time to lactogenesis stage 2 has been explained by maternal insulin and adiponectin concentrations. Insulin availability to the mammary alveoli is thought

to be a limiting factor in the upregulation of lactose synthesis, which is the key determinant of lactogenesis stage 2, whereas the hormone adiponectin increases sensitivity to insulin. The number of glands on the areola (Montgomery tubercles) has also been associated with a shorter time required to achieve lactogenesis stage 2. A possible mechanism is that more secreting glands on the areola cause the newborn to suckle more effectively, leading to more stimulation and earlier onset of lactation.

Whatever the cause, a recent study showed that delayed lactogenesis stage 2 is an independent risk factor for the cessation of any and exclusive breastfeeding in the first month after birth. Therefore, health professionals should ask mothers during the postpartum period if they have noticed a surge in milk production or breast fullness within the first 3 postpartum days, thereby helping to identify mothers at risk of breastfeeding cessation due to an inadequate milk supply. Newborns of women who perceive that they have delayed onset of lactogenesis have a 7-times increased risk of excessive neonatal weight loss if they are exclusively breastfed, compared with those whose mothers have experienced timely onset of lactogenesis stage 2.

Lactation

Lactation, or milk production and secretion, continues as long as milk is removed from the gland on a regular basis. Prolactin is required to establish and maintain milk secretion. Oxytocin produces milk ejection, or letdown, allowing the newborn or infant to extract milk from the gland.

Involution

The process of involution takes place at weaning (ie, when regular removal of milk from the gland ceases or in many, but not all, species when prolactin is withdrawn). Like the initiation of lactation, this stage involves an orderly sequence of events to bring the mammary gland back nearly to the prepregnant state.

Physiology of Lactation

Regulation of Milk Synthesis, Secretion, and Ejection

Milk is synthesized continuously and secreted into the alveolar lumen, where it is stored until milk removal from the breast is initiated. This means that 2 levels of regulation must exist: (a) regulation of the rate of synthesis and secretion and (b) regulation of milk ejection or removal. Although both processes ultimately

depend on suckling by the newborn or infant or other stimulation of the nipple, the mechanisms involved, central and local, are very different.

Prolactin is necessary for milk secretion, and its secretion is directly linked to suckling stimulation at the breast, the intensity of suckling being related to the height of the prolactin peak. However, as described in the Prolactin Secretion section later in this chapter, the level of plasma prolactin is not directly related to the amount of milk produced. Ongoing milk production and volumes of milk produced depend on local factors and regular milk removal from the breast. Oxytocin participates in a neuroendocrine reflex that results in stimulation of the myoepithelial cells that surround the alveoli and ducts (**Figures 5-2** and **5-3**). When these cells contract, milk is forced out of the alveoli

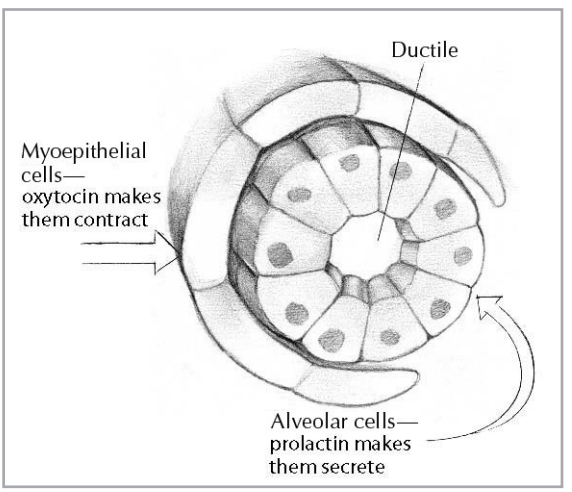


Figure 5-2. Breastfeeding stimulates the increase of hormones oxytocin and prolactin.



Figure 5-3. A neonate's or infant's mouth on the mother's nipple signals the brain to release oxytocin, which causes the milk ducts to contract and expel milk and the uterus to contract.

through the ducts and to the nipple (the *letdown reflex*). Only then does it become available to the suckling newborn or infant. If the letdown reflex is inhibited, milk cannot be removed from the breast, and local mechanisms bring about an inhibition of milk secretion. With partial removal of milk on a consistent basis, these local factors adjust milk secretion to a new steady-state level. If milk removal ceases altogether, involution begins and the gland loses its ability to secrete milk.

Milk Production

Newborn and infant demand regulates milk production in lactating women. When the milk has a lower caloric density, increased suckling by the newborn or infant is thought to result in increased emptying of the breast, in turn bringing about an increase in milk secretion. At this time, lactation changes from being *endocrine*, or hormone related, to *autocrine*, whereby regulation is controlled by milk removal. Mothers of twins, and occasionally even triplets, are able to produce volumes of milk sufficient for complete nutrition of their multiple babies. If newborns and infants are supplemented with milk sources other than human milk, however, milk secretion is proportionately reduced. Therefore, it is important that the baby suckle at the breast 8 to 12 times per day or whenever the baby displays cues for feeding.

Prolactin Secretion

Secretion of prolactin occurs episodically, with peaks of up to 75 minutes in duration that occur 7 to 20 times a day. During pregnancy, serum prolactin levels increase steadily from about 10 ng/mL in the prepregnant state to about 200 ng/mL at term. After parturition, the basal prolactin levels decrease, returning to prepregnancy values at 2 to 3 weeks in the woman who is not breastfeeding. In the lactating woman, suckling usually leads to a rapid increase in prolactin secretion, and prolactin levels are affected by the length, intensity, and frequency of nipple stimulation. If the nipple innervation is inhibited, the prolactin increase is abolished. Although prolactin levels are consistently above basal values for the duration of lactation, they are not proportional to milk volume secretion. Thus, although prolactin is necessary for milk secretion in women, plasma prolactin concentrations do not directly correlate with volumes of milk synthesis and secretion. Prolactin concentrations typically double in response to suckling and peak about 45 minutes after initiation of breastfeeding.

Local Regulation of Milk Production

Two local mechanisms have been implicated in the regulation of milk volume production. An inhibitor of milk secretion, a protein called *feedback inhibitor of lactation*, builds up as milk accumulates in the lumen of the mammary gland. When the milk is not removed regularly by feeding, manual expression, or use of a breast pump, feedback inhibitor of lactation serves to downregulate milk production. Thus, the actual volume of milk secreted may be reduced if the breast is not drained adequately. Distension or stretch of the alveoli may also regulate milk synthesis and secretion.

Oxytocin Stimulation of Milk Ejection

Newborn and infant suckling facilitates milk removal from the breast through the contraction of myoepithelial cells, which form a basketlike network around the alveoli where milk is stored. When the baby suckles, afferent impulses from sensory stimulation of nerve terminals in the areolae travel to the central nervous system, where they promote the release of oxytocin from the posterior pituitary. Oxytocin release can be associated with such stimuli as the sight, sound, or even the thought of the baby, which indicates a significant psychological component in this neuroendocrine reflex. More commonly, suckling or breast stimulation causes a pulsatile release of oxytocin. Levels increase and decrease quickly in temporal relation to the stimulation, which continues throughout the mother's breastfeeding experience. Oxytocin is transported systemically to the mammary gland, where it interacts with specific receptors on myoepithelial cells, initiating their contraction and expelling milk from the alveoli into the ducts. The process by which milk is forcibly moved out of the alveoli is called the *milk ejection reflex*, or *letdown*, and it is essential to milk removal from the lactating breast. Clinically, there is a great deal of individual variation in women's perception of letdown. In the first few days after delivery, uterine contractions, often referred to as *afterpains* and associated with suckling, indicate oxytocin release, which aids in uterine involution. Some women experience leaking of milk, some feel sensations in the breast, and some have none of these physical sensations in the presence of letdown. If present, the sensations are confirmatory; if absent, no specific conclusions can be drawn without further investigation into the feeding process.

Effect of Suckling

During correct positioning of the neonate's or infant's mouth for suckling, the nipple and much of the areola are drawn well into the neonate's or infant's mouth. Milk removal from the breast occurs because of a combination of positive pressure occurring from the mother's milk ejection reflex and negative

pressure (vacuum) created by the baby's tongue. This negative pressure results from a downward motion of the baby's tongue during the first half of the suck cycle. Tongue compression during the second half of the suck cycle is thought to clear the milk from the oral cavity (**Figure 5-4**).

Effect of Emotional State and Drugs

Psychological stress, pain, or fatigue can decrease milk output because of inhibition of oxytocin release. Studies have shown that higher oxytocin levels are associated with less severe depressive symptoms and more sensitive maternal behavior in pregnant women who report high levels of psychosocial stress. Oxytocin release begins with the onset of suckling in relaxed, undisturbed mothers but may occur before suckling if the neonate or infant cries or becomes restless. Alcohol and opioids inhibit oxytocin release. Stress can also cause increased prolactin levels, but there is wide variance among individuals.

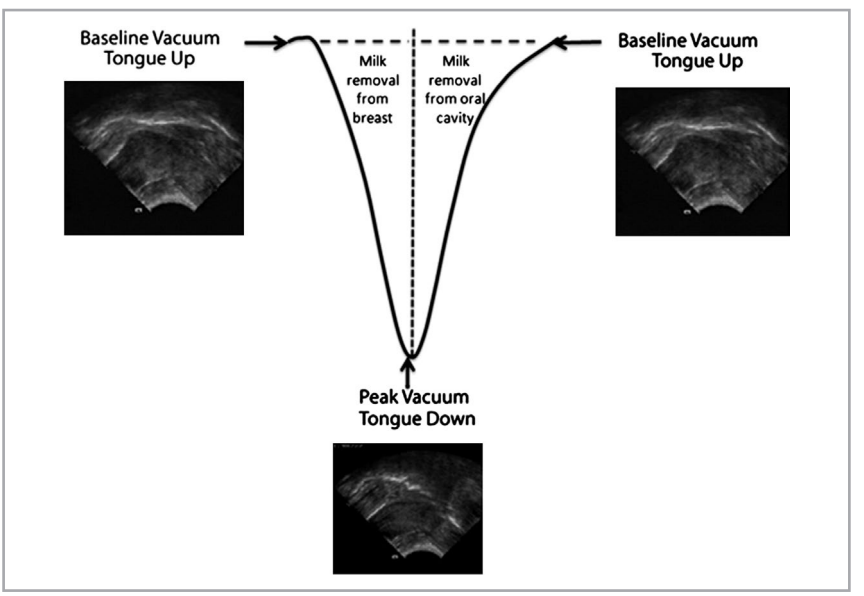


Figure 5-4. Newborn's or infant's tongue position as determined with ultrasonography with respect to the suck cycle. At baseline, the mid-tongue is in contact with the palate, and baseline vacuum is applied. When the tongue is drawn down during the first half of the suck cycle, vacuum increases, and milk flows into the intraoral cavity. During the second half of the suck cycle, the vacuum decreases when the tongue moves upward, and milk is cleared from the oral cavity.

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CHAPTER 6

Breastfeeding: Management Before and After Conception

The annual office encounter and other preconception visits for teens and women of childbearing age offer practitioners opportunities to reinforce their unequivocal support of breastfeeding and to discuss the benefits of breastfeeding, recommendations for exclusivity and duration of breastfeeding, and importance of a strong support system. With recurring visits to a breastfeeding-friendly medical office, the notion of breastfeeding can become normalized, and many natural occasions for patients to ask questions and seek resources may arise, which maximizes the chances of successful breastfeeding. To further optimize breastfeeding, practitioners can also assess the patient's personal and family breastfeeding history; perform a breast examination to identify any structural, medical, or surgical problems; and suggest lifestyle or medication changes.

Initial Visit

Once a patient presents for prenatal care, the initial and subsequent prenatal visits are excellent opportunities for the obstetric care professional to introduce and encourage breastfeeding. Most women make their feeding choice early; in fact, one study showed that 78% of women made their feeding decision before the pregnancy occurred or during the first trimester of pregnancy. Early intervention by the obstetric care professional positively affects initiation and continuation of breastfeeding. The initial input from the obstetric care professional may give the mother confidence to pursue her goal of breastfeeding. Ideally, the patient and practitioner will discuss breastfeeding and decide on a plan well before the patient presents in labor. If the advantages and benefits of breastfeeding are reinforced at multiple visits, patients may be more likely to succeed. Where specific circumstances of the pregnancy or the mother's health raise concerns about successful breastfeeding, referral to a physician who is a

breastfeeding medicine specialist or to a lactation specialist can often avert difficulties or allay fears. For example, if a prenatal diagnosis of cleft palate is suspected, plans can begin for pump acquisition, the learning of optimal techniques for the pumping mother, and the referral for a prosthesis that may create a seal for the suckling neonate. Likewise, a mother with gestational diabetes can learn how to express small amounts of colostrum either before or soon after delivery, in anticipation of the possibility of neonatal hypoglycemia. Similarly, if the patient did not meet her goals for a previous breastfeeding experience because of a concern about milk supply or nipple trauma and/or pain, prenatal assessment by an expert can improve subsequent breastfeeding success.

History

Whether a woman presents for a preconception visit or a prenatal visit, a health record should be compiled that would form the basis for her future care and aid in detecting any concerns that may arise with respect to future breastfeeding. In addition to an obstetric history, a complete medical history, including tabulation of chronic conditions, medications, diet and dietary supplements, smoking, alcohol use, and substance use, should be included. These data can be revisited at the first obstetric visit. **Box 6-1** lists factors that can be identified before delivery, or even pregnancy, that may affect the success of lactation.

Medical History

Medical Conditions

Any medical condition that may affect breastfeeding should be discussed.

Medications

Certain medications that are known to be problematic during lactation can be identified, and alternative medications may be suggested. The use of complementary and alternative medications and services should also be assessed.

Prior Breast Surgery

All forms of prior breast surgery, breast disease, and trauma should be explored—especially that which involved the areolar area—because peri-areolar incisions are most likely to interrupt the ducts and innervation. Depending on the technique used for breast reduction surgery, there may be more disruption to an adequate milk supply than other breast surgeries. Neonates of mothers who underwent breast reduction surgeries should be monitored closely to ensure adequate intake.

Box 6-1. Risk Factors for Lactation Problems That Can Be Identified Before Delivery

History and Social Factors

- Primiparity
- Multiple gestation
- Early intention to breastfeed *and* bottle-feed or formula feed
- Early intention or need to return to work or school (<12 weeks' postpartum)
- History of previous breastfeeding problems or breastfed newborn or infant with slow weight gain
- History of hormone-related infertility; intended use of hormonal contraceptives
- Conception via assisted reproductive technology
- Significant medical problems (eg, untreated hypothyroidism, diabetes, cystic fibrosis, polycystic ovarian syndrome, prepregnancy maternal obesity [body mass index ≥ 30 kg/m^2])
- Maternal age (ie, adolescent or older than 40 years)
- Psychosocial problems, especially depression (eg, anxiety, depressions, lack of social support for breastfeeding)
- Prolonged labor
- Long induction or augmentation of labor
- Medication use during labor
- Peripartum complications (eg, postpartum hemorrhage, hypertension, infection)
- Intention to use hormonal contraceptives before 6 weeks' postpartum
- Perceived inadequate milk supply
- Maternal medication use (Receiving inappropriate advice about compatibility with breastfeeding is common.)

Anatomical and Physiological Factors

- Lack of noticeable breast enlargement during puberty or pregnancy
- Flat or inverted nipples
- Variation in breast appearance (eg, marked asymmetry, hypoplastic or tubular breasts)
- Severed milk ducts or nipple afferent nerves from a previous breast surgery, particularly breast reduction surgery
- Previous breast surgery to correct abnormal appearance or developmental variants
- Previous breast abscess
- Maternal obesity
- Persistently or extremely sore nipples
- Failure of secretory activation in lactogenesis stage 2
- Mother unable to hand-express colostrum
- Need for breastfeeding aids at hospital discharge (ie, nipple shields, breast pumps, or supplemental nursing systems)

Nutritional Assessment

Adequate dietary intake should be assessed. When indicated, motivational interviewing can be used to improve dietary habits. Even before conception, patients should begin taking a prenatal multivitamin (including folic acid, iron, and vitamin D). To reduce maternal anxiety, practitioners should reinforce the

fact that usual diets do not affect milk composition. However, mothers with a vegan diet are at risk for vitamin B_{12} deficiency. Gestational weight gain that does not exceed National Academies of Sciences, Engineering, and Medicine Health and Medicine Division (formerly Institute of Medicine) standards may improve breastfeeding rates.

Social History

Substance use and other potentially harmful habits, such as tobacco use, vaping, and marijuana and alcohol use, should be discussed (see Chapter 16, Medications and Breastfeeding). Discontinuation before conception is recommended, and appropriate support services should be provided. In addition, appropriate support for breastfeeding can be assessed.

Prior Breastfeeding History

The documentation of prior breastfeeding history allows for an excellent opportunity to broach the topic of future breastfeeding and can help the patient address barriers to breastfeeding she may have experienced, as well as concerns the patient and her family and friends have expressed about breastfeeding.

Physical Examination

A breast examination should be performed by an obstetric care professional at an annual or preconception visit. If a recent breast examination is not documented, at the first prenatal visit, one should be performed gently, yet thoroughly, because the breasts are generally tender in early pregnancy. The examination offers an ideal opportunity in most patients to reassure the patient that she is physically capable of providing nutrition to her newborn.

Ideal Timing

When a patient is not pregnant, the ideal time for a breast examination is in the early follicular phase, after completion of the menses and before the midcycle increases in edema, mastalgia, and cutaneous tactile sensitivity.

Structural Evaluation of the Breast

Structural evaluation should include identification of scars or lesions, as well as the maturational stage and symmetry of the breasts. Inverted nipples and tubular or hypoplastic breasts can also be identified.

Breast Symmetry

Patients with hypoplastic or inadequately developed breasts should be evaluated further for prior hormonal deficiencies in the developmental process. Many patients will present with slight breast asymmetry, which is normal. Significant asymmetry between breasts warrants further consideration, especially if the asymmetry is a recent occurrence.

Inverted Nipples

Nipple size and shape generally do not affect the ability to breastfeed (**Figure 6-1**). Patients may complain of inverted (turned-in) nipples (**Figure 6-2**) and question the effect on future breastfeeding. A woman who has flat (**Figure 6-3**) or inverted nipples is able to breastfeed if her nipples can become erect. The use of breast shells for inverted nipples has not been shown to be effective in the limited research done to date. Similarly, stretching or rolling the nipples during pregnancy has not been found to be beneficial. Indeed, nipple rolling may result in oxytocin release, which might induce uterine contractions.

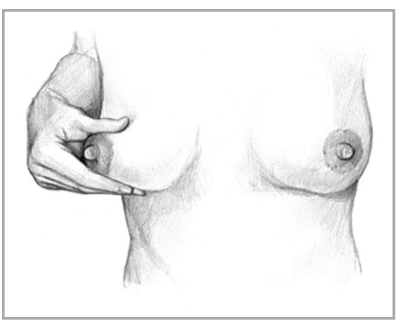


Figure 6-1. A normally protruding (everted) nipple becomes erect when you press the areola between 2 fingers.

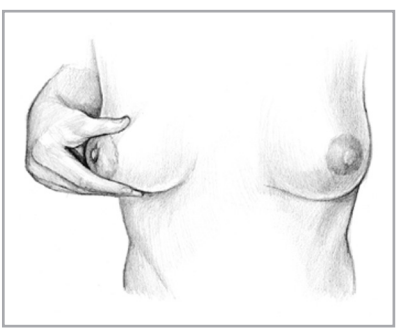


Figure 6-2. Inverted (turned-in) nipples retract toward the breast when pressure is applied to the areola.

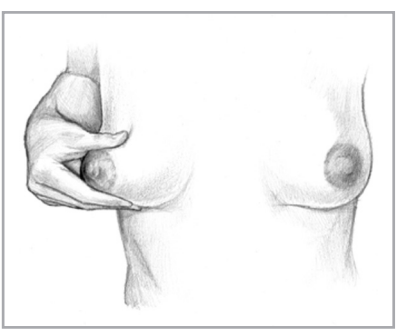


Figure 6-3. Flat nipples neither retract nor protrude.

Breast Size

Patients with small breasts should be reassured that their breastfeeding potential is not affected by breast size. The important clinical observation is that during pregnancy, a woman with normal breast tissue will notice an increase in breast size by at least a half of a cup size.

Suspicious Lumps

Any suspicious lumps should be managed appropriately, with imaging and surgical consultation as appropriate.

Education

The history and physical examination of a patient allow ample opportunity to initiate discussion and encouragement of breastfeeding. Anatomical considerations, practical concerns, and fears can be addressed. It is important to provide complete information on human milk, breastfeeding, and other newborn and infant feeding in relation to the health of women and their babies and to offer resources and support for breastfeeding. Having a patient attend a breastfeeding education class will increase breastfeeding success. The practitioner's recommendations and reassurance to the patient are essential and should not be underestimated. The timing of implementing various breastfeeding-related interventions is summarized in **Table 6-1**.

Table 6-1. Guide for Prenatal Breastfeeding Support During Obstetric Visits

Obstetric Visit	Discussion	Examination
Preconception visit	Communicate your support for exclusive breastfeeding. When making plans for breastfeeding, reinforce and/or explore reasoning, education, and correction of myths. Address risks to breastfeeding success as they apply (see **Box 6-1**).	Evaluate the breasts for structural and surgical issues.
Initial visit	When making plans for breastfeeding, reinforce and/or explore reasoning, education, and correction of myths. Note prior breast surgical history. Note breast growth during pregnancy. Note prior breastfeeding experience. Review the effects of medical conditions and applicable drugs on pregnancy and lactation.	Palpate the breasts for masses or adenopathy. Evaluate the breasts for inverted nipples and prior surgical scars.

Table 6-1 (*continued*)

Obstetric Visit	Discussion	Examination
14–20 weeks' gestation	Discuss breast growth (if not previously noted). Discuss feeding plans.	At *any* subsequent visit, if the patient voices concerns about her breasts or her ability to breastfeed, repeat the breast examination.
24–28 weeks' gestation	Recommend birthing classes. Reinforce the decision to breastfeed. Encourage breastfeeding during the first hour after delivery, with skin-to-skin contact, rooming-in, avoiding supplementation unless medically indicated, and avoiding bottle nipples and pacifiers until breastfeeding is established. Provide information about breastfeeding positions, latching, and feeding behaviors.	
32 weeks' gestation	Readdress prior breast surgeries if applicable.	
34–36 weeks' gestation	Give the patient a simplified review of breastfeeding physiology: feed early, feed frequently, avoid supplements, avoid inhibition of letdown and milk production, and avoid mother-baby separation. Discuss potential obstacles placed by hospital practices and strategies that need to be to overcome (eg, separation of mother and newborn). Discuss the mother's return to work, breast pumps, child care choices, and so on. Review pertinent medical conditions and medications, as well as potential changes after delivery and during breastfeeding. Reexplore prior breastfeeding experiences if relevant. Discuss the upcoming visit with the pediatric care professional.	
36+ weeks' gestation	Review patient knowledge and pertinent questions. Discuss the upcoming visit with the pediatric care professional. Discuss plans for additional childbearing and family planning.	

Educating the Individual

Patient Education Resources

The importance of early and continuing discussion about the decision to breastfeed cannot be overemphasized. Individual and group discussions between health care professionals and mothers-to-be have been shown to be effective. The efforts of women's health care professionals to educate patients about breastfeeding can be augmented by disseminating contact information for pediatric care professionals, nurses, lactation specialists, and breastfeeding support groups. Internet-based resources may also allow patients to explore the many benefits of breastfeeding. It may be helpful to direct patients to images from social media that empower women to breastfeed or help increase social support. Additionally, there are appropriate lactation resources on the internet that include mommy blogs, support groups, and consultations with certified lactation consultants that may promote breastfeeding initiation and maintenance.

Planning and Expectations

Proper planning during antepartum care can help ensure successful breastfeeding. Many new mothers will be returning to school or work, and these women often do not breastfeed, in anticipation of mother-infant separation. Patients should be assured that successful breastfeeding is possible, even if the mother will be apart from the infant at times (see Chapter 15, Supporting Breastfeeding During Mother-Infant Separation). Early discussions of practical issues and plans, including the use of breast pumps and milk storage, can help mothers continue breastfeeding when separated from their infants. It is helpful to suggest that patients discuss breastfeeding and pumping locations and timing with their school administrator or employer before delivery.

Family and Friends

The previous experiences that family and friends have had (especially if they breastfed exclusively for the recommended duration, or not) may be helpful in predicting the type of support the mother will receive after birth. Negative experiences and attitudes can be discussed to allay the patient's fears and suggest solutions to any problems encountered. The partner and other significant family members should be included in breastfeeding discussions, if feasible and culturally appropriate. The mother's partner can be her most important support person (see Chapter 2, The Scope of Breastfeeding).

Visit to the Pediatric Care Professional

Scheduling a visit with the pediatric care professional in the third trimester of pregnancy should be encouraged to discuss plans for newborn and infant

nutrition and address any concerns about the pregnancy. The patient should select a pediatric care professional who meets her needs, especially one who is a knowledgeable supporter of breastfeeding (**Box 6-2**).

Box 6-2. Conducting the Prenatal Pediatric Visit

Gather Information and Disseminate Anticipatory Guidance

- Discuss the family's thoughts and feelings about breastfeeding.
- Acknowledge the family's concerns.
- Provide accurate information on the topics that concern the family.
- State your support for exclusive breastfeeding.
- Review the benefits of exclusive breastfeeding for the baby and the mother.
- Review the important aspects of breastfeeding management.
- Per The Joint Commission Speak Up initiatives, the mother should be informed about the World Health Organization and United Nations Children's Fund "The Ten Steps to Successful Breastfeeding." She should also be notified that she can request that her birth center provide her with this information.
- Explain the importance of skin-to-skin contact and the first breastfeeding within the first 30 minutes to 1 hour after birth.
- Obtain information from the patient about previous breastfeeding experiences.
- Review the patient's medical history about breast-related conditions, including surgery or injury—particularly breast reduction surgery.
- Discuss the importance of prenatal breast examination to assess any breast changes in pregnancy. If the mother has not received a breast examination in the third trimester, the pediatric care professional may perform the examination or refer the mother to her own practitioner.
- Discuss the importance of exclusive breast milk feedings until the infant is about 6 months of age.
- Discuss available breastfeeding classes in the community.
- Discuss when the mother plans to return to work or school. Explore resources and support systems available to her at home and at work or school if she plans to return prior to 3 months' postpartum.
- Have appropriate videos and books for parents to purchase or borrow.
- Ask about maternal medications.
- For multiparous women, ask about previous experiences with breastfeeding (duration and challenges).

Closing the Visit

- Ask, "Do you have any other questions about breastfeeding?"
- Encourage parents to call with other questions.
- Reinforce the importance of optimal maternity care practices and empower families to request care consistent with "The Ten Steps to Successful Breastfeeding."
- Use positive, encouraging statements about breastfeeding.
- Discuss options about who can give professional breastfeeding support.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Educating the Public

Mass Media

There is an opportunity for mass media to affect many potential current and future mothers and their supporting families. More focus should be provided by the media in portraying breastfeeding as the standard or normative form of newborn and infant nutrition. It is important that accurate information, in content and in portrayal, be provided. Subtle marketing strategies may undermine breastfeeding; health care professionals should recognize the risk these strategies represent, help their patients understand these risks, and work to minimize their influence. Public art projects and "nurse-ins" have contributed to conversations about a baby's right to eat in public.

Legislative Initiatives

Many legislative initiatives have improved the climate for mothers who wish to breastfeed in public spaces or need to express their milk at work. Legislation exists in much of the United States to protect various concerns related to breastfeeding. State laws fall into 3 categories: (1) protecting the right to breastfeed, (2) breastfeeding in the workplace, and (3) exempting breastfeeding mothers from jury duty. All states have laws that specifically allow women to breastfeed in any public or private location. The Patient Protection and Affordable Care Act of 2010 mandates support by employers for breastfeeding employees, including break time to express milk or breastfeed and providing a space other than a bathroom to express breast milk. The Business Case for Breastfeeding (available at https://www.womenshealth.gov/breastfeeding/breastfeeding-home-work-and-public/breastfeeding-and-going-back-work/business-case) helps employers create breastfeeding support programs. In some states, companies that provide specific features to promote and support breastfeeding for their employees are designated as breastfeeding-friendly work sites. Businesses that meet certain criteria can then advertise this benefit to their employees. Health insurance plans (except grandfathered plans) must cover the cost of a breast pump, either a rental unit or a new unit (plans have specific guidelines on pump type, length of rental, and receipt of pump), without cost sharing.

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CHAPTER 7

Breastfeeding Initiation

Providing breastfeeding support before, during, and after birth in the hospital or birth center setting is the responsibility of all health care professionals who interact with the mother, her family, and other support persons. Promotion of a positive attitude, an up-to-date knowledge base, evidence-based policies, and support for the safe transition of mother and baby during the hospital stay can have a long-lasting effect on maternal and child health.

Before Delivery

Communicating With the Family

Most pregnant women in the United States intend to breastfeed their newborns. Many women today, whether they were born in the United States or elsewhere, were breastfed themselves. Families are often very supportive of breastfeeding, which constitutes a change from the past, when traditions of breastfeeding had been lost. Hospitals have updated their support systems in recent years and worked hard to develop a breastfeeding-friendly culture, policies, staff training, and community networks. Health care professionals—especially physicians—can provide powerful encouragement for breastfeeding with the manner in which they discuss and frame the importance of human milk for the baby.

Hospital Policies That Support Breastfeeding

In 1984, the Report of the Surgeon General's Workshop on Breastfeeding and Human Lactation commented on hospital practices that influence breastfeeding. This was the first national effort to promote breastfeeding as normative and vitally necessary from a public health perspective. In 2011, the Surgeon General reiterated the national interest and importance of breastfeeding (see Chapter 2, The Scope of Breastfeeding), calling to action many community partners to remove barriers to successful lactation.

The American Academy of Pediatrics (AAP) recommends that birth hospitals or centers implement maternity care practices shown to improve breastfeeding initiation, duration, and exclusivity. The AAP acknowledges the findings of the Agency for Healthcare Research and Quality that the Baby-Friendly Hospital Initiative increases breastfeeding initiation and duration. Recent data compiled by the Centers for Disease Control and Prevention in the periodic Maternity Practices in Infant Nutrition and Care survey confirm this finding. Review of newborn and infant feeding data and maternity practices at more than 1,300 US hospitals confirmed the positive correlation between having a supportive breastfeeding environment and higher rates of exclusive breastfeeding at the time of hospital discharge.

The manner in which nutritional messages and education are delivered to families is important when endeavoring to normalize and promote breastfeeding. Educational materials, electronic medical record templates and flowcharts, admission database questions, institutional signage that includes crib cards and staff identification badges, noncommercial materials, and discharge instructions are all important ways that hospitals can communicate their support for breastfeeding of newborns. Protecting the family from non–evidence-based negative breastfeeding messages and from routine distribution of unnecessary infant formula, gifts, or discounts to new mothers is encouraged.

Traditional hospital practices, such as removing the newborn from the mother for routine procedures, caring for newborns in a nursery setting, supplementation of the breastfeeding newborn without a medical indication, requiring pediatric clearance prior to the first feeding, and limiting maternal access to the newborn, can work against the physiology of lactation. A written breastfeeding policy is an important tool for establishing routines that endorse breastfeeding.

Staff Training

At all levels, staff training is critical for the successful support and promotion of breastfeeding. Without adequate staff education, families receive conflicting advice. Periodically updating the breastfeeding knowledge of perinatal staff is essential, given that most indicate that their professional preparation did not result in adequate breastfeeding education. All staff should receive formal training in current breastfeeding management.

Box 7-1. Supporting Early Breastfeeding Before and After Delivery

Labor and Delivery

- Women will benefit from having the continuous presence of a close companion throughout labor and delivery.
- Intrapartum analgesia may affect breastfeeding, and consideration needs to be given to the type and dose of analgesia administered to the mother.

Immediate Postpartum

- The healthy newborn should be given directly to the mother for skin-to-skin contact until after the first feeding is completed.
- Mother–baby rooming-in on a 24-hour basis enhances opportunities for bonding and for optimal initiation of breastfeeding.
- Education about the benefits of 24-hour rooming-in encourages parents to use this practice as the standard mode of hospital care for their families.
- Women may need help from health care professionals to ensure that they are able to position and attach their babies to the breast.
- Supplemental feeding should not be provided to breastfed newborns unless there is a medical indication.
- Pacifiers should be used with caution in the neonatal period.
- In general, acute infectious diseases, undiagnosed fever, and common postpartum infections in the mother are not contraindications to breastfeeding, if such diseases can be readily controlled and treated.
- All breastfed newborns should be evaluated by a health care professional 3 to 5 days after birth or within 48 to 72 hours of discharge from the hospital for assessment of the newborn and breastfeeding.

Derived from Holmes AV, McLeod AY, Bunik M. ABM clinical protocol #5: peripartum breastfeeding management for the healthy mother and infant at term, revision 2013. *Breastfeed Med.* 2013;8(6):469–473.

Promotion of Family-Centered Care

The evolution of newborn care from traditions of the newborn nursery have given way to encouraging parents and family to care for the newborn in a family-centered care model. The practice of rooming-in, where mother and baby are in close proximity to each other so that the mother can recognize and respond to the feeding cues, allows a better chance of successful initiation and establishment of breastfeeding. Ill or at-risk neonates may need a higher level of observation, but observation for initial transition in an appropriately staffed delivery room, performance of routine newborn therapies, and low-risk medical therapies such as phototherapy are appropriate in family-centered care and allow mother and baby to continue breastfeeding if all is well. Special precautions taken during the first hours after delivery are recommended as newborns transition from the intrauterine environment.

Labor Management to Facilitate Breastfeeding and Newborn Transition

Labor causes severe pain for many women, and the American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin No. 209 (March 2019) offers a complete discussion of pain management options. Pain management is not one-size-fits-all; women differ in their expectations of pain, their perception of pain, and their desires for pain relief or unmedicated childbirth. Health care professionals should have open discussions with mothers and other medical team members in a shared decision-making approach regarding pain relief, as well as possible effects on newborn feeding and transition. Nonpharmacological options may be adjuncts or alternatives to pharmacological interventions that can be offered to women. Opioids cross the placenta and may affect the transitioning newborn and lead to perinatal depression. Furthermore, neonatal immature opioid metabolism may lead to prolonged drowsiness. The newborn may thus be at risk for suboptimal breastfeeding behavior during the transition and may require extra lactation support. On the other hand, the amount of opioid that gains access to maternal milk is very small, and in combination with small-volume colostrum feedings, ingestion of maternal-labor opioid medication in the milk is unlikely to affect newborn transition.

Epidural Anesthesia

Although the effect of epidural or intrathecal narcotics had been thought to negatively influence breastfeeding initiation, contemporary neuraxial analgesia appears to not have this effect. Epidural anesthesia provides excellent and safe pain relief during labor, results in negligible maternal plasma levels of opioids, and should have minimal effects on breastfeeding success.

Trained Labor Support Personnel

Enlisting the help of labor support personnel, or a companion other than family, such as a doula or other trained health professional who provides one-to-one support, is an effective method for supporting some women's desire to decrease the need for labor analgesia. Although not necessarily formally trained breastfeeding experts, doulas have been shown to enhance the success of breastfeeding by providing experience, encouragement, and reassurance.

Cesarean Delivery

Mothers' success rates with breastfeeding may be lower after surgical delivery than after vaginal delivery. After cesarean deliveries, hospital staff who are concerned about maternal rest and recovery may be less likely to help the mother keep the baby at her side, put the newborn to the breast immediately, or encourage early frequent feeding. While important, rest and recovery should not preclude breastfeeding. Recently, hospitals working on family-centered care and breastfeeding support, with support from anesthesia personnel, are offering mothers who have had cesarean deliveries the opportunity for skin-to-skin contact in the delivery room or as soon as the mother is awake, alert, and able to respond to her baby. This has been successfully and safely implemented at many institutions and should be considered the new normative care of mothers and newborns. This early contact has, in turn, increased success in breastfeeding and may help offset the difficulties of a surgical delivery. Women undergoing planned cesarean deliveries are more likely to breastfeed than those for whom the cesarean delivery was not anticipated and who may have experienced a long and difficult labor.

After Delivery

Skin-to-Skin Contact

Skin-to-skin contact in the delivery room, operating room, or recovery room maintains the newborn's body temperature in a normal range, aids in newborn transition, and promotes early access to the breast (**Figure 7-1**). Safety issues regarding newborn physiological transition are imperative in the first hours after birth, but most term newborns benefit from skin-to-skin care after delivery. Traditions in early completion of standard newborn procedures have given way to an appreciation that there is time to allow for families and their newborns to benefit from the golden hour(s) after delivery and that nonurgent procedures should be postponed for the first several hours after delivery.

Early Attachment to the Breast

Within the first hour after birth, early initiation of breastfeeding should be encouraged, unless the medical condition of the mother or newborn indicates otherwise. Newborns who are placed on their mother's chests after birth and who attach to the breast within 1 hour of birth have better breastfeeding

outcomes than newborns who are not and do not. Indeed, early nursing in the delivery room is associated with a marked increase in the percentage of mothers who continue breastfeeding at 2 to 4 months' postpartum, when compared with later initiation. Many newborns placed on their mother's chests during their usually alert and active first hour after delivery will spontaneously find the breast. When a newborn does not self-attach, the mother should be taught and encouraged to perform hand expression to both stimulate her milk production and obtain colostrum to feed the baby.

Delay of Routine Newborn Therapies

Although newborn identification bands may be essential immediately after delivery, eye prophylaxis, vitamin K, hepatitis B vaccination, weighing, and other routine procedures may be postponed until the first breastfeeding has been completed successfully. Ideally, the initial feeding should not be interrupted, and as long as it is medically safe, the mother and baby should remain together. Performance of these interventions while the newborn is having skin-to-skin contact with the mother or on the breast may help to minimize pain responses.



Figure 7-1. Skin-to-skin contact should be initiated in the delivery room, if possible.

Breastfeeding Basics in the First Days

Breastfeeding is natural, but it is also a learned skill. Teaching the mother and her support team the basics of correct breastfeeding technique reduces the chance of physical discomfort during feedings, improves newborn attachment to the breast, and enhances milk transfer to the newborn. Bedside teaching should be reinforced with written materials or videos, or both, which may be reviewed in the hospital or at home.

Breastfeeding Frequency

Encouraging the mother to respond to her newborn's feeding cues rather than attempt to breastfeed on a rigid schedule is recommended. The hungry newborn may show hand-to-mouth activity, smacking lips, rooting, eye movement in light sleep, and movement of the extremities for some time before starting to cry. Putting newborns to the breast frequently, and whenever they demonstrate these cues, stimulates milk production and allows the full milk supply to develop as soon as possible—usually in 2 to 5 days. Breastfeeding should continue at each breast without a time limit, until the baby falls asleep or detaches from the breast. Important biological factors in colostrum aid the newborn in safely transitioning from the protected intrauterine environment and developing a normal intestinal microbiome and—although small in volume—provide necessary amounts of energy, carbohydrates, protein, and fat for the nutritional transition from the placental pipeline. Frequent and effective breastfeeding also helps the mother to empty her breasts and stimulates a full milk supply, as well as preventing later breast engorgement. It is important to teach the mother and other caregivers what to watch for while baby is at the breast. Active sucking with swallowing is to be encouraged. Shallow suckles should prompt the mother to massage her breast or stimulate the newborn to keep the baby actively feeding. If the baby is not actively swallowing and is unable to be stimulated, the mother or other caregiver may try to switch breasts or move the baby off the chest to awaken the baby more. There is no risk to continuing to allow the baby to suckle at the breast, as long as the mother is pain free—but watching for active feeding is an important skill to help the mother feel empowered in the process.

Positioning

Traditional breastfeeding positions may be taught to the mother but are not necessarily the only way to hold a baby at the breast. Maternal comfort, newborn safety, and successful breastfeeding are the goal. Depending on the mode

of delivery and the fatigue of the mother, she may find certain positions or props helpful. Newborns also differ in their feeding capabilities in these early hours, depending on their condition after delivery. Newborns who are slightly preterm, hypotonic, or stressed after delivery may need special attention to their body position and alignment and may need more support from hospital staff. Some newborns have positional preferences based on intrauterine position or birth trauma (eg, clavicle fracture, subgaleal hematoma) that may affect their feeding abilities early on. The realization that newborns are innately prepared to seek out the breast after delivery when lying in a prone position on their mother's chest, which triggers the crawling/swimming and grasping reflexes as they use their head, arms, hands, and legs to search for the breast, has led to the encouragement of more natural nursing positions. Knowledge of normal primitive newborn reflexes can help inform instruction on breastfeeding. Suck and rooting reflexes have a clear role in newborn feeding. But other innate responses may also be used to improve positioning of the newborn and suckling behavior and explain why maneuvers such as pushing on the back of the head may cause the newborn to arch back, extend the arms and legs, cry, and unlatch (Moro reflex) or why stroking the palm of the hand can improve suckling (palmomental reflex).

Initial feedings generally take place in the mother's hospital bed, and pillows can be used to help position the baby for the mother's comfort (**Figure 7-2**). As the mother recovers, she may find that nursing in a chair in a more upright position is easier.

Common nursing positions used in the hospital are discussed as follows.

Laid-back Position

In the laid-back position, the mother is typically in a semi-reclined position on a bed or couch, with the newborn prone and facing the mother with the cheek near the breast. Gravity thus supports the baby on the mother's body instead of using her arms or pillows for support, and the baby's chin, trunk, arms, and legs stay in contact with the mother's body in this position, as well. The baby can be oriented in any way that is comfortable to the mother (ie, vertical, horizontal, or approaching the breast over her shoulder), as long as the baby stays in a prone position relative to the mother. This way, the mother generally has at least one of her arms freed up—in contrast with the other common nursing positions. This more natural nursing position takes advantage of innate reflexes that lead the baby to move toward and attach at the breast.



Figure 7-2. In the laid-back position, the mother is in a semi-reclined position on a bed or couch, with the newborn prone and facing the mother with the cheek near the breast.

Cross-Cradle Hold

With this hold, the opposite arm is used to support the newborn, with the back of the head (below the occiput) and neck held in the mother's hand. This leaves the hand closest to the breast to support and position the breast as needed. This position is ideal for the early breastfeeding neonate because it provides excellent support and the ability to present the breast in a molded fashion with the free hand. It is also easier for the mother to visualize the baby's attachment to the breast.

Football Position

With the football position, the newborn is positioned at the mother's side, facing toward her, and a pillow is generally used to bring the newborn to the level of the breast. The newborn's feet and body are tucked under the mother's arm, and the newborn's head and neck are held in her hand, facing the breast (**Figure 7-3**). It may be more difficult for the mother to visualize attachment in this position, and others may have to double-check the latch. This is often a good position to use in the early days after a surgical delivery.

Cradle Hold

With the cradle hold, the mother uses her arm to support the newborn on the same side as the breast on which the newborn is nursing. The newborn's head is cradled near the mother's elbow while her arm supports the infant along the back, facing the mother, chest to chest. Care must be taken to prevent positioning the newborn too laterally with regard to the breast. Lining the newborn's nose up with the nipple allows for direct attachment without requiring neck flexion to reach the nipple.

Side-Lying Position

In the side-lying position, the mother lies on her side facing the newborn, who is also lying on his or her side. The newborn faces the mother, with the mouth at the level of the nipple. Special care should be taken that the newborn is not surrounded by loose clothing or bedding, and if the mother is drowsy, careful precautions should be taken to prevent entrapment or suffocation of the newborn with this position. Another awake, responsible adult can be a great safety champion to allow the mother to rest without concern.



Figure 7-3. In the football position, the newborn is placed along the mother's side, with the feet and body tucked under the mother's arm and the head and neck supported in her hand. A pillow is typically used to bring the newborn to breast level.

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Attachment

The neonate possesses multiple innate reflexes to facilitate breastfeeding. The rooting reflex helps the baby turn to the breast and open the mouth wide, and the sucking reflex is the principal reflex for feeding. The gag reflex can be involved in feeding in that the nipple should be drawn near to the hard/soft palate juncture but will trigger gagging if it is drawn further into the back of the mouth. Other neonatal reflexes also help the baby get into position for attachment.

Contemporary imaging has updated our knowledge of maternal breast anatomy and newborn and infant suckling mechanics. Ultrasonography of newborns and infants on the breast most specifically allows a better understanding of baby oral-motor mechanics and milk removal. Clinicians typically use observational tools such as the LATCH score (see Chapter 8, Breastfeeding in the Hospital) but should understand the way in which the baby draws the nipple, areola, and breast into the mouth and extracts milk. Some misunderstanding of newborn and infant oral-motor development and anatomy and its role in feeding has led to an overreliance on surgery (ie, frenotomy and other procedures) conducted on normal oral structures in recent years. Additionally, the many variations in maternal and newborn or infant anatomy mean that a flexible approach to assessment of latch is key. **Box 7-2** shows the basic steps in newborn and infant attachment to the breast, milk removal, and key structures involved.

Ineffective Latch

Many signs may indicate ineffective latch, including indentation of the newborn's or infant's cheeks during suckling, clicking noises, lips curled inward, frequent movement of the baby's head, newborn or infant frustration, and maternal complaint of pain. Other signs of incorrect latch include trauma to the nipples, pain, poor newborn or infant weight gain, and low milk supply. The nipple should be observed after a nursing session; it should be elongated but otherwise have no creases or signs of trauma.

Feeding Norms

Newborn feeding patterns may be erratic during the first 24 hours after birth, as the neonate recovers from the birth process. At that time, colostrum is present in small amounts, and a newborn may desire to suckle for a long time or nurse frequently. Other newborns are sleepy and disinterested. Mothers of healthy full-term neonates should be encouraged to follow the baby's lead and refrain from forcing, timing, or scheduling feedings. Giving the newborn plenty of skin-to-skin contact, access to the breast, and time to recover from the birth process

Box 7-2. The Basics of Newborn and Infant Attachment to the Breast

- The mother helps position the newborn or infant comfortably, facing her breast.
- The baby's face, cheeks, chin, and mouth come close to the breast.
- The rooting reflex triggers newborn or infant head turn and mouth opening.
- The baby's mandible and tongue drop down, and the baby takes a mouthful of breast, making an occlusive seal (**Figure 7-4**).
- The tip of the anterior tongue generally rests over the lower alveolar ridge; the tongue does not grasp the breast.
- The anterior and middle parts of the tongue move in concert with the mandible, dropping down together to create vacuum suction in the mouth. The tongue does not move laterally or lift independently of the mandible.
- A small intraoral space is created by this movement between the palate and the middle of the tongue, and suction is generated.
- The breast tissue and underlying milk ducts that have been drawn into the baby's mouth expand, and milk flows into the pharynx in response to intraoral negative pressure.
- Maternal milk ejection, in response to pituitary oxytocin, aids in milk removal from the breast.
- As the baby's mandible returns up to a neutral position, the breast tissue is compressed, and milk flow stops because of a lack of negative pressure.
- The baby's tongue does not strip or have peristaltic activity during nutritive suckling on the breast.
- Inside the mouth, the tip of the nipple generally lies just anterior to the hard/soft palate junction.
- As milk enters the pharynx, the posterior tongue and soft palate rise and the baby swallows, which pauses the breath.
- The cadence of suck-swallow-breathe is highly variable, from 1-1-1 to 12-1-14.

is important. It is normal for a newborn to fall asleep after nursing on one breast and not show interest in the second. Irregular feedings are common as well, because many neonates experience transient neonatal ileus as they initiate feeding, active peristalsis, and bowel movements. Parents can be reassured that the transient ileus and attendant gagging, spitting clear mucus, and slight abdominal distension of the neonate typically abates within 24 hours after birth. In the immediate newborn period, suckling occurs, but swallowing may not be audible until the milk supply is abundant.

Milk Production

Maternal milk production is a dynamic process; the initial low-volume, high-protein colostrum gives way gradually to high-volume transitional and eventually higher-calorie mature milk. Each mother varies greatly in her colostrum production, timing, and trajectory of abundant milk production.



Figure 7-4. A proper latch is shown.

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Establishment of Breastfeeding

Maternal Assessment and Common Concerns

Mothers and their partners often have many questions about dealing with breastfeeding comfort, pain, and fatigue and how medications or procedures will affect the quality of their milk. Families often worry unnecessarily that the baby isn't getting enough milk, especially in the early days as milk production builds. Providing mothers with appropriate information, anticipatory guidance, and references will help allay their concerns. Some mothers have risk factors that may cause them to struggle with successful exclusive breastfeeding and may require extra attention during the hospital stay (**Boxes 7-3** and **7-4**).

Maternal Physical Assessment

It is important to conduct maternal physical examinations before and after delivery to assess the mother's transition to lactation, demonstrate early colostrum production to her, and double-check that no physiological variables exist that might affect milk production. As the breasts fill with milk, especially if the newborn is not feeding well, mothers can become overly full or develop engorgement. Nipple trauma or pain is a common reason for women to get off-track with breastfeeding. Providing ongoing lactation support in these situations can be most helpful.

Box 7-3. Mothers Who May Need Help to Breastfeed Successfully

- Those with an intention to combination feed (ie, breast and bottle).
- Those with a lack of family or social support.
- Those with psychological problems or developmental delays.
- Those with a history of poor breastfeeding experiences in the past.
- Teen mothers or those with advanced maternal age.
- Those with risk factors for poor or delayed milk production (eg, breast surgery, no changes in breast size or shape during pregnancy, breast hypoplasia).
- Those with a history of medical problems (eg, diabetes, obesity, hypertension, cystic fibrosis, hypothyroidism).
- Those who use medications that may affect milk production or have potential adverse effects on the newborn (eg, drugs of abuse, hormonal contraceptives).
- Those with perinatal complications (eg, hypertension, blood loss, infection).
- Those who had a cesarean delivery.
- Those who have risk factors for latch problems (eg, flat or inverted nipples).
- Those who experienced mother-baby separation after delivery.
- Those with multiple births.

Box 7-4. Newborns Who May Need Help to Breastfeed Successfully

Vulnerable Newborns

- Late preterm birth (34–36 weeks' gestation)
- Fetal growth restriction
- Prematurity
- Neuromotor problems (eg, hypotonia, trisomy 21, achondroplasia)
- Abnormal oral anatomy (eg, cleft palate, ankyloglossia, micrognathia)
- Neonatal abstinence syndrome
- Resuscitation at birth, poor transition, or prolonged labor

Newborns With Medical Complications

- Hyperbilirubinemia
- Hypoglycemia
- Infection
- Birth trauma
- Respiratory distress
- Excessive weight loss and/or dehydration

Newborns With Suboptimal Feeding in the Hospital

- Failure to latch in the first 24 hours after birth
- Poor or uncoordinated suck
- Sleepy or infrequent feeder

Safety of Milk

Questions frequently arise about the safety of a mother's milk for the newborn. Many medications and substances that in the past would lead mothers to be told not to breastfeed are now known to not gain access to the milk in sufficient quantities to affect the newborn. Assessment of the risk of medications to the breastfed newborn and infant involves a knowledge of the pharmacology of the drug, the amount of the drug that is available to the baby in the milk, the oral absorption of the medication, and the newborn or infant metabolism of the drug (see Chapter 16, Medications and Breastfeeding).

Postpartum Pain Relief

Postpartum pain can interfere with a woman's ability to care for herself and her baby. In making therapeutic decisions, it is important to consider the effects of any pain-relieving drugs on the mother in terms of her ability to care for her baby, and for the newborn or infant in terms of passage of medications through the breast milk. For breast pain itself, the use of nonpharmacological treatments, such as cold packs and increased frequency of breastfeeding, are generally sufficient for management, along with a mild anti-inflammatory analgesic if needed.

ACOG has updated its postpartum pain recommendations to provide a safe framework for management of pain, prevention of overuse of opioids, minimization of potential effects of maternal medications on the newborn, potential help with the prevention of postpartum depression, and assistance with comfort as women recover from childbirth. The ACOG Committee Opinion No. 742, "Postpartum Pain Management," provides detailed guidance on these matters and offers the following recommendations:

- Pain can interfere with a woman's ability to care for herself and her newborn or infant. Nonpharmacological and pharmacological therapies are important components of postpartum pain management.
- Use of a stepwise approach involving a multimodal combination of agents can enable practitioners to individualize pain management.
- For postoperative cesarean pain, standard oral and parenteral analgesic adjuvants include acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, and opioids that are in combination formulations with either acetaminophen or NSAIDs.
- Parenteral and oral opioids should be reserved for treating breakthrough pain when analgesia from the combination of neuraxial opioids and nonopioid adjuncts becomes inadequate.

- A shared decision-making approach to postpartum discharge opioid prescription can optimize pain control while reducing the number of unused opioid tablets.
- If a medication that contains codeine is the selected choice for postpartum pain management, medication risks and benefits, including patient education regarding newborn signs of toxicity, should be reviewed with the family.
- Regardless of the medication selected, it is prudent to counsel women who are prescribed opioid analgesics about the risk of central nervous system depression in the woman and the breastfed newborn. Duration of use of opiate prescriptions should be limited to the shortest reasonable course expected for treating acute pain.

Newborn Assessment and Common Concerns

Mothers and their partners, families, and support teams often have many questions about breastfeeding, especially as we emerge from an era in which breastfeeding was not supported and many mothers did not meet their breastfeeding goals. Concerns about milk quality, quantity, newborn and infant growth, newborn and infant weight and output, and related nutritional concerns are common. Some newborns and infants are at risk of poor feeding outcomes, and these babies and their mothers may need additional support and assistance (see **Box 7-4**).

Newborn Assessment

The initial newborn physical examination is an important time to assess the baby's nutritional status, growth, anatomy, vulnerabilities, and strengths. Incorporating family education into the newborn examination and commenting on the baby's growth, normal oral/facial anatomy, and suck assessment can be reassuring. Examination should include assessment of neuromuscular tone, torticollis, congenital anomalies, birth trauma, and other physical factors that can affect feeding capabilities. A complete oral-motor examination is important. Visual inspection of the palate and uvula by using a good light is necessary to detect a U-shaped cleft palate. This condition can be missed with palpation only. To detect abnormalities in suction pressure, oral coordination, and tongue attachment and movement, examination of the mouth and tongue and assessment of suck with a gloved finger can be helpful and should feel rhythmic and smooth.

Oral-Motor Skills

During fetal life, abnormalities in development, neuromuscular tone, intrauterine position, and function of oral structures can result in difficulty feeding after birth. For example, a fetus with abnormal sucking mechanics in utero may

develop a short jaw and tongue, tight lingual frenulum, high arched palate, and/or poor oral coordination, with resulting difficulties with nursing after birth. Successful breastfeeding involves complex coordinated movements of oral structures to facilitate sucking, swallowing, and breathing. Additionally, production of adequate vacuum suction with sucking is necessary for milk removal. Therefore, structural abnormalities and inadequate latching can cause poor milk transfer.

Supplementation

Although before delivery, most women intend to breastfeed, many begin giving their newborns artificial milk feedings or are offered newborn supplementation products before discharge from the hospital, without medical indication. There is no need for routine supplementation of breastfeeding newborns unless a medical indication exists, such as hypoglycemia or excessive weight loss. Giving such supplements is likely to interfere with the process of successful initiation of breastfeeding by the mother and the newborn (see Chapter 8, Breastfeeding in the Hospital).

Pacifiers

The use of pacifiers in the early breastfeeding period has been thought to be associated with shorter breastfeeding duration; however, the evidence remains unclear. A recent study demonstrated the effect on breastfeeding duration if pacifiers are used in a well-baby setting—but not in the neonatal intensive care unit. It may be that pacifier use is a marker for other feeding issues, such as excessive newborn hunger or a mother's ambivalence about breastfeeding. Until more is known, avoiding pacifiers and maximizing opportunities to breastfeed will help the mother and baby get off to the best start. Use of pacifiers may mask early hunger cues and result in missed feedings, and it could affect milk intake. However, newborns who are ill or who are undergoing painful procedures may be calmed with nonnutritive sucking, either at the breast or with a pacifier and/or sucrose. After breastfeeding is firmly established, the American Academy of Pediatrics (AAP) recommends the use of a pacifier when placing the infant down for sleep as one strategy to reduce the risk of sudden unexpected postnatal collapse and sudden infant death syndrome.

Vitamin K

The term newborn's only potential early nutritional deficiency is that of vitamin K, and it should be addressed soon after birth. Deficiencies in vitamin K may result in blood-clotting difficulties and cause early, classic-, or late-onset neonatal hemorrhage in sites such as the skin, mucous membrane, gastrointestinal tract, or brain. There is no way to predict which newborns will develop bleeding from vitamin K deficiency. Vitamin K sufficiency depends

on production by the intestinal flora. The intestinal floras of the breastfed newborn produce relatively little vitamin K in the early weeks, and amounts of vitamin K in human milk are low. Vitamin K is supplemented in infant formula, although oral vitamin K may have variable absorption. To ensure vitamin sufficiency and prevent hemorrhagic disease of the newborn, a single intramuscular dose of vitamin K_1 (phytonadione) is given to all newborns more than 1,500 g within 6 hours of birth. Hospitals should review their practices to allow discussion of the benefits of vitamin K. Occasionally, some parents refuse to allow vitamin K to be given to their newborns despite laws in several states mandating its administration within 6 hours of birth. Hospitals should be prepared with information and plans on how to overcome these refusals.

Newborn Safety and Fall Prevention

Fatigue and Depression

Long and difficult labor, lack of sleep, and interruption of normal circadian rhythms may affect breastfeeding outcomes in both the short and long term. Hospital staff can address these issues with strategies to reduce interruptions, consolidate care, institute "quiet time," and establish good communication among staff and family members. Postpartum depression is not uncommon and may be aggravated by sleep deprivation and fatigue (see Chapter 10, Maintenance of Breastfeeding: The Mother).

Safe Sleep and Prevention of Sudden Unexpected Postnatal Collapse

The newborn may be vulnerable to poor positioning in the hours and days after delivery, especially if ill, preterm, or stressed from resuscitation or a long delivery process. Skin-to-skin contact may help the newborn recover, but close observation, especially in the first 2 hours after delivery, combined with careful attention to the newborn's body position, is prudent. Refer to **Box 7-5** for components of safe positioning for the newborn while skin-to-skin. Parents should be given clear instructions on safe skin-to-skin contact, and the mother's partner can also provide skin-to-skin contact for bonding and during times when the mother is fatigued (**Figure 7-5**). *Sudden unexpected postnatal collapse* is a condition of temporary or permanent cessation of breathing or cardiorespiratory failure in a previously healthy term or late preterm newborn in the first 7 days after birth. Sudden unexpected postnatal collapse often results from lack of education

Box 7-5. Components of Safe Positioning for the Newborn During Skin-to-Skin Contact

- The newborn's face can be seen.
- The newborn's head is in "sniffing" position.
- The newborn's nose and mouth are not covered.
- The newborn's head is turned to one side.
- The newborn's neck is straight, not bent.
- The newborn's shoulders and chest face the mother.
- The newborn's legs are flexed.
- The newborn's back is covered with blankets.
- The mother-newborn dyad is monitored continuously by staff in the delivery environment and regularly in the postpartum unit.
- When the mother wants to sleep, the newborn is placed in a bassinet or with another support person who is awake and alert.

Adapted from Feldman-Winter L, Goldsmith JP; American Academy of Pediatrics Committee on Fetus and Newborn, Task Force on Sudden Infant Death Syndrome. Safe sleep and skin-to-skin care in the neonatal period for healthy term newborns. *Pediatrics*. 2016;138(3):e20161889.

on concerns of entrapment or suffocation and may have tragic consequences. The AAP discusses these conditions and complications at length in the 2016 clinical report, "Safe Sleep and Skin-to-Skin Care in the Neonatal Period for Heathy Term Newborns." **Box 7-6** summarizes the report's recommendations



Figure 7-5. The mother's partner can also provide skin-to-skin contact with the newborn.

for the pediatrician's role in supporting safe sleep and skin-to-skin contact in the neonatal period for healthy term newborns. Newborn safety in the hours and days after delivery are paramount.

Prevention of Falls and Drops

Newborn and infant falls or drops in the hospital environment are rare but appear to be increasing due to a transition from nursery to family-centered care. Estimates are that approximately 4 newborns and infants fall or are dropped per 10,000 live births. These events tend to occur more often on the second day in the hospital. Other risk factors include family fatigue; breastfeeding during the night and early morning hours, when the mother is alone with the baby; and unsafe sleep practices that lead to falls or drops from a couch or chair. Others have noted that mothers who have had a cesarean delivery or who are receiving opioid medications may be at higher risk for falls or for dropping their baby. Hospitals are encouraged to develop fall and drop prevention strategies, including family education on safe sleep and mitigation of fatigue.

Box 7-6. The Pediatrician's Role in Supporting Safe Sleep and Skin-to-Skin Contact in the Neonatal Period for Healthy Term Newborns

- Develop standardized methods and procedures of providing immediate and continued skin-to-skin contact, with attention to continuous monitoring and assessment.
- Standardize the sequence of events immediately after delivery to promote safe transition, thermoregulation, uninterrupted skin-to-skin contact, and direct observation of the first breastfeeding session.
- Document maternal and newborn assessments and any change in conditions.
- Provide direct observation of the mother-newborn dyad while in the delivery room.
- Position the newborn in a manner that provides an unobstructed airway.
- Conduct frequent assessments and monitoring of the mother-newborn dyad.
- Assess the level of maternal fatigue periodically.
- Avoid sharing a bed with the newborn.
- Promote supine sleep for all newborns and infants.
- Train all health care personnel in these recommendations.

Adapted from Feldman-Winter L, Goldsmith JP; American Academy of Pediatrics Committee on Fetus and Newborn, Task Force on Sudden Infant Death Syndrome. Safe sleep and skin-to-skin care in the neonatal period for healthy term newborns. *Pediatrics.* 2016;138(3):e20161889.

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CHAPTER 8

Breastfeeding in the Hospital

The ongoing management of breastfeeding in the hospital during the immediate postpartum period, problem-solving for common issues that may arise, and hospital discharge planning will be addressed in this chapter. The primary focus of these discussions will center around breastfeeding of the healthy term newborn. Future chapters will address breastfeeding in special circumstances, such as preterm birth and newborns and infants with special health care needs.

Newborn Assessments

Physical Examination

A thorough physical examination of the neonate to assess for findings that might affect breastfeeding initiation and success should be done on the first day after birth (**Box 8-1**). Subsequent examinations may be briefer but should continue to assess the neonate for new findings that might affect feeding and to look for signs of feeding difficulties. A review of vital signs, weight, urine, and stool output may provide clues about feeding effectiveness. Hungry babies may have mild tachypnea, and a dehydrated neonate may have a mildly increased temperature. Assessment of a mother's breasts may be necessary when issues such as maternal pain or inadequate milk production arise.

Weight Changes

The most accurate appraisal of the adequacy of breastfeeding is the serial measurement of the newborn's naked weight. Nearly all newborns lose weight for the first 2 to 4 days after birth, given the loss of meconium and diuresis. Newborns who are feeding well should not continue to lose weight after lactogenesis stage 2. If weight loss persists, milk production and transfer should be assessed. Once lactogenesis stage 2 is completed, a newborn who did not lose excessive weight

Box 8-1. Overview: In-Hospital Newborn Breastfeeding Health Supervision

Breastfeeding Assessment

- Review the maternal prenatal record, the intrapartum record, and the newborn recovery and transition records.
- Discuss the timing and events of the first feeding.
- Has the mother previously breastfed?
- How is the mother doing, and how is she feeling about breastfeeding?
- Does the newborn need to be awakened to feed?
- Does the newborn easily latch on to the breast and nurse eagerly?
- How many times has the newborn been to the breast within the first 24 to 48 hours after birth? What is the duration of each feeding? Was the newborn actively sucking and swallowing?
- Is the newborn receiving any supplements?
- What is the number of wet diapers in the past 24 hours?
- What is the number of stools in the past 24 hours?
- What is the color of the stools?
- Are the mother's breasts comfortable (ie, no tenderness or pain)?
- Is the mother taking any medications?
- How do family members feel about breastfeeding?

Examination of the Newborn and the Mother

- Obtain the newborn's birth weight and gestational age.
- Evaluate the neurobehavioral condition of the newborn.
- Calculate the newborn's weight gain or loss since birth.
- Observe breastfeeding.
- Examine the mother's breasts or refer her for examination, if needed.
- Perform the newborn examination with attention to oral-motor function.
- Assess the newborn's state of hydration.
- Observe the newborn for jaundice and assess the bilirubin level by using an hour-specific nomogram.

Anticipatory Guidance

- Encourage breastfeeding on demand, approximately 8 to 12 times per 24 hours.
- During the first 24 to 48 hours after birth, the newborn may show little interest in breastfeeding.
- Newborns who do not awaken to feed should be aroused to feed at least every 4 hours.
- Discourage the use of pacifiers until after breastfeeding is well established (usually between 2 and 4 weeks of age) and discuss that if the baby is interested in suckling. It is important for the baby to be at the breast to signal the mother's body to make the right amount of milk. After breastfeeding is well established, it is recommended that pacifiers be offered for sleep, as a preventive measure for infant sleep-related deaths.
- Review normal breastfeeding patterns.
- Review normal elimination patterns.

Box 8-1 (*continued*)

Breastfeeding Interventions

- Providing supportive, nondisruptive care is important during first 24 to 48 hours after birth.
- Attempt to identify signs of inadequate milk supply or oral intake, and address potential contributing factors.
- Assist with maintaining lactation if the mother and newborn are separated.
- Consider referral to a lactation specialist if breastfeeding problems are ongoing.

Discharge Visit

- Congratulate the parents on the decision to breastfeed their baby.
- Discuss lining up family and friends to perform household tasks so the mother can rest, recover, and focus on herself and her baby.
- Review some of the benefits of breastfeeding.
- Remind the mother to eat when hungry and drink when thirsty.
- Arrange for follow-up in the office 3 to 5 days after birth or sooner, if indicated.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

and who is nursing effectively should obtain enough milk to begin gaining weight by day 4 or 5 after birth, at a rate of approximately 15 to 30 g per day (0.5–1.0 oz/d). Most neonates are discharged from the hospital prior to lactogenesis stage 2, so instead of assessing weight gain, assessing the neonate for excessive weight loss is more helpful in the hospital setting. Previously, physicians used the general rule of less than 3% to 4% weight loss per day as a normal amount, but nomograms for newborn weight loss in the birth hospital are now available online, free of charge (eg, newborn weight tool [Newt], www.newbornweight.org). Within the Newt, collected data are divided into feeding type (breast or formula) and delivery method (vaginal or cesarean). One benefit of the Newt is that it focuses on weight loss per hour after birth, rather than postpartum day. Weight loss of more than the 75th percentile of expected weight loss should prompt a feeding evaluation for effectiveness of latch and milk production and transfer.

Once the onset of copious milk production commences, a pre-feeding and post-feeding weight assessment is a valuable tool for the assessment of milk transfer volume. The newborn is weighed in a dry diaper and then allowed to nurse. After nursing, the newborn is weighed again, without changing the diaper. The difference in weight (in grams) is estimated to equal the volume (in milliliters) of milk transferred during the feeding. A low value in the post-feeding weight assessment can indicate that the mother's milk supply has not increased yet or that the newborn is not transferring the milk well. It's important to use an accurate electronic baby scale for this assessment. More specifics are available in Chapter 14, Lactation Support Technology.

Elimination Patterns

Urine output usually exceeds fluid intake for the first 3 to 4 days after birth, as a physiological response to contract the extracellular fluid space. Developing stool production and voiding patterns after the first few days are good indicators of adequate milk intake. A journal or diary kept by the parents to record the newborn's feeding and elimination patterns can be helpful.

Urine Output

The color of the first few voids is generally clear, but subsequent voids before lactogenesis stage 2 begins will likely be more concentrated. Uric acid crystals are commonly seen. Families should be shown the "brick dust precipitate" in the diaper and reassured. A jaundiced neonate may have dark urine. By 5 to 7 days after birth, the healthy breastfed newborn should be voiding colorless, dilute urine at least 6 times per day.

Stool Output and Character

Both stool output and character are particularly useful indicators of adequate milk intake. The normal green-black meconium stool should change to transitional green, and then to soft, seedy, yellow stool. Many breastfed babies have not completely transitioned to this type of stool by the time of hospital discharge at 1 to 2 days of age. Providing anticipatory guidance to the parents is essential for preventing concern and for identifying babies at risk for insufficient feeding. Additionally, normal human milk stools are quite loose and may be confused with diarrhea. Insufficient milk intake in a newborn or an infant older than 5 days may be signaled by the presence of meconium stools, green-brown transitional stools, infrequent (<3 per day) stools, or scant stools.

Breastfeeding Observation

The physician, or staff under a physician's guidance, should regularly observe feedings with the mother's permission, to be able to evaluate positioning, latch, milk letdown, and milk transfer, as well as maternal responses to the feeding (eg, pain, pleasure, anxiety, relaxation). The hospital staff should document these breastfeeding observations at least twice daily. Several lactation assessment tools exist, such as the LATCH score (**Table 8-1**) and the Bristol Breastfeeding Assessment Tool (**Table 8-2**). Some of the factors that are important for the assessment include the ability of the neonate to latch, the quality of the latch, the presence of audible swallowing, the anatomy of the nipple and signs of nipple trauma, breast filling and engorgement, maternal sensation, and the mother's independence with feeding.

Table 8-1. The LATCH Score

	0	1	2
Latch	Too sleepy or reluctant No latch achieved	Repeated attempts. Hold nipple in mouth. Stimulate to suck.	Grasps breast Tongue down Lips flanged Rhythmic sucking
Audible swallowing	None	A few with stimulation	Spontaneous and intermittent <24 hours old Spontaneous and frequent >24 hours old
Type of nipple	Inverted	Flat	Everted (after stimulation)
Comfort (breast/nipple)	Engorged Cracked, bleeding, large blisters, or bruises Severe discomfort	Filling Reddened/small blisters or bruises Mild/moderate discomfort	Soft Tender
Hold (positioning)	Full assist (Staff holds baby at breast.)	Minimal assist (ie, elevated head of bed, place pillows for support). Teach one side; mother does other. Staff holds and then mother takes over.	No assist from staff Mother able to position/ hold newborn

From Jensen D, Wallace S, Kelsay P. LATCH: a breastfeeding charting system and documentation tool. *J Obstet Gynecol Neonatal Nurs.* 1994;23(1):27–32.

Breastfeeding Patterns and Newborn and Infant Behaviors

In addition to information about latching and positioning of the newborn (see Chapter 7, Breastfeeding Initiation), the mother should be instructed on expected breastfeeding patterns, which can vary widely.

Feeding Frequency and Duration

After the usual 1 to 2 hours of quiet alertness immediately after birth (sometimes referred to as the "golden hour," which is the ideal time to initiate breastfeeding), many newborns fall into a deep sleep, with only brief, partial arousals for several

Table 8-2. The Bristol Breastfeeding Assessment Tool

	0 Poor	1 Moderate	2 Good	Score
Positioning				
Baby well supported; tucked against mother's body; lying on side/ neck not twisted; nose to nipple; mother confident handling baby	No or few elements achieved Needs to be talked through positioning	Achieving some elements Some positioning advice still needed	Achieving all elements No positioning advice needed	
Attachment				
Positive rooting; wide-open mouth; baby achieving quick latch with a good amount of breast tissue in mouth; baby stays attached with a good latch throughout feeding.	Baby unable to latch onto breast or achieves poor latch No/few elements achieved Needs to be talked through attachment	Achieving some elements Some advice on attachment needed	Achieving all elements No advice on attachment needed	
Sucking				
Able to establish effective sucking pattern on both breasts (initial rapid sucks then slower sucks with pauses). Baby ends feeding.	No effective sucking; no sucking pattern	Some effective sucking; no satisfactory sucking pattern; on and off the breast	Effective sucking pattern achieved	
Swallowing				
Audible, regular soft swallowing—no clicking	No swallowing heard; clicking noises	Occasional swallowing heard; some swallows noisy or clicking	Regular, audible, quiet swallowing	

From Ingram J, Johnson D, Copeland M, Churchill C, Taylor H. The development of a new breast feeding assessment tool and the relationship with breast feeding self-efficacy. *Midwifery.* 2015;31(1):132–137.

hours (see Chapter 7, Breastfeeding Initiation). This is a normal pattern and does not indicate a need for supplementation. Sometimes unwrapping the newborn, providing a gentle massage, holding the newborn upright, creating motion, changing the diaper, talking to the newborn, or holding the newborn skin-to-skin against the mother's chest may arouse a sleepy newborn. If arousal is not possible, at bare minimum, the mother should put the newborn skin-to-skin for stimulation. Skin-to-skin time should always occur with an awake and alert mother and should be closely observed by staff in the first 2 hours after birth. The newborn

whose mother received a large quantity of narcotics or sedatives may have longer periods of sleep and may need to be awakened after 4 hours to feed.

On the second day after birth, a newborn should be more alert and wanting to feed more frequently—typically 8 to 12 times or more in 24 hours. *Cluster feeding* often sets in the second night; this is characterized by almost constant nursing for a few hours. This is typical and should not raise alarm that the newborn isn't getting enough milk, unless other signs of inadequate intake are seen.

The interval between feedings is calculated from the beginning of one nursing episode to the beginning of the next. New mothers should be encouraged to rotate which breast their newborn feeds from, starting with the breast offered last at the prior feeding. This will help them achieve an optimal milk supply. However, it is perfectly normal for a newborn to fall asleep after nursing from the first breast and refuse the second. It is preferable to allow newborns to drain the first breast well before switching them over to the other breast. The mother should not interrupt a good feeding session just to switch to the second side. Typically, the newborn will spontaneously release the first breast after sufficient draining. Timing each side is not necessary or desirable. Limiting the time at the breast has no effect on nipple soreness, but correct latch and positioning are crucial. To be able to remember which breast to begin with, the mother can use an easily available item, like a hair band or hair tie on her wrist, or she can keep track on a paper log or one of the many breastfeeding apps that exist for this purpose.

Frequent breastfeeding in the first few days after birth minimizes newborn postnatal weight loss, decreases newborn bilirubin levels, and helps establish a good milk supply. Although breastfeeding every 2 to 3 hours is the average, there is a great deal of variation from neonate to neonate and during a 24-hour period. Families should be advised to feed the newborn on demand, rather than on a particular schedule—although until the milk production is copious and the newborn is gaining weight, families shouldn't let newborns go longer than about 4 hours without attempting to feed. Human milk empties from the newborn stomach faster than formula does. Without receiving anticipatory guidance, a new mother might compare the higher frequency of her newborn's feedings to those of formula-fed babies, who require feeding less often, and potentially misinterpret the normal (higher) frequency of breastfeeding to mean that she has an insufficient milk supply. However, as newborns get older, they nurse more efficiently, and the frequency and duration of feedings decrease.

Newborn and Infant States and Hunger Cues

Newborns rotate through various states of sleep and alertness multiple times per day (**Table 8-3**). It is best to attempt to feed them when they are in the quiet alert state, before they become fussy. In a quiet alert state, a newborn's eyes are open, and the baby is looking around. Subtle signs of hunger may emerge, such as increased alertness, flexion of the extremities, mouth and tongue movements, cooing sounds, rooting, bringing the fist toward the mouth, or sucking on the fingers or the hand. Allowing the newborn to room-in 24 hours a day, unless separation is medically necessary or requested by the mother, allows the parents to notice these early newborn hunger cues. If no hunger cues are present, the quiet alert state is a good time for parents to make eye contact and bond with their baby.

A newborn who has progressed to the active alert state may appear fussy or unsettled. Such a newborn may need to be calmed before being able to successfully latch at the breast. Soothing techniques include holding the baby tightly to the chest, speaking softly, gently bouncing the baby, or swaying the baby back and forth.

Many new parents expect their babies to cry when they are hungry, but the crying state is a late sign of hunger that can result in a newborn who is difficult to calm

Table 8-3. Newborn States of Consciousness

State	Characteristics
Deep sleep	Very difficult to awaken; regular respirations; little movements; may startle
Light sleep	May awaken and go back to sleep; body movements, eyelid movements; irregular respirations
Drowsy	Increasing body movements, eyelid opening; more easily awakened for a feeding but may return to sleep with comforting
Quiet alert	Alert expression, open eyes, surveys surroundings, especially faces; optimum state for feedings
Active alert	Beginning to fuss and show the need for a diaper change. If needs are not met, fussing escalates to crying.
Crying	Crying that lasts for > 20 seconds. Usually the newborn can be comforted with holding, feeding, or changing the diaper; exploring the duration, intensity, and frequency of crying is needed to determine strategies for interventions.

Adapted from American Academy of Pediatrics. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents.* Hagan JF, Shaw JS, Duncan PM, eds. 4th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2017:88.

and latch to the breast. Interpreted through the years as a sign of vigor, having "good lungs," and general health, crying results in increased work, energy expenditure, and swallowing of air, which may precipitate vomiting. Babies who cry for a long time may become exhausted and go to sleep without nursing or before they have finished the entire feeding. Frequent feeding will diminish crying episodes.

Once fed, newborns typically move into a sleep state. Signs of satiety include nonnutritive sucking with longer pauses between sucking bursts, babies taking themselves off the breast, disappearance of hunger cues, and adopting a relaxed posture.

Helping parents understand their baby's behaviors will help them be more confident in caring for their baby overall.

Temperament

Temperament refers to an individual's innate character traits. These character traits are present at birth and affect how babies interact with the world around them. Temperament affects a newborn's ability to control his or her state and how easily he or she can move from one state to another. Three broad categories have been described: *easy* or *flexible*, *challenging* or *difficult*, and *cautious* or *slow to warm up*. Studies have shown how newborn temperament can affect breastfeeding and results have varied, but at least 2 studies have shown that challenging newborns and infants are likely to be breastfed for fewer months than newborns and infants with other temperaments. It's hypothesized that the challenging newborn's or infant's fussiness leads the mother to believe that the newborn or infant isn't satisfied with her breast milk. Being able to discuss temperament and its effect on breastfeeding may help mothers nurse for longer durations. At the same time, an easy newborn may be more likely to have inadequate oral intake without a parent recognizing the issue. Maternal temperament is as important as baby temperament. An anxious mother may find breastfeeding difficult because she cannot see how much milk her baby is getting. Other mothers may not notice or recognize their newborn's hunger cues. Indeed, the combination of baby and maternal temperament may affect the success of breastfeeding.

Common Hospital Issues and Challenges

Ankyloglossia (Tongue-tie)

Significant controversy exists over the definition, diagnosis, and incidence of *ankyloglossia*. Most physicians can agree that ankyloglossia, commonly known as *tongue-tie*, refers to a tight anteriorly inserted lingual frenulum that affects

function of the tongue. It may result in difficulty with suckling and could lead to sore nipples, low milk supply, poor weight gain, maternal fatigue, and frustration. It may affect breastfeeding more than bottle-feeding because of the differences in tongue movements required between the 2 feeding modalities. There is a paucity of data for other forms of ties, such as posterior tongue-tie or "lip tie." The lack of clear definitions and diagnostic tools has resulted in overdiagnosis of ankyloglossia and unnecessary oral surgeries in newborns and infants without clear evidence of anatomical issues. A thorough evaluation and assessment for other causes of breastfeeding problems should, therefore, be performed before proceeding with a potentially unnecessary surgical procedure.

Signs and Symptoms

The most common symptom of ankyloglossia is maternal nipple pain. The nipple may be flattened or pinched after breastfeeding. There may be evidence of nipple trauma, such as abrasions. The newborn's tongue may appear heart shaped when protruded, as the middle of the tongue is tethered in place. Forward extension of the tongue is limited. If the tongue does not extend beyond the gum, the newborn may bite at the breast. Maternal pain may lead to withdrawal of the breast and/or inhibition of milk letdown. Difficulty with suckling, low milk supply, poor weight gain, maternal fatigue, and frustration characterize the additional constellation of findings in newborns and infants with ankyloglossia.

Evaluation

The appearance of the frenulum is not relevant if the baby is latching well, sufficient milk is being extracted, and the mother is without pain. If not, careful oral evaluation of the newborn is needed to assess the ability to extend the tongue beyond the lower gum border and observe the newborn for restriction of tongue mobility. A digital oral assessment, including a finger sweep under the tongue, may be helpful in palpating a tight frenulum. The mother should be evaluated for evidence of nipple trauma.

Management

A frenulum that is affecting function (ie, feeding) can easily be clipped by a trained practitioner during the birth stay or in the outpatient setting. This procedure is called a *frenotomy*. There are no data to support clipping the lingual frenulum if there are no feeding problems. A Cochrane review indicated that there is not enough research on the topic of ankyloglossia, but lingual frenotomy may lessen maternal nipple pain. The anterior portion of a tight or thick frenulum is divided with scissors. Anesthesia beyond sucrose usually is not required,

and suturing is not necessary. The newborn should be observed for bleeding from the site of the division, although this is usually minimal or absent because the ligament binding the tongue is relatively avascular. The newborn can be put to the breast right after the procedure. Given the lack of consensus within the medical community, it is important for all health care practitioners, including the physician and lactation consultant, to discuss the situation with the parents and come to a mutually agreeable decision before proceeding. In addition, there are no data to support clipping labial frenula (lip tie) to improve breastfeeding.

Oral-Motor Dysfunction

Some neonates have difficulty with their latch and milk extraction, whether they are breastfeeding or bottle-feeding. They may be able to suck, but they cannot coordinate the swallowing and breathing. This can lead to ineffective feeding, excessive weight loss, choking, and hypoxia.

Signs and Symptoms

A neonate with oral-motor dysfunction may have a weak suck. Feedings may take an excessive amount of time. Pre- and post-feeding weight assessments may show a lack of milk transfer. The mother's breasts may become engorged because of lack of proper milk drainage.

Causes

The most common cause of oral-motor dysfunction is preterm birth. The late-preterm neonate (34–36 weeks of gestation at birth) makes up a large proportion of newborns who just do not coordinate suck-swallow-breathe adequately. This can also be seen in neonates of diabetic mothers and in conditions in which there are anatomical defects, such as cleft palate and hypotonia as associated with trisomy 21 (see Chapter 13, Breastfeeding in Special Circumstances), or exposure to drugs in utero (see Chapter 16, Medications and Breastfeeding).

Evaluation

A thorough physical examination should be performed to assess the neonate for anatomical abnormalities, muscle weakness, abnormal reflexes, and dysmorphic features.

Management

An International Board Certified Lactation Consultant, certified lactation specialist, or occupational therapist should be consulted to help with feedings. There are many options for a neonate who has anatomical defects, such as cleft lip or palate or hypotonia, to keep them successfully feeding at the breast

(eg, using the dancer hold for a neonate with hypotonia). The priority should be to maintain the breastfeeding relationship and the mother's milk supply first. Even babies who are not effectively transferring sufficient milk at the breast may be allowed to "comfort suckle" and will benefit from feeding on the mother's expressed milk. The specialist can teach parents how to use special bottles, if needed, and pace feedings. Newborns who are not able to take adequate volumes despite receiving assistance require a nasogastric tube and care in a neonatal intensive care unit. If a newborn is not able to feed at the breast, the mother should be taught to pump until the newborn's oral-motor function improves.

Hypoglycemia

One of physicians' most commonly cited concerns about breastfed neonates is hypoglycemia. The risk of hypoglycemia may be reduced by immediate and sustained mother-baby skin-to-skin contact and early initiation of breastfeeding. Neonate energy expenditure and, therefore, glucose utilization are decreased by initiating early skin-to-skin contact, which decreases newborn stress and helps to regulate the newborn's temperature. Blood glucose concentrations reach a nadir 1 to 2 hours after birth. An adaptive response to low blood glucose concentrations in breastfed neonates is an increased concentration of ketone bodies and other substrates, which act as alternate fuels for the neonate until breastfeeding is established.

Signs and Symptoms

The clinical signs of hypoglycemia may be nonexistent, nonspecific, or obvious, such as changes in the level of behavior (eg, irritability, lethargy, stupor, coma), apnea, tachypnea, cyanotic episodes, hypothermia, hypotonia, tremor, seizures, temperature instability, and change in feeding patterns and/or responses.

Causes

In general, healthy term breastfed neonates do not experience symptomatic hypoglycemia. If symptomatic hypoglycemia develops, an underlying illness must be excluded. Newborns of diabetic mothers, newborns who are small or large for gestational age, and preterm newborns are among the common groups of newborns at risk for hypoglycemia.

Evaluation

Routine monitoring of blood glucose levels in asymptomatic, not at-risk, term neonates is unnecessary. Blood glucose concentrations should be measured in at-risk newborns, such as preterm newborns, newborns of diabetic mothers, and those who are small for gestational age, as well as those with clinical signs

suggestive of hypoglycemia. At-risk newborns and those with abnormal blood glucose concentrations should be monitored before each feeding and require continued monitoring until several normal pre-feeding blood glucose concentrations are obtained. Serial monitoring does not preclude routine breastfeeding. In addition, newborns with excessive weight loss and/or for whom there is concern of insufficient feeding may benefit from a glucose check.

Management

Hypoglycemia can be reduced by early skin-to-skin contact and initiation of breastfeeding within the first hour after delivery. Early breastfeeding is not precluded even though a newborn meets the at-risk criteria for glucose monitoring. The intervention in an asymptomatic breastfed newborn is to increase the frequency of breastfeeding to every 1 to 2 hours and to recheck the blood glucose level before the next feeding. If breastfeeding alone cannot correct and maintain an appropriate blood glucose concentration, then glucose gel, expressed human milk, or formula should be offered. Symptomatic hypoglycemia requires treatment with intravenous (IV) glucose administration. As long as the neonate is clinically stable, breastfeeding should continue, even if IV glucose is provided.

Jaundice is described in Chapter 9, Maintenance of Breastfeeding: The Newborn and Infant.

Nipple Pain

Nipple soreness is the most common complaint of breastfeeding mothers in the immediate postpartum period, but it may be encountered at any time. However, nipple pain should not be considered normal. Nipple pain beyond mere soreness or discomfort or even soreness that continues beyond the beginning of a nursing episode or after letdown should be investigated immediately. If ignored, it can lead to other problems, such as breast engorgement, mastitis, or early cessation of breastfeeding (see Chapter 10, Maintenance of Breastfeeding: The Mother).

Some potential sources of sore nipples in the immediate postpartum period include

- Ineffective breastfeeding technique, specifically poor position and ineffective latch. These are the most common causes of nipple pain in the immediate postpartum period. Moreover, limited milk transfer occurs when the neonate is attached incorrectly, resulting in poor neonate weight gain and impaired milk production. Mothers with abdominal incisions from a cesarean delivery or other surgery should find comfortable positions, such as the football (clutch) hold, in which to feed the neonate.

- Trauma that produces cracking, such as from overzealous breast cleansing, failing to release suction before removing the newborn from the breast, climate variables, and unique skin sensitivity. There is no need for nipple cleansing, other than routine bathing. Counsel the mother to avoid using soap on the nipples, because it can be irritating to the skin.
- Mismatch of maternal nipple diameter and newborn mouth size may lead to difficulty in latching during the early days or weeks. Temporary milk expression and feeding the newborn expressed milk by bottle may be necessary until the newborn grows and is able to effectively attach to the breast.

Evaluation and management options for nipple pain are described in Chapter 10, Maintenance of Breastfeeding: The Mother.

Insufficient Milk

The lack of milk, either real or perceived, is a common reason for discontinuing breastfeeding. *Insufficient milk* is an imprecise term because it refers to failure of a mother's milk production, either primary or secondary, or a failure of the newborn to extract milk. Because most newborns leave the hospital between 24 and 72 hours after birth, insufficient oral intake and dehydration are problems that may not be seen until follow-up. Problems that arise from insufficient oral intake can usually be prevented and/or treated with appropriate interventions. Formal evaluation of breastfeeding prior to hospital discharge is important to ensure the use of appropriate technique.

Signs and Symptoms

Insufficient intake results in delayed or infrequent stool output, decreased urinary output, early jaundice, an inconsolably hungry baby, lethargy, and/or excessive daily weight loss of more than the 75th percentile of expected weight loss. Generally, there are noticeable abnormalities in milk supply, feeding, and elimination patterns (**Table 8-4**).

Causes

Insufficient milk intake is related to failure of the mother to produce milk or failure of the newborn to extract milk. Although primary lactation failure is rare (and often heralded by a lack of breast growth during pregnancy), delayed lactogenesis stage 2 may occur with retained placental fragments, primary pituitary insufficiency, diabetes, or certain maternal medications. Mothers who have undergone breast surgery are also at risk of insufficient milk production, especially if nerves and ducts have been severed. Insufficient milk supply is more commonly caused by inappropriate early feeding routines, including the use of unnecessary formula supplementation. Occasionally, a neonate may not

Table 8-4. Breastfed Newborn Intake and Output Norms

Day	Age (h)	Milk Volume per Feeding (mL)	Milk Volume That the Mother Sees	Characteristic of the Day	No. of Feedings	No. of Voids[a]	No. of Stools[a,b]	Stool Appearance
1	0–24	0–5	Drops	"Anything goes"	>6	≥1	≥1	Meconium
2	24–48	5–10	1 tsp	"Feeding frenzy"	≥8[c]	2–3	1–2	Meconium
3	48–72	10–20	1 tbsp	"Starting to get milk"	≥8[c]	4–6	≥3	Transitional
4	72–96	20–30	1 oz	"Dealing with milk volume"	≥8	4–6	≥4	Transitional
5	>96	>30	>1 oz	"Growing"	≥8	6–8	≥4	Yellow

[a] The newborn has 24 hours to void and 48 hours to produce stool after birth.
[b] There may be a lull in stool production after the meconium is cleared out of the system, while the newborn waits for the mother's milk to come in.
[c] Newborns may feed *very* frequently before the milk comes in—even hourly for the first few nights.
Adapted from Stellwagen LM, Schanler RJ. Breastfeeding the newborn. In: McInerny TK, Adam HM, Campbell DE, DeWitt TG, Foy JM, Kamat DM, eds. *American Academy of Pediatrics Textbook of Pediatric Care*. 2nd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2017.

be able to extract milk effectively, which can lead to a gradual decrease in milk supply. Such is the case with orally fed preterm newborns, especially late preterm newborns (34–36 weeks of gestation), and some newborns with neurological problems or oral anomalies. Any factor that limits milk removal may result in diminished milk synthesis, because local factors in the breast govern milk production (see Chapter 5, Anatomy and Physiology of Lactation).

Evaluation

A review of the perinatal history will often help identify maternal and/or newborn factors that need to be addressed. A mother whose breasts did not enlarge during pregnancy or did not become full by 5 days' postpartum may have structural or hormonal problems that can result in an inadequate milk supply. Direct observation of breastfeeding may demonstrate ineffective latch or positioning or inadequate newborn effort (ie, short feedings, falling asleep quickly, and potential uncoordinated feedings relating to neonatal abstinence syndrome and other causes). Objective measures of newborn growth should be performed before beginning any intervention. Although significant weight loss usually indicates a problem with the milk supply and/or transfer of milk to the neonate, weight loss may also occur in neonates who have increased insensible water loss from hospital radiant warmers or from prolonged crying episodes. Newborn birth weight also may be falsely increased as a function of peripartum IV fluids administered to the mother during a prolonged labor. The subsequent diuresis of the neonate after delivery may make weight loss more notable. Investigating peripartum IV fluid administration may be helpful in investigating excessive weight loss in the newborn in the first postpartum days. The Newt cesarean delivery nomogram (www.newbornweight.org) can help prevent this problem of interpreting excessive fluid administration. The weight of the newborn 24 hours after birth may be more reliable than the birth weight, because most of the excess fluid should have led to diuresis by that time. Also, apparent excessive weight loss may be an artifact of the scale used to weigh the newborn, especially when there are separate scales in the delivery and postpartum areas.

A pre-feeding and post-feeding weight assessment can be performed by using electronic scales (see Chapter 14, Lactation Support Technology). One report in which neonates were evaluated in the first few weeks after birth demonstrated a high predictability of maternal lactation insufficiency if the weight change from before to after the feeding was less than 45 g beyond the first few days after birth. Manual milk expression or mechanical milk expression techniques may be needed to ascertain total milk volume before feeding or residual milk volume in the breast after a feeding. If the residual milk volume is high (>30 mL), this may

be a reason for concern. Less invasive procedures, such as observing a feeding or performing a physical examination, should be undertaken before performing pre- and post-feeding assessments.

Management

The major goal in management of insufficient milk is to increase milk production and milk transfer. Regardless of the cause, consultation with a certified lactation specialist should be considered. The primary management depends on the etiologic origin but usually involves increasing the frequency and effectiveness of breastfeeding. Mothers may also need to express their milk mechanically after each breastfeeding to increase breast stimulation and breast drainage. Supplementation of the newborn may adversely affect establishing a full milk supply by decreasing the frequency and completeness of breast draining, which can lead to milk stasis and reduced milk supply. Supplementation may be necessary, however, if the milk production does not increase with increased frequency of properly latched breastfeeding. Supplementation may also be needed if the milk supply is markedly inadequate or if signs of dehydration or malnutrition are already present.

Fluids preferred for supplementation, in order of preference, are expressed mother's own milk, pasteurized donor human milk from a milk bank that follows Human Milk Banking Association of North America guidelines, and infant formula. Glucose water is not a preferred fluid; it provides significantly fewer calories than milk and no alternate substrates, and it does not stimulate intestinal motility the way milk does. Depending on the circumstances, if dehydration or malnutrition is present, the neonate should be given enough supplemental milk to produce improved weight gain. Breastfeeding should continue with the addition of the supplemental milk during or after nursing. At the same time, the mother should continue milk expression techniques to increase her milk production. As milk production increases, the need for supplemental fluids will diminish.

Perceived Inadequate Milk Supply

If objective evaluation demonstrates that the milk supply is adequate, it is important to reassure the mother that her milk supply is adequate and provide her with the knowledge to be able to assess its adequacy. Even with appropriate prenatal education, many women and many cultures do not appreciate that colostrum is milk and that the volumes of colostrum produced in the first 2 to 5 days after birth (2–20 mL per feeding) are adequate for the newborn.

Breast Filling and Engorgement

Normal breast fullness occurs because of vascular congestion during lactogenesis stage 2. Engorgement is the firm, diffuse, and painful overfilling and edema of the breasts, usually because of infrequent or ineffective milk removal, typically seen on days 3 to 7 after birth (see Chapter 10, Maintenance of Breastfeeding: The Mother). Therefore, the best treatment of breast engorgement is prevention via frequent breastfeeding or gentle hand expression or pumping. If left untreated, breast engorgement may lead to difficulties in latch and mastitis. If the newborn cannot latch frequently enough to prevent engorgement, pumping may also be recommended.

Supplemental Feedings for the Breastfeeding Newborn

While exclusive breastfeeding is the goal, some dyads are not able to achieve this in the short or long term. Some mothers have plenty of milk, but the newborn can't extract it. Some newborns are great feeders, but the mother has an insufficient milk supply. With cultural changes and reproductive technologies, more and more mothers are older than ever before, and they may have underlying medical conditions that can affect their ability to lactate. Being able to provide nutrition to the newborn in these circumstances is the number one priority, while continuing to look for solutions to the underlying breastfeeding problem.

Typically, the first step in the hospital is to start the mother pumping with a double-breast electric hospital-grade pump. Whatever milk is collected should be given to the newborn, even if it is just drops. In the early postpartum days, some mothers are able to express more milk manually than by using an electric pump. The stimulation of the pump is still helpful. If an insufficient volume of milk is obtained by pumping, supplementation with pasteurized donor milk or formula should be given to meet the newborn's needs. The total volume of expressed breast milk and supplementation should approximate what a breastfeeding baby would receive (see **Table 8-4**). Giving the newborn excessive supplementation early on may prevent the newborn from nursing frequently, therefore worsening the maternal milk supply. By about day 5 or 6 postpartum, newborns should be receiving full feeding volumes.

There are a number of methods available to feed neonates expressed breast milk or supplement. Milk can be provided by spoon, cup, syringe, at-breast lactation aid, or even with paced bottle-feeding, depending on the neonate's condition. Using an at-breast lactation aid to deliver milk while breastfeeding is considered by many to be optimal because the neonate continues to practice

latching and stimulates the mother's milk supply at the same time as receiving the supplement. This triple-prong approach is referred to as *triple feeding* (breastfeeding, pumping, and supplementing). See Chapter 14, Lactation Support Technology, for more information on pumping and supplemental feeding methods.

Hospital Discharge Planning

Readiness for Discharge and Discharge Criteria

The American Academy of Pediatrics (AAP) has published hospital discharge criteria for the newborn and a discharge-readiness checklist. In addition to items such as normal vital signs and passage of urine and stool, the newborn should have accomplished at least 2 successful feedings, witnessed by a knowledgeable caregiver. The family should be educated about breastfeeding, jaundice, and other common newborn issues. An outpatient health care practitioner should be chosen, and families should know how to contact the office if needed.

Education and Anticipatory Guidance

The success of breastfeeding is measured by the *duration* of any breastfeeding and exclusive breastfeeding, not in the initiation of breastfeeding alone. Giving anticipatory attention to the needs of the mother and the newborn and engaging care partners to help support breastfeeding women at the time of discharge from the hospital facilitates successful, long-term breastfeeding. Education should be simple, targeted, and culturally sensitive, with the recognition that hormonal factors and maternal fatigue may precipitate information overload.

General Education

General education should include information about newborn positioning, latch-on, expected feeding and elimination patterns, jaundice, and signs that warrant physician notification. Education can be communicated in a variety of ways, including baby care classes and individual instruction with the use of noncommercial literature or video presentations. Mothers should be given information on reputable local breastfeeding support groups, outpatient lactation consultants, and telephone triage services. Since the COVID-19 pandemic, more breastfeeding follow-up visits are available via telemedicine, including telelactation consultations with pediatricians and/or lactation specialists, as well as peer counselors. Short hospitalization stays and receiving limited assistance from extended family can heighten the need for adequate breastfeeding support

after discharge from the hospital. Support groups can increase a woman's confidence in her breastfeeding abilities. Strategies that provide face-to-face contact seem to be most effective, but providing a 24-hour telephone source for assistance is also valuable. Lactation consultants are often available to continue care on an outpatient basis, and contact information for these resources can be provided to the family prior to discharge. Breastfeeding mothers should receive instruction on manual and mechanical milk expression methods so they can maintain their milk supply and obtain milk for feeding if mother and baby are separated. Discharge packs that contain infant formula, pacifiers, and/or commercial advertising materials should not be given out. Partners and other family members should be encouraged to assist the new mother in a way that is supportive of breastfeeding. They may assist with the evaluation of breastfeeding, burping, cuddling, soothing, and bathing the baby, as well as helping the mother with other household chores.

Newborn and Infant Vitamins and Mineral Supplements

Vitamin D

The AAP recommends that all newborns receive 400 IU of vitamin D per day, to prevent rickets. Because commercial preparations vary in their concentration of vitamin D, it is prudent to order the dose in units (400 IU) rather than volume (in milliliters). Randomized trials have shown that if a mother takes 6,400 IU of vitamin D per day, she is able to provide enough vitamin D in her breast milk to meet her baby's needs. However, the current practice is generally to supplement the newborn with 400 IU of vitamin D per day at the time of hospital discharge.

Multivitamins

Routine multivitamin supplementation is not needed in breastfed term newborns in most areas of the world. In many low-income/resource countries, vitamin A deficiency has been found in breastfed newborns, infants, and children, and programs for periodic supplementation are recommended. Vitamin concentrations in human milk may be affected by maternal diet. Maternal malnutrition and alcoholism are situations in which nutritional rehabilitation should include a multivitamin supplement for the mother. Mothers who follow a vegan diet do not receive adequate vitamin B_{12} from their diet, and this may result in low B_{12} concentrations in their milk. Their babies may present with vitamin B_{12} deficiency without obvious symptoms in the mother. Therefore, vegan mothers should receive a multivitamin supplement to ensure adequate availability of micronutrients (see Chapter 10, Maintenance of Breastfeeding:

The Mother). If the mother is supplemented with multivitamins, water-soluble vitamin supplements do not need to be given to the baby. Preterm newborns should receive multivitamin preparations while receiving human milk and mixtures with human milk.

Iron

Iron reserves at birth are a critical factor in determining the risk for anemia during infancy. In healthy full-term infants, who generally have adequate iron reserves, there is little risk for anemia with exclusive breastfeeding before 6 months of age (see Chapter 9, Maintenance of Breastfeeding: The Newborn and Infant). In preterm newborns, or in some cases of maternal or newborn anemia, iron supplementation is warranted (see Chapter 12, Breastfeeding and Human Milk for Preterm Newborns and Infants).

Basic Breast Care

The mother should be given basic breast care information. She should be instructed that little special care is required, outside of avoiding the use of harsh soaps and detergents directly on the nipple and areola. The use of a comfortable, non-constraining nursing bra during lactation is advised. If an underwire-type bra is used, care should be taken to ensure that it fits properly and does not compress any tissue, which could lead to poor drainage and the potential for plugged ducts. Mothers should also be counseled on the use of breast pads to absorb leakage. These can either be reusable pads made of cloth or disposable pads. If disposable pads are chosen, those backed with plastic liners should be avoided, to reduce the possibility of inducing sore nipples from constantly being moist. Reusable pads should be changed frequently and laundered. Silicone pads are also available that stop the flow of breast milk altogether. No research has been conducted on these products.

Maternal Care

Recommendations for healthy eating with no special restrictions should be given to new mothers (see Chapter 10, Maintenance of Breastfeeding: The Mother). New mothers should also be asked about plans for contraception prior to discharge from the hospital (see Chapter 17, Contraception and the Breastfeeding Mother). Mothers should be made aware that most medications are safe during breastfeeding, but that anytime she is starting a medication, she should check with a lactation consultant or her baby's doctor to be sure it is safe. It is also important for mothers to be screened for perinatal mood and anxiety disorders and to be referred to resources for postpartum self-care,

such as the 4th Trimester project (https://jordaninstituteforfamilies.org/activate/4thtrimesterproject) or NewMomHealth.com.

Follow-up

General Support

Every breastfeeding mother should be provided with names and phone numbers of knowledgeable individuals who can provide breastfeeding advice on a 24-hour-a-day basis. Although primary physicians' offices provide general support to the breastfeeding mother, other community-based resources exist, such as the Special Supplemental Nutrition Program for Women, Infants, and Children; peer support groups (eg, La Leche League); Baby Cafés; telemedicine resources; and text messaging support. Contact information for knowledgeable professionals and resources should be shared, and mothers should be encouraged to participate.

Pediatric Follow-up

Before discharge from the hospital, an appointment should be made for an office visit. Ideally, families will be referred to breastfeeding-friendly offices (see Chapter 11, The Breastfeeding-Friendly Medical Office). American Academy of Pediatrics policy recommends that all newborns discharged before 48 hours after birth be evaluated by a health care practitioner within 48 hours of discharge. It would be prudent to have even earlier follow-up if the newborn is discharged before 24 hours after birth or has borderline feeding or jaundice. If the mother is ready for discharge but the newborn is not, every effort should be made to allow the mother to remain in the hospital, either as a continuing patient or as a "mother in residence," with access to her newborn for continued exclusive breastfeeding.

Maternal Follow-up

Assessment of breastfeeding should be an integral part of the postpartum obstetric evaluation. At the routine 4- to 6-week postpartum visit, the obstetric care professional should assess breastfeeding and provide support for the patient's decision to breastfeed (see Chapter 10, Maintenance of Breastfeeding: The Mother).

Return to Work

The physician can discuss plans with the new mother who intends to return to work outside the home or attend school soon after delivery. The timing of the return to work and a plan to adjust the infant's feedings and the milk supply should be discussed well before the anticipated date of return (see Chapter 10,

Maintenance of Breastfeeding: The Mother; Chapter 14, Lactation Support Technology; and Chapter 15, Supporting Breastfeeding During Mother-Infant Separation).

Care Provider Communication

If the obstetric care professional is made aware of breastfeeding issues that could affect the breastfed baby, these issues should be communicated to the pediatric health care professional, care managers, and child care providers (and vice versa, as appropriate), as well as from inpatient health care professionals to outpatient health care professionals.

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CHAPTER 9

Maintenance of Breastfeeding: The Newborn and Infant

Skilled anticipatory guidance and positive support are critical to the maintenance of lactation. When physicians have a good understanding of common breastfeeding issues, they can help foster a growing, healthy newborn and infant and a mother who is comfortable and confident with breastfeeding. Issues common to breastfeeding maintenance in the newborn and infant are addressed in this chapter.

Newborn Jaundice

Early-Onset Versus Late or Persistent Jaundice

Depending on the timing of when it occurs, there are 2 main categories of newborn jaundice. Each period or type of jaundice has both physiological and pathological causes that must be distinguished (**Figure 9-1**). All newborns have some degree of early-onset physiological jaundice in the first week after birth (which may serve to offer some protection via its antioxidant effect and infection-fighting mechanisms). Early-onset pathological jaundice, or jaundice occurring in the first week after birth that exceeds physiological levels, is almost always associated with poor oral intake. Rather than "breastfeeding jaundice" per se, it could be better described as "suboptimal intake jaundice," and its pathogenesis is considered to be the result of an increase in the enterohepatic circulation of bilirubin. Good management and support of the initiation of breastfeeding can help prevent early pathological jaundice by preventing poor intake or recognizing it early and managing it. Other causes of early-onset pathological jaundice include isoimmunization and other causes of hemolysis, as well as increased breakdown of heme caused by a cephalohematoma.

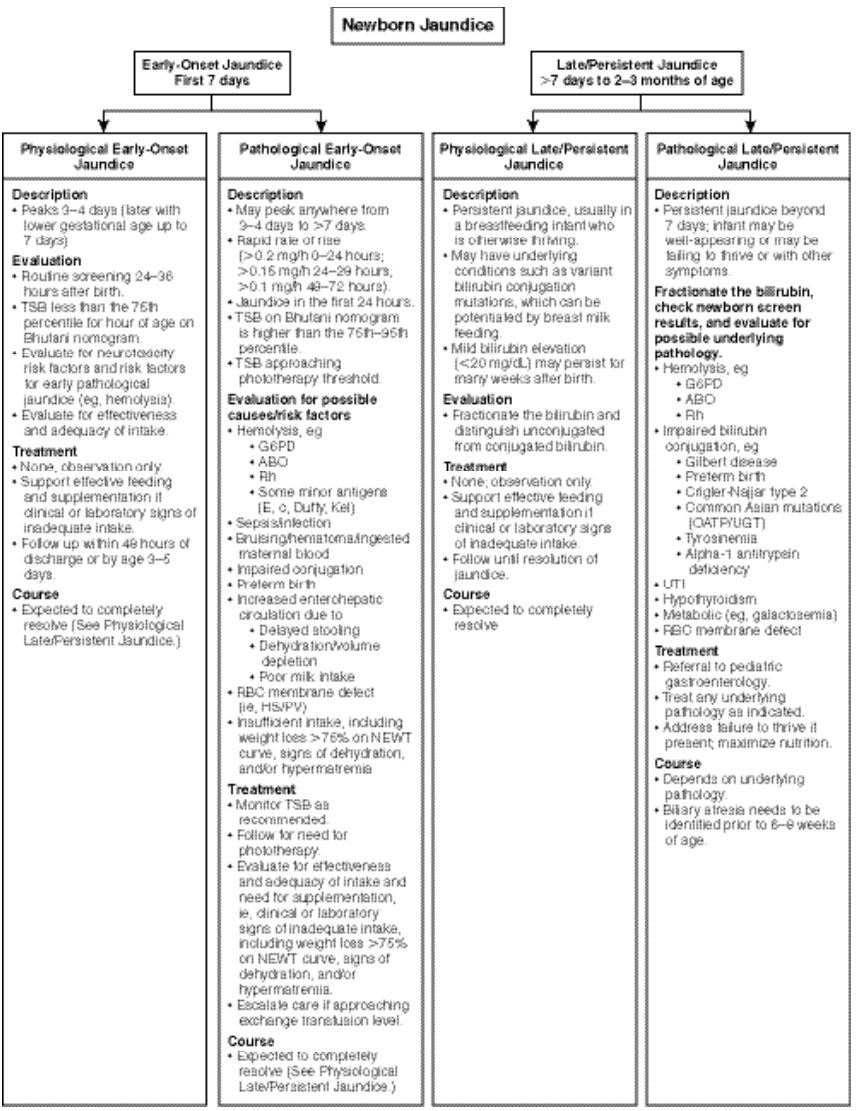


Figure 9-1. Early versus late newborn jaundice.

Late or persistent physiological jaundice is jaundice that persists beyond adequate weight gain and can continue for as long as 2 to 3 months. At the age of 28 days, 34% of predominantly breastfed newborns have transcutaneous bilirubin levels of at least 5 mg/dL, 9% have levels of at least 10 mg/dL, and 1% have levels of at least 12.9 mg/dL. Although extensively investigated, the pathogenesis of this prolonged jaundice remains elusive. Late or persistent physiological

jaundice is distinguished from late pathological jaundice by fractionating the serum bilirubin and ascertaining that it is all unconjugated bilirubin. Late or persistent pathological jaundice, which has a higher percentage of conjugated bilirubin, must be recognized early and managed promptly. The most concerning cause would be biliary atresia, which requires prompt surgical treatment to improve prognosis.

The Association of Breastfeeding and Jaundice

Jaundice is one of the most common reasons for hospital readmission of term and late-preterm newborns. Adequate support and management of breastfeeding initiation will help ensure adequate intake, making early-onset pathological jaundice less likely, thus helping to prevent the need for hospital readmission. All newborns should be assessed for adequate oral intake, as well as the presence of pathological jaundice, at each assessment period—starting with a careful physical examination and an objective assessment of jaundice with either a transcutaneous bilirubin reading or a total serum bilirubin level and continuing usually 24 to 48 hours after discharge from the hospital. If early-onset pathological jaundice is found, an evaluation is needed to determine the underlying cause, such as infection, acute hemolysis, or inadequate intake. If, based on objective criteria (see **Figure 9-1**), the newborn is determined to have insufficient oral intake, a thorough lactation assessment by a trained professional should occur, including a feeding observation and assessment of milk production, effectiveness of latch, and milk transfer. The first option for supplementation of the newborn with inadequate intake should be the mother's own expressed milk whenever possible. If the newborn needs more than the mother is producing, it is important to provide signaling to the mother's body by having the baby first feed at the breast, followed by pumping, to establish and maintain a full milk supply, with the goal of an eventual return to exclusive breastfeeding.

Late-preterm neonates are at a higher risk for development of kernicterus and are often the "great imitators"—that is, "feeding" at the breast often but lacking the strength, coordination, or vigor to adequately transfer milk and signal the mother's body to produce more. Clinicians cannot assume that these neonates will feed like term neonates. In the hospital, late-preterm newborns may appear to feed well. However, once they are at home, they may not have the stamina required to ingest larger volumes. They may struggle to achieve an adequate intake and may demonstrate a slow rate of weight gain. In addition, milk

removal may be suboptimal and may inadequately stimulate maternal milk supply. Close observation of late-preterm neonates is, therefore, essential.

If needed, phototherapy for jaundice can be accomplished in the hospital room with the mother. Unless the newborn is ill or is close to exchange transfusion level, the newborn does not require intensive care for jaundice. Intensive phototherapy can be provided while the newborn is held skin-to-skin with the mother and while breastfeeding. If it is determined that the newborn is dehydrated and/or having inadequate oral intake, in addition to facilitating adequate intake, it is important to (a) evaluate the mother-baby dyad for effectiveness of latch, milk production, and milk transfer and intervene as appropriate; (b) maximize intake of maternal milk by improving the latch or having the mother express her milk as needed; and (c) signal to the mother's body that she needs to produce more by hand expressing or pumping beyond milk removal if it is determined she is making less than the newborn needs. If more milk is needed than what the mother is producing, the mother should be assisted with pumping her breasts to signal her body to catch up to the baby's level of need; supplementation to the newborn can then be tapered as the mother's milk supply increases. In rare instances of jaundice approaching exchange level, breastfeeding—but not breast signaling—may be interrupted to help quickly lower the baby's bilirubin levels.

Growth Spurts

Growth spurts are common in newborns and infants—babies who are 2 weeks old do not take in as much as they will when they are 2 months old. During growth spurts, the baby acts hungrier than usual and may want to eat more frequently (generally over a period of 2–3 days) or stay at the breast longer, which can potentially lead the mother to believe her milk supply is insufficient and that she should start supplemental fluids or introduce complementary foods to satisfy her baby's appetite. Approximately one-third of breastfeeding mothers experience these growth-spurt periods with their babies 1 or more times during lactation; most occur during the first 3 months of lactation (typically around 2–3 weeks after birth, 6 weeks of age, and 3 months of age) and are of short duration.

When conducting assessments during these growth-spurt periods, the history and physical examination are unchanged. Verify that no new medications that might diminish milk production have been introduced, such as oral contraceptives or decongestants.

In terms of management, extra breastfeeding over a few days will stimulate an increased milk supply to enable the baby to resume a more normal feeding pattern. Administering anticipatory guidance about baby feeding patterns to the mother

can often prevent unnecessary supplementation and premature weaning. If the problem persists more than 3 or 4 days, the nursing dyad should be evaluated to determine the adequacy of the mother's milk supply and the baby's weight gain.

Nursing Refusal ("Nursing Strike")

A newborn's or infant's sudden refusal to nurse, often called a "nursing strike," can occur at any time and may be mistakenly perceived by the mother as a personal rejection, a rejection of the breastfeeding relationship, or evidence that her milk is bad or inadequate. These behaviors usually occur in older infants, and the mother may misinterpret a "nursing strike" as a sign to wean, unless she knows to expect these behaviors and how to manage them.

Nursing strikes are patterns of infant behavior that may be associated with the onset of the mother's menses; a change in maternal diet; a change in maternal soap, perfume, or deodorant use; or maternal stress. Infant nasal obstruction, infant illness, gastroesophageal reflux, choking episodes, and teething also can cause nursing strikes. The older breastfeeding infant might suddenly refuse to nurse when the mother goes back to work, when the infant is offered a bottle, or when there is another separation of the dyad. Occasionally, infants will refuse to feed from one breast. Sometimes this occurs after an episode of mastitis, when the milk tastes slightly saltier. There are also case reports of maternal malignancy causing an infant to refuse to feed on one side. If the reason can be identified and changed, nursing will usually resume quickly.

When conducting an assessment during a nursing strike, the history and physical examination are unchanged. In terms of management, when a baby refuses the breast, efforts to restore breastfeeding may take several days or longer. Infants may nurse more willingly when they are sleepy or just awakening, so-called dream feeding. Other methods to reestablish the nursing relationship include making feeding time special and quiet, with no distractions; increasing the amount of cuddling and stroking of the infant, including skin-to-skin care (**Figure 9-2**); and using co-bathing as a relaxation and reattachment strategy. All breastfeeding attempts and practicing should be conducted when the infant is calm and not frantically hungry, and mothers should refrain from forcing the infant to feed or struggling with the infant. Most babies will return to nursing, but often on their terms. Avoiding use of a bottle and using other methods of feeding in the interim, such as feeding from a cup, are often successful in overcoming breast refusal. Mothers should be advised to maintain their milk supply by using manual or mechanical expression techniques so that breast refusal is not compounded by insufficient maternal milk supply.



Figure 9-2. Increasing the amount of cuddling and stroking of the newborn or infant, including skin-to-skin care, can help reestablish the nursing relationship.

Ankyloglossia

Commonly known as *tongue-tie,* ankyloglossia is a congenital oral anomaly in newborns that may result in difficulty with suckling and could lead to sore nipples, low milk supply, poor weight gain, maternal fatigue, and frustration. It may affect breastfeeding more than bottle-feeding because of the differences in tongue movements between the feeding modalities (see Chapter 8, Breastfeeding in the Hospital).

Growth Patterns of Breastfed Newborns and Infants

Normal Growth Curves

In 2010, the World Health Organization (WHO) growth standards were adopted as the growth curves for children through the first 2 years of age by the Centers for Disease Control and Prevention (CDC), and the use of these curves is endorsed by the American Academy of Pediatrics (AAP). The curves were derived from a multinational, multicultural prospective study of newborns and infants who were healthy and optimally breastfed. These curves are available

on the CDC website and are considered the standard of care for assessing the growth of all newborns and infants. If other growth charts are used, the conclusions drawn from plotting the growth of a breastfed newborn or infant may be erroneous if the chart does not adequately reflect the normal growth of the breastfeeding newborn and infant.

Newborn Weight Loss Curves

A large study with more than 100,000 healthy newborns yielded weight loss curves that have since been validated and are available at www.newbornweight.org. These curves show weight trajectories for newborns according to delivery type and method of feeding (see Chapter 8, Breastfeeding in the Hospital). Weight loss of more than the 75th percentile of expected weight loss should prompt a feeding evaluation for effectiveness of latch, milk production, and milk transfer.

Growth Faltering

Concern should also arise when a newborn's or infant's weight for age (or weight for length) changes by more than 2 SDs below the median (approximately the fifth percentile) or the weight for age crosses more than 2 percentile channels downward on the growth chart. Nutritional assessment of the newborn or infant with slow weight gain or faltering linear growth includes an evaluation of milk supply and baby intake, appropriateness of complementary foods, intake of micronutrients (eg, zinc), and the feeding environment. The principles in the assessment of insufficient milk syndrome also should be considered for these babies (see Chapter 8, Breastfeeding in the Hospital).

Vitamin and Mineral Supplementation

To maintain an adequate serum vitamin D concentration, all breastfed newborns should routinely receive an oral supplement of 400 U per day of vitamin D, beginning at hospital discharge (see Chapter 8, Breastfeeding in the Hospital). Routine multivitamin and iron supplementation is not needed in breastfed term newborns in most areas of the world.

Iron

Iron reserves at birth are a critical factor in determining the risk of anemia during infancy. In healthy full-term newborns, who generally have adequate iron reserves, there is little risk of anemia with exclusive breastfeeding before 9 months of age, although biochemical indices of low iron status may occur

in some infants between 6 and 9 months of age. Some babies may require supplementation with oral iron drops before 6 months of age to support iron stores—for example, those with a history of anemia or blood loss at birth. With the trend toward delayed cord clamping, it may be that fewer babies will require iron supplementation. At about 6 months of age, iron should be given to the infant in the form of iron-containing or iron-fortified complementary foods, or iron drops can be given at a dose of 1 mg/kg/d. Pureed meats are good sources of heme iron. Iron-fortified infant cereals contain less bioavailable iron but are still a moderate source of iron.

Fluoride

Fluoride supplementation in breastfed newborns and infants is not recommended during the first 6 months after birth. Thereafter, fluoride supplementation is only recommended if the local water supply contains less than 0.3 ppm of fluoride, in which case a supplement of 0.25 mg/d is recommended. Maternal fluoride intake does not affect the fluoride content of human milk.

Zinc

Zinc intake from human milk is adequate until 6 months of age, and infants are reliant on complementary foods or supplements after this period. Preterm or low-birth-weight newborns and infants are at increased risk of development of zinc deficiency, which typically manifests with growth faltering.

More severe zinc deficiency is associated with a characteristic periorificial dermatitis. Zinc is not included in liquid multivitamin preparations for newborns or infants, so a liquid supplement can be compounded to provide 10 mg/mL elemental zinc; the dosage for supplementation is 1 mg/kg/d. Pureed meats or multiple-micronutrient–fortified infant cereals are excellent sources of zinc for the older infant who receives complementary foods.

Duration of Exclusive Breastfeeding and Introduction of Complementary Feedings

The AAP recommends exclusive breastfeeding for approximately 6 months after birth. Furthermore, the AAP supports continued breastfeeding, along with appropriate complementary foods introduced at about 6 months, as long as mutually desired by mother and child for 2 years or beyond. This

recommendation is consistent with the WHO and American Academy of Family Physicians guidelines. The American College of Obstetricians and Gynecologists recommends exclusive breastfeeding for the first 6 months after birth, with continued feeding as complementary foods are introduced during the infant's first year or longer, as mutually desired by the woman and her infant. The US Department of Agriculture Pregnancy and Birth to 24 Months project concluded that starting complementary feedings earlier than 6 months of age offers no benefit to the breastfeeding infant in growth or iron status but may increase the risk of overweight and obesity, especially if complementary feedings are introduced prior to 4 months of age.

As more and varied complementary foods are introduced, mothers should be supported in continuing to breastfeed as long as mutually desired by mother and child for the first 2 years of their child's life or beyond, as consistent with WHO recommendations. The food that is provided to exclusively breastfeeding mothers in the Special Supplemental Nutrition Program for Women, Infants, and Children contains a full supply of complementary foods that the infant will need from 6 to 12 months of age.

The timing of the introduction of complementary foods into the diet of the breastfed infant is difficult to define with precision, and, indeed, there may not be a single optimal age for all infants. Decisions about the introduction of complementary foods for individual infants need to be based on a number of considerations, including birth weight, postnatal growth rate, developmental readiness, and the possible perception that the infant needs more food and is not satisfied by more frequent breastfeeding. Infants who were born preterm or small for gestational age may need micronutrients provided by complementary foods earlier than other infants, especially iron and zinc. Delaying the introduction of complementary foods beyond 6 months of age is not recommended because of increasing risk of micronutrient deficiencies and potentially increased risk of atopic disease.

Sleep Patterns

Lack of sleep, in the mother or the newborn or infant, is a frequent parental concern. Parent and physician expectations for sleep are shaped by cultural norms, which may not be based on normal physiology and newborn or infant behavior.

Mother

Healthy breastfed newborns and infants wake easily and often to feed. In the early stages of establishing breastfeeding, it is important for the infant to breastfeed with every feeding cue and to feed at least 8 to 12 times per 24 hours in the first 2 to 3 months after birth, including during the night. Mothers with continuous rooming-in during their hospitalization after birth are able to sleep for the same duration as mothers whose newborns are taken out of their room, and sleep quality may be better while rooming-in. Because new babies require around-the-clock care, ideally mothers should be encouraged and supported in focusing only on the needs of the newborn and themselves in the first several weeks and, as much as possible, to sleep whenever the newborn is sleeping—including daytime napping in their daily routine—so that they may thereby adjust to their baby's physiological needs.

Sharing a Room but Not a Bed

Conducting nighttime feedings can be made easier by allowing the newborn or infant to sleep in the same room as the mother but on a separate and approved sleep surface for babies, particularly during the period of greatest risk (when the baby is younger than 4 months). Room sharing without bed-sharing facilitates responding to the baby's feeding cues throughout the night, while leaving the mother's sleep relatively undisturbed. Some families may prefer using an attached bedside bassinet (sometimes called a "co-sleeper") or having a free-standing bassinet next to their bed. Although sharing a bed (ie, sharing the same sleep surface with a baby) is a common sleeping arrangement for most of the world, including higher-income/resource countries, and can promote breastfeeding duration and exclusivity, the AAP does not endorse such a sleeping arrangement because of the concern of sudden unexpected infant death, which includes sudden infant death syndrome, accidental suffocation or strangulation, or deaths due to unknown causes. Families who choose to share a bed with their baby should be made aware of the risks and recognize that sharing a bed may be hazardous, especially under certain conditions such as preterm birth, exposure to tobacco smoke, maternal use of sedating substances or medications, and the presence of soft bedding.

Dental Health

The risk of dental decay exists for the breastfed infant, as it does for the bottle-fed infant. Early childhood dental caries can result from a complicated combination of factors, including genetics, general nutrition, preventive dental care, and the presence or absence of *Streptococcus mutans*, which is usually acquired

from the mother or another adult through close oral contact. Infants should see a dentist as early as 6 months of age and no later than 6 months after the first tooth erupts or 12 months of age (whichever comes first). Good dental hygiene is important for all infants, regardless of feeding method.

Newborn and Infant Illness

The severity of newborn and infant illness, such as upper or lower respiratory infection, otitis media, and gastroenteritis, is reduced overall if breastfeeding is maintained. Because of its low solute load, human milk enables the ill baby to maintain hydration despite fever, diarrhea, or other increased fluid losses. Continued breastfeeding helps lessen the severity and duration of the diarrhea and helps preserve gut mucosal integrity. With significant respiratory symptoms, a newborn or infant may feed better at the breast than with a bottle because the baby has more control over the milk flow. Human milk can be expressed and fed through a syringe, small cup, or a feeding tube if the baby is unable to suckle. In addition to the appropriateness of human milk for a sick baby, there is the added comfort of nursing because of the closeness with the mother.

Readmission to the Hospital

Breastfeeding newborns and infants should be followed up closely to watch for signs of excessive weight loss, dehydration, hyperbilirubinemia, and hypernatremia that can result from insufficient oral intake. As discussed earlier, it is necessary to conduct feeding observations to assess effectiveness of latch and milk production and transfer and to monitor weight trajectories to ensure that babies who are not receiving adequate calories or volume are detected and managed appropriately so that they can thrive and avoid hospitalization whenever possible. If hospitalization occurs for any reason, efforts should be made to continue breastfeeding, along with administering any medically necessary supplementation. In addition, a lactation evaluation by a trained professional should occur to determine the root cause of the problem and to ensure adequate milk production signaling to the mother's body via mechanical breast pumping or hand expression if supplementation is necessary. Every effort should be made to keep the mother and baby together. When the breastfeeding mother requires hospitalization, efforts should be made to continue the breastfeeding relationship either by having the newborn stay with the mother through the hospitalization or by bringing the newborn to the mother one or more times per day to complement mechanical milk expression (see Chapter 10, Maintenance of Breastfeeding: The Mother).

Breastfeeding Guidance During Preventive Pediatric Health Care Visits

Lactation is a dynamic process, as is growth and development, so the health care practitioner should be mindful of the changing agenda at each follow-up visit. Incorporation of breastfeeding assessments, encouragement, and anticipatory guidance may enhance successful breastfeeding outcomes. A summary of key points for each follow-up visit from the first newborn office visit to 12 months of age is provided in **Boxes 9-1** through **9-7**.

Breastfeeding in the Second Year and Beyond

The AAP supports continued breastfeeding, along with appropriate complementary foods introduced at about 6 months, as long as mutually desired by mother and child for 2 years or beyond. In societies in which children are allowed to nurse as long as they wish, they usually self-wean, without emotional trauma, between 3 and 4 years of age. Physicians may be surprised to discover that their patients are actually nursing much longer than they believe. Mothers may fail to disclose that they are continuing to nurse an older infant or child if they perceive that their physician may not approve of or support their continued breastfeeding.

The studies demonstrating advantages of breastfeeding for children and mothers indicate that many of the benefits are directly related to the duration of breastfeeding. The composition of human milk, including most nutrients and bioactive factors, does not change markedly from 12 to 24 months after birth. Because the human immune system may not mature completely for several years, the constituents of human milk continue to support the host defense of the child. Breastfeeding also promotes comfort and caring. A strong attachment to the mother during the early years may have a positive neurobehavioral effect. Long-term breastfeeding seems to be a mutually positive experience for mother and child.

Weaning

Weaning can mean either the beginning of a process of gradual introduction of complementary feedings and decreased breastfeeding or the complete cessation of breastfeeding. Weaning is a complex process that involves nutritional, microbiological, immunologic, biochemical, and psychological adjustments.

(*continued on page 164*)

Box 9-1. Breastfeeding Assessment: 48 to 72 Hours After Discharge

Breastfeeding Assessment

- What is the number of feedings in the past 24 hours?
- What is the number of wet diapers in the past 24 hours?
- What is the number and color of stools in the past 24 hours?
- Does the newborn need to be awakened to feed?
- Does the newborn easily latch on to the breast and nurse eagerly?
- Is the newborn receiving any supplements?
- How is mother doing, and how is she feeling about breastfeeding?
- Is the latch comfortable for the mother? Is there any nipple pain or compression?
- Has the mother experienced signs of increased milk production? If so, when? If not, explain the importance of monitoring mother and baby until this occurs.
- Is the mother taking any medications?

Examination of the Newborn and Mother

- Calculate the newborn's weight gain or loss since birth.
- With the mother's permission, assess breastfeeding, with an observed breastfeeding session by using standardized methods such as LATCH scoring.
- Encourage the mother to express concerns about breast changes during lactation; examine and refer her as clinically necessary.
- Perform routine newborn examination, with attention to oral-motor function.
- Assess the newborn's state of hydration.
- Observe the newborn for jaundice and develop a follow-up plan for the bilirubin level if it is in the high- or intermediate-risk zone.

Anticipatory Guidance

- Discuss the importance of exclusive breast milk feedings until about 6 months of age.
- Encourage breastfeeding on demand.
- Review normal breastfeeding patterns.
- Discourage use of pacifiers until breastfeeding is well established (usually around 2–4 weeks of age), and discuss potential risks of using a pacifier.
- Recommend sleeping within close proximity but avoiding sharing the same sleep surface.
- Avoid long nighttime intervals without feeding.
- Review normal elimination patterns.
- Reinforce the need to use a vitamin D supplement.

Breastfeeding Interventions

- Attempt to determine and treat the cause of any inadequate milk supply before supplementing.
- Consider referral to a lactation specialist if problems are ongoing.
- Develop a support group or refer patients to an existing breastfeeding support group.

Closing the Visit

- Congratulate the parents on the decision to breastfeed their newborn.
- Review some of the benefits of breastfeeding.
- Remind the mother to eat when hungry and drink when thirsty.
- Arrange for appropriate follow-up until newborn weight gain is adequate and breastfeeding is going well.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Box 9-2. Breastfeeding Assessment: 1-Month Office Visit

Breastfeeding Assessment
- What is the infant's feeding pattern?
- What is the number of feedings per 24 hours?
- Is the infant breastfeeding on demand?
- What is the number of wet diapers and stools per 24 hours?
- Is the infant receiving any supplements?
- How is the mother feeling?
- How does the mother perceive her milk supply?

Examination of the Infant and Mother
- Plot the infant's weight on www.newbornweight.org.
- The infant should be gaining approximately 140 to 200 g (5–7 oz) per week.
- With the mother's permission, observe and assess breastfeeding, using validated scoring tools such as LATCH, if weight gain is inadequate or feeding is ineffective.
- Screen for maternal depression by using standardized screening tools.
- Perform complete examination.

Anticipatory Guidance
- Discuss the importance of exclusive breast milk feedings until about 6 months of age.
- Is the infant usually breastfeeding 8 to 12 times per 24 hours?
- Encourage unrestricted breastfeeding.
- Review normal patterns of nighttime feedings, typically 1 or 2 feedings per night.
- Remind the family about the importance of vitamin D supplementation.
- It is OK to introduce a pacifier with sleeping if breastfeeding is well established.
- Explain changes in normal stool production patterns.
- Review maternal nutrition.
- Discuss the mother's plans to return to school or work.
- Explain techniques for expressing and storing breast milk.
- Discuss common over-the-counter medications and how they may affect breastfeeding.

Breastfeeding Interventions
- Attempt to determine and treat the cause of any inadequate milk supply before supplementing.
- Consider referral to a lactation specialist if problems are ongoing.

Closing the Visit
- Commend the mother on ongoing breastfeeding success.
- Review some of the benefits of breastfeeding.
- Encourage continued breastfeeding and discuss any plans to return to work or school and how to maintain breastfeeding if mother and baby are separated.
- Explain techniques for expressing and storing breast milk.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Box 9-3. Breastfeeding Assessment: 2-Month Office Visit

Breastfeeding Assessment
- What is the baby's feeding pattern?
- Is the baby breastfeeding on demand?
- Has the baby had any feedings other than breast milk?
- How does the mother perceive her milk supply?
- Is the mother taking any medications?
- Is the mother restricting any foods?

Examination of the Baby and Mother
- Plot the baby's weight on the WHO growth curve for infants 0 to 2 years of age.
- Baby should be gaining approximately 140 to 200 g (5–7 oz) per week.
- Observe breastfeeding if weight gain is inadequate or feeding is ineffective and ask about any nipple compression or soreness.
- Perform routine examination.
- Screen for maternal depression by using standardized screening tools.

Anticipatory Guidance
- Discuss the importance of exclusive breast milk feedings until about 6 months of age.
- Is the baby usually breastfeeding 8 to 12 times per 24 hours?
- Encourage unrestricted breastfeeding.
- Review normal patterns of nighttime feedings, typically 1 or 2 feedings per night.
- Stool production may become less frequent in a normally breastfeeding baby.
- Discuss teething in a breastfeeding baby.
- Discuss the mother's plans to return to school or work.
- Explain techniques for expressing and storing breast milk.
- Discuss common over-the-counter medications.
- Reinforce the recommendation to provide 400 IU of vitamin D daily.

Breastfeeding Interventions
- Attempt to determine and treat the cause of any inadequate milk supply before supplementing.
- Consider referral to a lactation specialist if problems are ongoing.

Closing the Visit
- Commend the mother on ongoing breastfeeding success.
- Review the benefits of continued exclusive breastfeeding for about 6 months.
- Encourage continued breastfeeding through at least 2 years of age.

Abbreviation: WHO, World Health Organization.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Box 9-4. Breastfeeding Assessment: 4-Month Office Visit

Breastfeeding Assessment
- What is the baby's feeding pattern?
- Is the baby content with feedings?
- Is the baby breastfeeding on demand?
- What is the baby's longest sleep period at night? If not at night, when?
- Has the baby had any feedings other than breast milk? If so, what?
- How does the mother perceive her milk supply?
- Is the mother taking any medications?

Examination of the Baby and Mother
- Plot the baby's weight on the WHO 0- to 2-year growth curve.
- The baby should be gaining approximately 140 to 200 g (5–7 oz) per week.
- Observe breastfeeding if weight gain is inadequate, feeding is ineffective, or the mother has concerns.
- Perform routine examination.
- Screen for maternal depression by using standardized screening tools.

Anticipatory Guidance
- Is the baby usually breastfeeding 6 to 12 times per day at 4 months of age?
- Discuss the importance of exclusive breast milk feedings until about 6 months of age.
- Encourage unrestricted breastfeeding.
- Review normal patterns of nighttime feedings, typically 1 or 2 feedings per night.
- Discuss the potential for iron supplementation.
- Stool production may become less frequent in a normally breastfeeding baby.
- Discuss breastfeeding the baby during teething.
- Discuss the increasing distractibility of the baby during feedings.
- Discuss the mother's plans to return to school or work.
- Explain techniques for expressing and storing breast milk.
- Discuss common over-the-counter medications.
- Reinforce the recommendation to provide 400 IU of vitamin D daily.

Breastfeeding Interventions
- Attempt to determine and treat the cause of any inadequate milk supply before supplementing.
- If the baby is gaining weight and the mother is satisfied with feeding behavior, interventions are usually not indicated.

Closing the Visit
- Commend the mother on ongoing breastfeeding success.
- Review some of the benefits of breastfeeding.

Abbreviation: WHO, World Health Organization.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Box 9-5. Breastfeeding Assessment: 6-Month Office Visit

Breastfeeding Assessment
- What is the baby's feeding pattern?
- Is the baby content with feedings?
- Is the baby's longest sleep period at night? If not at night, when?
- Has the baby had any feedings other than breast milk? If so, what?
- How does the mother perceive her milk supply?
- Is the mother taking any medications?

Examination of the Baby and Mother
- Plot the baby's weight on the WHO 0- to 2-year growth curve.
- Assess the baby's weight gain by using current growth standards.
- Observe breastfeeding if weight gain is inadequate, feeding is ineffective, or the mother has concerns.
- Perform complete examination.
- Screen for maternal depression by using standardized screening tools.

Anticipatory Guidance
- Is the baby usually breastfeeding 6 to 12 times per 24 hours?
- Review the importance of continued breastfeeding.
- Discuss readiness for introduction of complementary foods.
- Discuss the importance of iron-containing foods.
- Offer expressed breast milk or supplemental fluids in a cup.
- Discuss the increasing distractibility of baby during feedings.
- Discuss breastfeeding the baby during teething.
- Introduce fluoride supplement if indicated.
- Recommend that the mother obtain a routine breast examination from her physician.
- Review the recommendation to provide 400 IU of vitamin D daily.

Breastfeeding Interventions
- If the baby is gaining weight and the mother is satisfied with feeding behavior, interventions are usually not indicated.

Closing the Visit
- Commend the mother on ongoing breastfeeding success, especially if the baby was exclusively breastfed for 6 months.
- Review some of the benefits of continued breastfeeding for 2 years and beyond.

Abbreviation: WHO, World Health Organization.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Box 9-6. Breastfeeding Assessment: 9-Month Office Visit

Breastfeeding Assessment
- What is the baby's feeding pattern?
- Is the baby's longest sleep period at night? If not, when?
- What other foods does the baby take?
- Is the mother taking any medications?

Examination of the Baby and Mother
- Plot the baby's weight on the WHO 0- to 2-year growth curve.
- Assess the baby's weight gain by using current growth standards.
- Observe breastfeeding if weight gain is inadequate, feeding is ineffective, or the mother has concerns.
- Perform complete examination.
- Obtain hematocrit or hemoglobin measurement.

Anticipatory Guidance
- Is the baby usually breastfeeding fewer than 6 to 8 times per 24 hours?
- Review the importance of continued breastfeeding.
- Discuss the importance of iron-containing foods.
- Offer expressed breast milk or supplemental fluids in a cup.
- Discuss breastfeeding the baby during teething.
- Discuss the behavior of an older breastfeeding baby, including nursing strikes and how to manage them.
- Discuss the benefits of long-term breastfeeding.
- Recommend that the mother obtain a routine breast examination from her physician.
- Review the recommendation to provide 400 IU of vitamin D daily.

Breastfeeding Interventions
- If the baby is gaining weight and the mother is satisfied with feeding behavior, interventions are usually not indicated.

Closing the Visit
- Commend the mother on ongoing breastfeeding success, especially if the baby was exclusively breastfed for 6 months.
- Review the benefits of continued breastfeeding.

Abbreviation: WHO, World Health Organization.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Box 9-7. Breastfeeding Assessment: 12-Month Office Visit and Beyond

12-Month Office Visit

Breastfeeding Assessment

- What is the toddler's feeding pattern?
- Is the toddler's longest sleep period at night? If not, when?
- What other foods does the toddler take?

Examination of the Toddler and Mother

- Assess growth by plotting the toddler's weight on the WHO 0- to 2-year growth curve.
- Perform complete examination.
- Consider obtaining hematocrit or hemoglobin measurement, if indicated.
- Observe breastfeeding if weight gain is inadequate, feeding is ineffective, or the mother has concerns.

Anticipatory Guidance

- Is the toddler usually breastfeeding 4 to 8 times per 24 hours?
- Review the importance of continued breastfeeding.
- Discuss the importance of iron-containing foods and introducing a wide variety of foods and flavors.
- Offer expressed breast milk or supplemental fluids in a cup.
- Discuss breastfeeding the toddler during teething.
- Discuss the behavior of an older breastfeeding toddler.
- If weaning is desired, discuss appropriate weaning techniques.
- Recommend that the mother obtain a routine breast examination from her physician.
- Review the recommendation to provide 400 IU vitamin D daily.

Breastfeeding Interventions

- Provide indicated support or intervention.

Closing the Visit

- Commend the mother on successfully breastfeeding for 12 months.
- Review some of the benefits of breastfeeding a toddler.

15-Month, 18-Month, and 2-Year Office Visits, and Beyond

- Breastfeeding support and anticipatory guidance should continue to be included in well-child visits as long as mother and child continue to breastfeed.

Abbreviation: WHO, World Health Organization.

Adapted from American Academy of Pediatrics Work Group on Breastfeeding. *Checklists for Breastfeeding Health Supervision.* Elk Grove Village, IL: American Academy of Pediatrics; 2013.

Infant-led weaning can easily be confused with a nursing strike. When infants attempt to wean from the breast, the reasons commonly cited include inadequate milk supply (eg, because of illness or return to work) and infant illness.

Mother-led weaning should be done gradually by replacing one feeding at a time with solids, a bottle, or a cup, depending on the infant's age and stage of development. The bedtime breastfeeding is often the last to be eliminated. Occasionally, sudden weaning is necessary because of severe illness in the mother or prolonged separation of the mother and infant. Mothers should use manual or mechanical methods of milk expression to relieve breast fullness; wear a supportive, comfortable bra; and be alert to signs of a plugged duct or breast infection. Other measures, such as cold compresses, may help in reducing engorgement. Rapid weaning may increase the mother's risk for development of mastitis. The infant should receive extra cuddling and holding during the weaning process, as should the mother.

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CHAPTER 10

Maintenance of Breastfeeding: The Mother

Support for the breastfeeding mother continues beyond the immediate postpartum period. The mother's obstetric care professional should assess her breasts at various postpartum visits and be aware of the evaluation and management of various maternal problems and complications related to lactation.

Postpartum Visits

Routine Obstetric Visits

All women should have contact, either by phone or in person, with their obstetric care professional within the first 3 weeks' postpartum. If any difficulties with lactation are identified by phone, an in-person visit should be offered. This initial assessment should be followed up with ongoing care as needed and should be concluded with a comprehensive visit by 12 weeks' postpartum. Obstetric care professionals should encourage the mother to bring the baby to all visits.

Breastfeeding Assessment

Early, undesired weaning may occur before 6 weeks' postpartum, so early initial contact is an ideal time to address any concerns about a mother's perceived breastfeeding problems or concerns. This visit should include observation of the newborn or infant breastfeeding, specifically assessing position, latch, and milk transfer.

Providing Support

Obstetric support for the mother's decision to breastfeed has been shown to improve breastfeeding continuation. This is an ideal time to praise the success

of her breastfeeding experience and allow the mother to explore any of her concerns.

Breast Examination

A breast examination should be performed to evaluate the mother for any signs of trauma, infection, or breast masses. It may be helpful to have the mother nurse her baby prior to the examination to decrease the engorgement of tissue that could obscure physical examination findings. The obstetric care professional should also encourage continuation of breastfeeding and point out the benefits of exclusive breastfeeding during the first 6 months after birth. The mother should also be familiar with the normal appearance and feel of her lactating breasts, and she should report any unusual findings to her health care professional.

Plans for Return to Work

Plans for the new mother to return to work outside the home should be discussed, including options for feeding and milk expression. Milk expression should begin before her return to work so that there is an adequate supply of stored milk to allow for daily variations in the amount of milk consumed by the baby (see Chapter 15, Supporting Breastfeeding During Mother-Infant Separation). It should be noted that in 2010, the Patient Protection and Affordable Care Act amended section 7 of the Fair Labor Standards Act to require employers to provide reasonable break time for an hourly employee to express breast milk for her nursing infant for 1 year after the infant's birth. Employers are also required to provide a place, other than a bathroom, that is shielded from view and free from intrusion from coworkers and the public so that mothers may express their milk. Many state and local laws offer additional lactation accommodations that may protect salaried employees, as well.

Resources

Mothers should be provided with the names and phone numbers of local resources that can provide lactation advice on a 24-hour-a-day basis. Mothers also should know of breastfeeding peer support groups, have their contact information, and be encouraged to participate (see Appendix A).

Post-cesarean Delivery

If the mother has undergone a cesarean delivery, she may have more difficulty establishing and sustaining lactation. Although a follow-up visit at 2 or 3 weeks' postpartum is primarily focused on detecting surgical complications, it is also

well timed to assist with any early breastfeeding concerns. This visit offers an opportunity to provide anticipatory guidance and support as lactation is being established.

Short-term Maternal Breastfeeding Issues

Nipple pain and engorgement are the most frequent complaints of lactating women, which may occur early in the immediate postpartum period (see Chapter 8, Breastfeeding in the Hospital) but may also arise at any time during lactation.

Nipple Pain

Assessment of breastfeeding technique and latch is the most important part of prevention and early management of nipple pain and skin breakdown. A detailed history of the onset of pain, location, and timing is important. Pain on latching is often associated with poor latch or holding the breast too close to the nipple. Pain during a feeding may be related to poor latch or tongue mobility issues (eg, ankyloglossia). Pain at the end of a feeding may be caused by insufficient release of suction. When pain occurs later during a feeding, the latch may need readjustment. Differential diagnosis for pain includes simple irritation, nipple damage, contact or atopic dermatitis, psoriasis, infection, and nipple vasospasm. Slow letdown may also be a cause of pain, especially when a mother is exhausted or anxious. This problem usually resolves with time, and relaxation techniques may hasten the process. Nipple damage may be caused by suboptimal latch, ankyloglossia (tongue-tie), infant biting and/or jaw clenching, or breast pump trauma. No specific topical agent has been shown to provide relief superior to expressed breast milk applied to the nipple after feeding. For suboptimal latch, adjustment of positioning to draw the breast/nipple further into the baby's mouth in an asymmetrical position, with the nipple resting in the arch of the baby's palate, relieves pain and helps protect the nipple from further damage.

Dermatoses

Contact dermatitis may be commonly seen on and around the areola in breastfeeding women. Dermatitis is triggered in women with atopic tendencies or by irritants such as friction during feedings, laundry detergents and/or dryer sheets, or nipple creams. Another potential cause is contact with foods once they are introduced into the infant's diet. Some baby foods can become topical

triggers for contact dermatitis in the mother. Less commonly, psoriasis may flare (usually at 4–6 weeks' postpartum) and may be a response to skin injury. Treatment includes use of an emollient, a low- to medium-strength steroid ointment applied twice daily for 2 weeks (applied just after breastfeeding), and occasionally the use of a short course of prednisone in severe or resistant cases. If the condition progresses and does not respond to treatment, referral for biopsy or treatment may be required to rule out the rare but serious condition of Paget disease of the nipple.

Superficial Nipple Bacterial Infections

Infection is one cause of nipple pain beyond the immediate postpartum period. As with any defect in the skin, a nipple crack or abrasion is likely to grow *Staphylococcus aureus*. Treatment with topical antibiotic ointments, as well as local wound care, often bring relief in a matter of days.

Bacterial Dysbiosis and Lactiferous Duct Infections

Bacterial overgrowth combined with biofilm formed by bacteria (and possibly yeast) may lead to narrowed lactiferous ducts and inflamed epithelium. This condition may appear with a constant, dull, deep aching pain in both breasts. With milk flow and ejection, this condition may cause pressure and sharp shooting pain. Nipple and breast milk cultures may clarify this diagnosis. Treatment with an oral antibiotic such as a cephalosporin, amoxicillin/clavulanate, dicloxacillin, or erythromycin for 2 to 6 weeks may be required to resolve clinical symptoms.

Nipple *Candida* Infections

The association of *Candida* with nipple and/or breast pain remains controversial, as both *Staphylococcus* and *Candida* may be found in asymptomatic women.

Symptoms

Superficial nipple and/or skin infections caused by *Candida* may appear with nipple pain, itching, or pinkness of the skin.

Causes

Predisposing factors for *Candida* infections of the breast include infant thrush, nipple trauma, antibiotic use, diabetes, steroid use, and immune deficiency. Some experts have noted the association of *Candida* with the use of plastic-lined breast pads, which keep the nipples moist.

Evaluation

Candida nipple infections can be treated on the basis of clinical symptomatology alone, if no other diagnosis is apparent. It is difficult to prove that *Candida* is the causative organism in many situations. Because yeast is ubiquitous, cultures of skin surfaces may represent skin flora and yield positive results even in asymptomatic mothers. Therefore, cultures of milk or the skin surface for *Candida* are not helpful and are not performed routinely.

Management

Treatment of superficial nipple infections caused by *Candida* should be undertaken by treating the mother and baby simultaneously when either of them is symptomatic. The mother's partner also may need treatment. Therapies include

- *Antifungal therapy*. A variety of effective antifungal agents are available. Typically, mothers are treated with a topical antifungal agent, such as ketoconazole, nystatin, or miconazole. The antifungal cream is applied to the mother's breast after feeding. An antifungal solution, such as nystatin suspension, is swabbed on the inside of the baby's inner cheeks and tongue after feeding. The baby's diaper area also may need treatment. This therapy is usually continued for 14 days or at least several days after symptoms have resolved.
- *Gentian violet*. Another topical treatment option includes the use of 0.25% to 1% gentian violet swabbed on the affected areas for up to 3 days. Gentian violet may cause permanent staining of clothing, temporary violet discoloration of the baby's mouth, and occasionally irritation, oral ulceration, stomatitis, nausea, vomiting, or diarrhea.
- *Oral fluconazole* may be prescribed for the mother if the nipples are not significantly better after several days of topical treatment or if symptoms persist or worsen. The baby may also require oral fluconazole in cases of recurrent or intractable oral candidiasis.
- *Additional management*. Any objects in contact with the baby's mouth (eg, pacifiers, nipples) or the mother's breast (eg, breast pump equipment) should be washed in hot, soapy water and submerged in boiling water daily. Clothing, such as bras and blouses, should be laundered by using a dilute bleach solution or dried in sunlight daily. If used, disposable nursing pads are preferred. Leaving the breasts exposed to air and applying good wound care principles may assist with rapid healing. Other sites of yeast infection should also be checked, such as yeast vaginitis or tinea cruris in the mother's partner and diaper rash in the baby. Regardless of the treatment regimen used, the mother should be instructed on appropriate hygiene to prevent reinfection.

Viral Infection

Herpes simplex virus infection should be considered in the setting of blisters (unlike a milk blister, which is usually an isolated blister covering a milk duct). Affected areas should be cultured to confirm the diagnosis. Because babies may be at risk for severe complications of herpes simplex virus infection, mothers should not breastfeed on the affected side, and expressed breast milk should be discarded until the infection has resolved. Herpes zoster may also be contagious to the baby, and zoster immunoglobulin may be indicated to minimize risk to an exposed breastfeeding baby (see Chapter 16, Medications and Breastfeeding).

Vasospasm

Vasospasm occurs with blanching or purple color changes of the nipple, accompanied by sharp, shooting, or burning pain. It may occur after breastfeeding or with exposure to cold, and it is often associated with a history of nipple trauma. Vasospasm may be treated with warm compresses and avoidance of cold stimuli. Nifedipine 30-mg to 60-mg sustained-release tablets given daily or 10-mg to 20-mg immediate-release tablets given 3 times daily for 2 weeks may be used if heat and avoidance of underlying trauma are not effective.

Allodynia (Functional Pain)

Allodynia is a sensation of pain in response to a stimulus, such as light touch, that would otherwise not cause pain. Breast allodynia may be associated with other chronic pain disorders. Treatment may include around-the-clock nonsteroidal anti-inflammatory medications, propranolol starting at 20 mg 3 times daily, antidepressants, and psychological therapy.

For general management of functional pain, limiting the time at the breast, even with the intention of gradually increasing nursing time, will not prevent nipple pain. Treatment for nipple pain depends on the underlying cause. Skilled help with positioning and latch-on are primary interventions. Specific infections and dermatoses require directed therapy. Some creams and lotions can be irritating and can result in allergic manifestations. Pain relief with nonsteroidal agents may be necessary. If severe trauma exists, it may be necessary to manually or mechanically express milk until the tissue has healed well enough to resume breastfeeding. Nipple healing might be hastened if a small amount of breast milk is applied to the area after a feeding. Different breastfeeding positions may also be helpful in avoiding more sensitive or traumatized areas. If only one breast is affected, nursing should begin on the unaffected breast to achieve the letdown reflex, and the baby may then be moved to the affected breast when suckling

may be less vigorous. Nipple pain may also be lessened by the use of a silicone nipple shield (see Chapter 14, Lactation Support Technology).

Engorgement

Swelling and distension can result from ineffective drainage of the breast; engorgement usually occurs around the time milk production peaks, approximately 3 to 7 days' postpartum (see Chapter 8, Breastfeeding in the Hospital). Engorgement may also occur later in the course of breastfeeding in relation to a missed feeding or an abrupt change in feeding frequency. Engorgement should not be confused with a plugged duct, which can result in a localized lump or cord in one area of the breast, or with mastitis, which can result in fever, systemic flulike symptoms, and an increased white blood cell count (**Table 10-1**). Engorgement may be the result of infrequent or ineffective nursing from causes such as sore nipples, a sleepy baby, or mother-baby separation.

The breast must be examined to rule out related problems, such as plugged ducts or mastitis. If left untreated, engorgement can lead to difficulties in properly latching the baby to the breast and to mastitis. The best treatment of engorgement is prevention. Frequent breastfeeding or pumping of the breasts (≥8 times per day from both breasts) is the best way to prevent engorgement. *Reverse pressure softening* is a technique that may be used to reduce edema around the nipple and areolar complex and facilitate a proper latch when the nipple may otherwise be distorted by breast edema. Reverse pressure softening is performed by applying steady, gentle, but firm pressure on a 1- to 2-cm radius of the central

Table 10-1. Comparison of Findings of Engorgement, Plugged Duct, and Mastitis

Characteristics	Engorgement	Plugged Duct	Mastitis
Onset	Gradual, immediately postpartum	Gradual, after feedings	Sudden, after 10 days
Site	Bilateral	Unilateral	Usually unilateral
Swelling and heat at the site	Generalized	May shift; little or no heat	Localized, red, hot, swollen
Pain	Generalized	Mild, but localized	Intense, but localized
Body temperature	<38.4°C (101°F)	<38.4°C	>38.4°C
Systemic symptoms	Feels well	Feels well	Flulike symptoms

Adapted with permission from Lawrence RA, Lawrence RM. *Breastfeeding: A Guide for the Medical Professional.* 6th ed. Philadelphia, PA: Elsevier, Mosby, Philadelphia, PA; 2005:563.

areola, adjacent to its junction at the base of the nipple. Pressure is applied for 1 to 3 minutes and may be performed before each attempt at latching until engorgement has resolved.

Oversupply

Oversupply may be common in the initial weeks of breastfeeding. Excessive milk expression may exacerbate this condition. Oversupply may cause breast and nipple pain, and it is associated with an increase in risk of plugged ducts, mastitis, and other breastfeeding complications. A spontaneous oversupply may stabilize as the breasts adjust to the baby's nutritional needs. Blocked feedings, in which only one breast is offered at each feeding, may help regulate milk supply and minimize symptoms.

Plugged Ducts (Milk Stasis)

Symptoms

A *plugged duct* is a localized blockage of milk and frequently manifests as a painful knot in the breast. This lump may decrease in size with nursing.

Causes

This condition may be caused by an abrupt change in the feeding schedule, inadequate draining of the breast, failure to vary nursing positions, wearing of tight and constricting clothing (eg, a poorly fitting underwire bra), incorrect pump flange size, or sleep position. It may originate as a milk blister that can block a duct opening superficially. Especially when the condition recurs in the same breast segment, the cause may be anatomical variations leading to plugged ducts. Rarely, what is considered a plugged duct may be a tumor—benign or malignant—that is blocking the duct.

Evaluation

Plugged ducts are easily differentiated from engorgement and mastitis because blockage is not associated with fever or other signs of systemic illness (see **Table 10-1**). If the plugged duct does not resolve within 48 to 72 hours or if fever develops, the mother should be evaluated by a health care professional.

Management

The treatment of plugged ducts is the application of moist heat prior to feeding and massage of the affected area before and during nursing. If possible, start feedings with the affected breast first. Attempt different positions to allow better drainage of the particular part of the breast that is affected, pointing the baby's

nose or chin in the direction of the blockage. Ensure that the breast tissue is not being compressed, such as indenting the breast with the finger(s) to provide an airway space for the baby.

Mastitis

Typically defined as a unilateral bacterial infection of the breast, mastitis occurs in 2% to 3% of lactating women.

Symptoms

Mastitis most commonly appears as a single area of localized warmth, tenderness, edema, and erythema in one breast more than 10 days after delivery. The incidence rate is highest in the second and third weeks' postpartum. Depending on the severity of the infection, the area of inflammation can range from a few centimeters to almost the entire breast. Mastitis may occur with a sudden onset of breast pain, myalgia, and fever that can be dramatic. Sometimes mastitis presents with flulike symptoms, such as fatigue, nausea, vomiting, fever, and headache.

Causes

The infection commonly enters through a break in the skin, usually a cracked nipple. However, milk stasis and congestion that result from engorgement, or plugged ducts, can also lead to mastitis. Fifty percent of causative organisms are penicillin-resistant *S aureus*. Other organisms seen are *Escherichia coli*, group A streptococcus, *Peptostreptococcus*, *Haemophilus influenzae*, *Klebsiella pneumoniae*, and *Bacteroides*. One recently recognized factor is exclusive pumping and may be caused by a lack of contact with protective microbiota shared with the infant.

Evaluation

Perform a careful examination of the breast to verify the diagnosis and rule out abscess formation. Clinicians should be aware of resistant organisms in their community and should order a breast milk culture and antibiotic sensitivities when women with mastitis are unresponsive to first-line treatment.

Management

If symptoms are mild and have been present for less than 24 hours, conservative management with effective milk removal may suffice. Treatment should be initiated if conservative management is not effective within 24 hours. Mastitis needs to be treated as soon as it is discovered when symptoms are severe. The following steps should be taken:

- *Prescribe an antibiotic* that is effective against penicillin-resistant *Staphylococcus* and administer a 10- to 14-day course. Safe antibiotics for therapy include first-generation cephalosporins or dicloxacillin. If the patient is allergic to penicillin, erythromycin and its derivatives are also effective. Choose alternative therapies if methicillin-resistant *S aureus* is suspected.
- *Instruct the mother to continue nursing* because the milk is not harmful to the baby. Frequent feeding is recommended. If the mother can tolerate feeding on the affected breast first, this is preferable. However, if this is too painful, the mother may begin on the unaffected breast until symptoms subside. The affected breast should be drained at each feeding by nursing, pumping, or both. In an occasional circumstance, manual expression or a breast pump may be needed to remove the milk from the breast because of more severe pain prohibiting breastfeeding. Weaning and mother-baby separation should be avoided during mastitis, as it may predispose the mother to developing a breast abscess.
- *Encourage fluid intake* to promote hydration.
- *Recommend bed rest* until the mother's fever has subsided for at least 24 hours. She can have the baby with her and should seek help from family members.
- *Analgesics*. Symptomatic relief can be achieved with mild analgesics (ie, acetaminophen or ibuprofen), warm or cold packs (whatever works best), and a supportive bra.

Severe cases of mastitis that do not respond rapidly to outpatient therapy will require admission to the hospital and parenteral therapy.

Recurrent and Chronic Mastitis

Symptoms

Recurrent and chronic mastitis share the same symptoms as acute mastitis but persist beyond treatment.

Causes

Recurrent or chronic mastitis usually results from incomplete treatment of mastitis or the use of an ineffective antibiotic. Patients with mastitis typically experience improvement after only a short course of antibiotics and should be counseled to comply with the entire duration of therapy. Another cause of recurrent mastitis is a failure to treat underlying predisposing factors, such as persistent nipple trauma and fissuring or an obstructive lesion.

Evaluation

In cases of recurrent infection, a thorough breast examination should be performed after resolution of infection to rule out any underlying solid or cystic masses. An ultrasonographic (US) examination may also be useful.

Management

A midstream culture of expressed milk may prove helpful for diagnosis and management, particularly for recurrent cases caused by uncommon pathogens or antibiotic resistance. Generally, midstream milk cultures do not grow pathogens. The mother should be counseled on compliance with a full 2-week course of therapy, and any potential predisposing factors should be addressed. In some circumstances, a longer course of antibiotics may be needed.

Breast Abscess

A *breast abscess* is a walled-off area of the breast that contains purulent material; it occurs in about 3% to 11% of women with mastitis.

Symptoms

The signs and symptoms of a breast abscess are similar to those of mastitis, with the added finding of a defined, tense or fluctuant mass in the breast. Persistent symptoms of mastitis after 48 to 72 hours of therapy should prompt investigation for a possible underlying abscess.

Causes

If mastitis is not promptly treated or if treatment is not adequate, abscess formation is possible.

Evaluation

The breast should be carefully evaluated to rule out other causes of a breast mass. Breast US may demonstrate an abnormal fluid collection consistent with an abscess.

Management

Fluid collections identified with breast US can be serially drained. This treatment may be sufficient (along with antibiotics and frequent milk removal) to treat even multiloculated breast abscesses. Occasionally, an incision is required to surgically drain an abscess. In all cases, the abscess fluid should be cultured so that the appropriate antibiotic can be prescribed. In some cases, hospitalization and parenteral antibiotics will be necessary. Breastfeeding from the contralateral breast can be continued with a healthy term baby. Breastfeeding from the affected breast will depend on practical considerations. If an incision and drainage of an abscess are required and the incision can be made far enough from the areola to allow successful latch that does not allow the baby to be in contact with purulent drainage, breastfeeding on the affected breast can be undertaken. If breastfeeding cannot occur, the milk must be emptied via mechanical or manual methods. Sometimes applying pressure over an incision with sterile dressing during feeding or pumping can help prevent a fistula.

Postpartum Mood Changes: Postpartum Blues and Depression

Every mother should be evaluated with a validated depression screening tool at her postpartum visit and initial well-baby visits, with appropriate referrals made when indicated. Postpartum blues and mild depression are common conditions after childbirth and are estimated to occur in up to 85% of new mothers. Ten percent to 15% of women experience moderate to severe postpartum depression. Postpartum psychosis is less common, occurring in 0.1% to 0.2% of women. Because these conditions may affect not only the health of the woman but also the care of her child(ren), including breastfeeding, their acknowledgment of the condition, as well as treatment, are important.

Symptoms

Postpartum blues are transient and are characterized by mild sadness or weepiness. Symptoms of postpartum depression mimic other types of depression and may include changes in sleep patterns, appetite changes, fatigue, sadness, hopelessness, apathy, or persistent crying. In rare cases, symptoms may be severe and involve thoughts of harming oneself or one's baby, or an inability to care for oneself or one's baby, signaling postpartum psychosis, which warrants immediate referral for psychiatric care.

Causes

Postpartum mood changes may be caused by sudden hormonal changes, fatigue, stress, sleep deprivation, or a combination of these factors. Risk factors for the development of depression include a prior history of depression, prior postpartum depression, a positive family history for postpartum depression, and adjustment difficulties related to childbirth. Medical problems, such as hypothyroidism, should be considered.

Evaluation

Breastfeeding problems may predispose a woman to postpartum depression, and screening with a standardized, validated tool should be routine for women who present with lactation difficulties. Symptoms and coping mechanisms should be discussed with the mother.

Management

Transient or mild mood changes require support. If the new mother's symptoms do not resolve rapidly, she should be referred to her mental health care professional for further assistance. Depending on the severity of the condition,

pharmacological therapy may be required. If pharmacological therapy is needed, antidepressants and selective serotonin reuptake inhibitors can be used during lactation (see Chapter 16, Medications and Breastfeeding). If indicated, obstetric care professionals should be prepared to initiate medical therapy and refer mothers to mental health care professionals.

Long-term Maternal Breastfeeding Issues

Maternal Illness

A breastfeeding mother with an illness, whether it is acute or chronic, often finds that advice about breastfeeding during illness is inconsistent among medical professionals. Factors to consider include whether lactation worsens the mother's illness, whether milk composition or supply will be affected, and whether the baby will be affected by the mother's illness or medication use. The answer to all these questions is usually no, and breastfeeding may proceed. The medical professionals involved in the mother's care should promote 2-way communication to give the best and most consistent advice and management.

Acute Illness

During an immediate postpartum illness, the newborn should be allowed to room in with the mother, or at least be brought to her for breastfeeding at frequent intervals. The mother's milk supply should be established and maintained through continued breastfeeding or breast pumping. Most acute illnesses (eg, maternal respiratory infections, gastroenteritis) are compatible with breastfeeding, and breastfeeding can provide the newborn with protective antibodies. Interruption of breastfeeding at the time of onset of maternal symptoms may increase the risk of the newborn developing the infection.

Chronic Illness

A chronic illness may have a greater effect on a mother's ability to breastfeed because of changes in her own functioning, changes in milk supply, and the possible adverse effects of her medications on the baby. Mothers should be given information about the risks and benefits of breastfeeding to herself and her baby. Most chronic illnesses are compatible with breastfeeding, and breastfeeding can help normalize the mother's experience with her baby (see Chapter 18, Complications and Contraindications to Breastfeeding).

Diagnostic Studies

Studies performed to aid in diagnosis of maternal illness, especially those that require radioisotopes, may necessitate temporary "pump and dump" strategies to protect the baby (see Chapter 18, Complications and Contraindications to Breastfeeding). According to the American College of Radiology, the routine administration of gadolinium-based or iodinated contrast medium is not a contraindication to breastfeeding (https://www.acr.org/Clinical-Resources/Contrast-Manual).

Surgery and Anesthesia

When a nursing mother is required to have surgery, either urgently or electively, the mother and her health care professional should consider options for anesthesia and postoperative analgesia that meet the mother's health and comfort needs and have little effect on the breastfeeding baby (see Chapter 7, Breastfeeding Initiation, and Chapter 16, Medications and Breastfeeding). Hospital policies and support should encourage and be compatible with lactation maintenance, particularly if the procedure necessitates a prolonged hospital stay. When possible, arrangements should be made for pumping and storage of milk before and after the procedure in the case of a prolonged mother-baby separation. Postoperatively, the mother should pump or breastfeed at least every 3 hours to maintain her milk supply and avoid engorgement. Breastfeeding may resume after surgery, when the mother is awake and alert, without concern for exposure of the baby to anesthesia medications.

Maternal Nutrition, Energy Needs, and Weight Management

Maternal Nutrition During Lactation

The assessment of maternal nutritional status is important to ensure the adequacy of her diet. In adequately nourished women, additional caloric intake and fluid intake do not enhance milk volume. Overall, the quality of milk is maintained over a wide spectrum of maternal diet, although specific components may be affected by maternal intake and nutritional status.

Fluid Intake

Milk volume is not affected by the amount of fluid intake during lactation. Breastfeeding women should drink to satisfy their thirst. Mothers are encouraged to drink fluids and to note whether their urine is pale yellow, which is indicative

of adequate fluid intake. Inadequate fluid intake may also be associated with constipation.

Energy Intake

The dietary reference intake for energy during the first 6 months of lactation is an additional 500 kcal per day above the usual diet appropriate for a woman's height, normal weight, and level of activity. From 7 to 9 months of postpartum lactation, the energy requirement declines to an additional 400 kcal per day. Energy reserves accumulated in the body during pregnancy may be used to meet the energy and nutrient requirements during lactation. However, dietary intakes less than 1,500 kcal per day may cause maternal fatigue and lower milk volume.

Nutrient Intake

Specific nutrient needs are generally higher in lactation than in pregnancy (**Table 10-2**). The milk contents for many nutrients are unrelated to maternal intake. Milk concentrations of water-soluble vitamins, however, do reflect maternal intake, and a normal diet typically provides adequate

Table 10-2. Dietary Reference Intakes for Lactating Women

Nutrient	Dietary Reference Intakes[a] in Adult Women[b]	Dietary Reference Intakes[a] in Pregnancy	Dietary Reference Intakes[a] During Lactation	Percentage Increase During Lactation Over Nonreproducing Adult Women
Energy,[c] kcal	19–50 y	↑ 340 kcal/d Second trimester ↑ 452 kcal/d Third trimester	↑ 500 kcal/d 0–6 mo ↑ 400 kcal/d 7–9 mo	↑
Protein,[d] g	46	71	71	54
Vitamin C,[d] mg	75	85	120	60
Thiamin,[d] mg	1.1	1.4	1.4	27
Riboflavin,[d] mg	1.1	1.4	1.6	45
Niacin,[d] ng NE	14	18	17	21
Vitamin B_6,[d] mg	1.3	1.9	2	54
Folate,[d] μg DFE	400	600	500	25
Vitamin B_{12},[d] μg	2.4	2.6	2.8	17

(*continued*)

Table 10-2 (*continued*)

Nutrient	Dietary Reference Intakes[a] in Adult Women[b]	Dietary Reference Intakes[a] in Pregnancy	Dietary Reference Intakes[a] During Lactation	Percentage Increase During Lactation Over Nonreproducing Adult Women
Pantothenic acid,[e] mg	5	6	7	40
Biotin,[e] μg	30	30	35	17
Choline,[e] mg	425	450	550	29
Vitamin A,[d] μg RE	700	770	1,300	86
Vitamin D,[e] μg	15	15	15	0
Vitamin E,[d] mg TE	15	15	19	27
Vitamin K,[e] μg	90	90	90	0
Calcium,[e] mg	1,000	1,000	1,000	0
Phosphorus,[e] mg	700	700	700	0
Magnesium,[d] mg	310	350	310	0
Iron,[d] mg	18	27	9	−50
Zinc,[d] mg	8	11	12	50
Iodine,[d] μg	150	220	290	93
Selenium,[d] μg	55	60	70	27
Fluoride,[e] mg	3	3	3	0

Abbreviations: DFE, dietary folate equivalents; NE, niacin equivalents; RE, retinal equivalents; TE, tocopherol equivalents.

[a] Values are from the Institute of Medicine.
[b] Assumes age older than 19 years. Women younger than 19 years have greater nutrient needs for calcium (1,300 mg), phosphorus (1,240 mg), and zinc (13 mg).
[c] Calculations are based on recommended intakes per day, assuming 9 months is equivalent to 270 days.
[d] Recommended Dietary Allowance (RDA), the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97% and 98%) individuals in a life stage and gender group, and based on the Estimated Average Requirement (EAR).
[e] Adequate Intake, the value used instead of an RDA if sufficient scientific evidence is not available to calculate an EAR.

Adapted with permission from Picciano MF. Pregnancy and lactation: physiological adjustments, nutritional requirements and the role of dietary supplements. *J Nutr.* 2003;133(6):1997S–2002S.

vitamin levels. Strict vegetarians and vegans, who avoid all animal products, are at risk of vitamin B_{12} deficiency and should be advised to take a vitamin B_{12} supplement. If the mother's vitamin B_{12} stores are depleted, her milk will also be low in this nutrient, and vitamin B_{12} deficiency may develop in the baby. For some nutrients (ie, vitamin B_6, vitamin D, iodine, and selenium), maternal intake is directly associated with the concentration in mother's milk. For mothers at risk for vitamin D deficiency, those who live in northern climates, and those not exposed to external sources of vitamin D, additional supplementation may be beneficial to improve maternal vitamin D status. The contents of some nutrients in milk may be maintained at a satisfactory level at the expense of maternal stores, especially folate and calcium. Most practitioners encourage the continued intake of prenatal vitamins that contain folic acid (400 mcg/d) during lactation. There are no recommendations for calcium supplementation if dietary reference intakes are met. Calcium losses from the maternal skeleton occur in early lactation, but these losses are restored after weaning. Milk concentrations of calcium, iron, and zinc are essentially independent of maternal intake. High maternal dietary fat intake and obesity are associated with higher milk fat content. Some studies also suggest that maternal body fat stores are correlated with milk fat content. The pattern of fatty acids in human milk is affected by the maternal diet. A maternal diet high in polyunsaturated fatty acids increases the proportion of these fatty acids in the milk. Consumption of sugar-sweetened beverages that contain high-fructose corn syrup may increase the fructose concentration in breast milk, and early fructose intake has been associated with a higher risk of obesity and appetite dysregulation.

Weight Loss

Lactating women who eat self-selected diets generally lose weight at the rate of 0.5 to 1.0 kg (approximately 1–2 lb) per month in the first 4 to 6 months of lactation. Approximately 20% of women, however, do not lose weight during this time. Women can lose as much as 1 lb per week without compromising milk volume. For the lactating woman who had an increased body mass index before pregnancy or who had excessive gestational weight gain and desires to lose weight more quickly, restriction in caloric intake has been shown to be more effective for weight loss than exercise alone. Systematic reviews, however, indicate that maternal exercise has benefits for metabolic fitness and does not impair milk production or baby growth. Rapid weight loss should be discouraged because it can decrease milk volume. Weight-loss drugs and liquid diets are not recommended during lactation, and a weight reduction diet in general is discouraged during the first 4 to 6 weeks' postpartum. However, postpartum weight

retention is a clinically significant risk factor for obesity, and 47% of women may retain more than 10 pounds at 12 months' postpartum. Mothers should be given sound nutritional advice to ensure adequate nutrient intake and return to prepregnancy weight during the postpartum year.

Breast Evaluation While Nursing

Screening for Breast Masses

The incidence of breast malignancy during pregnancy and lactation is estimated at 1 in 3,000 to 1 in 10,000 women. Approximately 3% of women who receive a diagnosis of breast cancer will be either pregnant or lactating. With increased childbearing in more advanced years, this number is expected to increase. Delay in diagnosis of breast cancer has been reported in pregnant and breastfeeding women. If a breastfeeding mother notices a lump in her breast that does not decrease with breastfeeding or one that increases in size, prompt evaluation should be pursued. If the mass persists, diagnostic tests should be performed (see Chapter 18, Complications and Contraindications to Breastfeeding). Any pregnant woman or breastfeeding mother should have a mass evaluated by a breast specialist and biopsied as needed. Lactation should not delay the evaluation process.

Ultrasonography

According to the American College of Radiology, breast US is the first-line imaging modality in pregnant women and lactating mothers when assessing a palpable mass. Breast US can help identify a benign mass, such as a galactocele. If the breast US results are negative and a mass persists, or if the US findings are suspicious for cancer, further evaluation may be performed.

Diagnostic Mammography

Mammograms, including digital breast tomosynthesis, are safe to undergo during lactation, but negative findings should not negate further workup in the presence of a palpable mass. If mammography is performed, the mother should either nurse her baby or express milk from her breasts immediately before the procedure to allow optimal visualization of the breast tissues.

Breast Magnetic Resonance Imaging

Breast magnetic resonance imaging with contrast material may be considered in the evaluation of concerning imaging or clinical findings, and breastfeeding

should not be interrupted after the administration of gadolinium-based contrast material. Emptying the breasts before imaging studies may help increase the ability to visualize the breast tissue.

Diagnostic Procedures

Needle biopsy or fine-needle aspiration biopsy, as well as other diagnostic tests, can be performed without significant interruption of lactation. Most breast masses identified and those for which a biopsy is performed during pregnancy and lactation are benign (in 80% of cases) and can be biopsied without harm to the mother, fetus, or baby. About 30% of breast masses have pathological findings that are specific to the lactating breast. Benign pathological findings specific to the lactating breast include lactating adenoma, infarcted fibroadenoma, hypertrophied breast tissue, galactoceles, mastitis and inflammatory lesions, and papillomas. The risk of milk fistula and its management should be discussed when a biopsy is required.

Bloody Nipple Discharge

Bloody nipple discharge is a relatively frequent finding associated with nipple trauma and engorgement in early lactation, and it typically occurs around postpartum days 3 to 7. Evaluation of the nipple for trauma and adjustments needed for problems associated with latching the newborn may resolve the problem. Occasionally, mothers will report having reddish-brown milk as their ducts become distended and their capillaries leak (ie, ductal ectasia or "rusty pipe syndrome"). This usually resolves within the first week of lactation. If the milk is tinged with blood, this is usually well tolerated by the newborn, although occasionally it may be associated with vomiting and blood-tinged stools in the newborn. If the bloody nipple discharge is persistent and occurring from only a single milk duct, further evaluation is required. Most commonly, this will be caused by an intraductal papilloma. Intraductal carcinoma is rare and may also be associated with a mass in the affected breast.

Recommendations for Breast Evaluation During Lactation

- *Regular breast self-awareness.* Women should be familiar with the normal appearance of their lactating breasts, and they should report changes to their health care professionals.
- *Clinical breast examinations* should be performed by a physician at the onset of pregnancy, in the postpartum period, and annually thereafter, even while lactating.
- *Mammograms.* Routine screening mammograms may be performed in women during lactation if they are at high risk of breast cancer, depending

on the expected duration of lactation. Otherwise, screening mammograms may be delayed until several months after weaning.

- *Biopsy*, if indicated, is safe during pregnancy and lactation.
- *Breast cancer* diagnosed during pregnancy and lactation generally has the same prognosis, stage for stage, as premenopausal breast cancer diagnosed outside of pregnancy and lactation. Early diagnosis of breast cancer is important, and treatment should not be delayed. Early referral to a breast surgeon for further evaluation of a breast abnormality is indicated if there is any cause for concern.
- *Lactation* is possible (even if unilateral) after most breast surgeries and breast cancer treatments.

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CHAPTER 11

The Breastfeeding-Friendly Medical Office

The medical home, including the partnership between the family and the pediatric, obstetric, and/or family health care professionals, should establish a breastfeeding-friendly environment that encourages breastfeeding in the office setting. Office medical practices should be directed to support the goals of Healthy People 2030 to increase the percentage of mothers who breastfeed and the duration of breastfeeding. In addition, the entire office staff, professional and nonprofessional, should be educated about the value and implementation of breastfeeding and how to support the breastfeeding dyad during the visit. Each visit is a valuable opportunity to provide that initial and ongoing support. Furthermore, incorporating breastfeeding management into the office can provide a resource to patients while offering a financial benefit to the practice.

A Breastfeeding-Friendly Environment

The medical office presents a valuable opportunity to demonstrate that health care staff believe breastfeeding is the normative form of nutrition for all babies. It can be enlightening to walk through a clinical setting with the intention of critically observing the environment and ask the question, "What message does the environment of this medical office convey to families?" The decor, advertising literature, and attention given to the needs of breastfeeding mothers reflect the values of the office. Transforming the physician's office into a setting in which breastfeeding is the societal norm will create an influential educational experience for parents and children and will show that the practice enthusiastically promotes, supports, and protects breastfeeding.

Elements of a Breastfeeding-Friendly Environment

Posters and Enlarged Photographs

Pictures, posters, and enlarged photographs of breastfeeding mothers and babies from a variety of ethnic and cultural backgrounds should be displayed throughout the office to encourage breastfeeding mothers to nurse their babies.

Mother's Room and Waiting Room

A private area equipped with a comfortable chair, a changing table, an electric breast pump, and, ideally, a small refrigerator can become a breastfeeding room in which mothers (including staff members) go to breastfeed in private or to express milk. The area will emphasize that breastfeeding is encouraged and supported in the practice. Breastfeeding in the waiting or examination room itself should never be discouraged.

Discourage Formula Marketing

The practice of giving pregnant women prenatal packs that contain formula undermines breastfeeding success. If breastfeeding is important to the practice, accepting formula marketing and similar gifts from formula companies is counterproductive and should be discouraged. Careful thought should be given to the breastfeeding messages presented in the magazines and other materials provided in the waiting room. Giving prenatal or postnatal formula company gifts to mothers or posting sign-up forms for "new mother clubs" sponsored by formula companies should not be encouraged in the office practice. When women sign up for such clubs, they will probably receive free formula, either before or after the baby's birth.

Track Breastfeeding Rates in the Practice

When prospective or new parents are interviewing a pediatrician or new practice, they often want to know about the breastfeeding rates and duration in the practice. This helps them to distinguish whether the practice is supportive of breastfeeding. For this reason, breastfeeding rates in the practice should be tracked to determine the effectiveness of breastfeeding promotion, support, and optimal clinical management. This allows the practice to see how it measures up against national breastfeeding goals and supports parents and staff in understanding the importance of breastfeeding. In addition, analyzing breastfeeding initiation and duration trends in the patient population can help pinpoint critical periods when more support for breastfeeding at well-child visits can make a significant difference in breastfeeding success. Information can be gathered

through the use of office surveys, periodic chart reviews, focus groups, and interviews of key stakeholders.

Give Encouragement

At each visit, the pediatrician should ask women if they are still breastfeeding, monitor breastfeeding success, and provide continued encouragement.

Staff Education

The key to providing breastfeeding care is effectively integrating relevant information and skills into existing daily routines, without increasing the time required to provide a given service. Physicians and all staff should be educated in the basics of breastfeeding management to ensure that the practice communicates a consistent message and does not confuse families with conflicting information. Physicians and staff should also develop skills and comfort in evaluating breastfeeding through appropriate history and physical assessments. Each office should have a breastfeeding policy. Excellent resources are available to support the development of a breastfeeding-friendly office, and it should be the intent of the practice to have all staff trained in lactation support (**Appendix E**).

Physicians

Physicians need to be key leaders in promoting and supporting breastfeeding. Physician education should occur during medical school and residency training. Many myths and personal beliefs affect breastfeeding attitudes and advice. Unless they are educated, health care professionals may offer advice based on their own personal experience instead of relying on evidence-based practices. Clinician education through reputable breastfeeding courses, conferences, and books, as well as internet resources, can introduce the novice to the basics of breastfeeding and can expand knowledge of management and diagnosis for the more sophisticated physician. Physicians and other health care professionals who care for breastfeeding mothers and children should receive breastfeeding education during their training and should stay up-to-date in their knowledge and clinical skills through continuing education.

It is important for physicians to provide age-appropriate breastfeeding intervention and anticipatory guidance as part of every routine health-screening visit for mother and baby (see Chapter 9, Maintenance of Breastfeeding: The Newborn and Infant, and Chapter 10, Maintenance of Breastfeeding: The Mother). Physicians should also be aware of the contraindications to breastfeeding (see Chapter 18, Complications and Contraindications to Breastfeeding). Concerns about maternal medication use during breastfeeding can be addressed by using the LactMed database (see Chapter 16, Medications and Breastfeeding).

Nursing Staff

Nursing staff can often attend breastfeeding courses or conferences that offer continuing education units, or they can be required to complete a course on breastfeeding competency. Shorter educational presentations can be offered to non-nursing staff on-site, covering the health benefits of breastfeeding and a discussion of breastfeeding-related issues that are specific to the types of patient interactions the employee has. It is important to emphasize that office breastfeeding facilities should also be available to all staff, both clinical and nonclinical.

Support Staff

Medical assistants, nursing assistants, laboratory technicians, receptionists, housekeeping staff, administrative staff, and other support personnel should be included in educational presentations about breastfeeding, because all individuals in the office setting interact with breastfeeding mothers. The staff also should be encouraged to use breastfeeding facilities within the office. Employees also may share a cultural or linguistic background with patients, and this shared background can serve to support breastfeeding efforts. Leadership should assess the educational gaps of staff and develop strategies to fill those gaps. Strategies may include holding in-house meetings or sending staff to conferences where they can learn more about the importance of breastfeeding.

Lactation Specialists

The use of lactation specialists may be beneficial in a practice. Some physicians prefer to select a lactation consultant who has been certified by the International Board of Lactation Consultant Examiners. Certification involves meeting specific education requirements, completing mentored clinical practice, and passing a standardized written examination; it is open to physicians, nurses, and other qualified individuals who have experience with helping breastfeeding women. Other lactation programs provide additional education and clinical training for nurses and other allied health workers. Some practices may choose to hire lactation specialists to handle their breastfeeding educational needs. Another option is to hire a lactation specialist on a case-by-case basis or to choose one in private or hospital practice who accepts referrals on a regular basis. Physicians should be aware of appropriate resources in their communities. Lactation educators; Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) dietitians and peer counselors; and other community-based personnel can provide breastfeeding support.

Patient Education

Most women make their feeding choice early. Nearly three-fourths of women make their feeding decision before the pregnancy or during the first trimester (see Chapter 6, Breastfeeding Management Before and After Conception). Thus, it is important for breastfeeding education to begin prenatally.

Prenatal Classes

Support groups for new mothers, breastfeeding classes for new mothers, and prenatal classes that incorporate breastfeeding will provide accurate information and social support for families.

Prenatal Visits

The routine prenatal visit offers an opportunity not only for the mother to express any questions or concerns she may have about breastfeeding but also for the physician and staff to demonstrate a commitment to breastfeeding. Although optimal, prenatal visits with a pediatrician are infrequent (occurring in 11% of patients in one study). Therefore, the early obstetric visits are important to set the stage for breastfeeding.

Telephone Support Lines

Support lines, either specifically dedicated to breastfeeding or incorporated within the practice telephone triage system, are beneficial as long as a health care professional with an appropriate level of breastfeeding knowledge handles the calls. The content of telephone calls should be recorded in the medical record. Although it may be convenient to give breastfeeding guidance over the phone or via email, if there is a question about the adequacy of breastfeeding and milk supply, it is best to evaluate the baby and mother in person (see Chapter 8, Breastfeeding in the Hospital). The American Academy of Pediatrics (AAP) publication *Breastfeeding Telephone Triage and Advice* is available for assistance in providing telephone call advice.

Preventive Monitoring

Screening postpartum women for symptoms of depression, along with other preventive monitoring, should be conducted (see Chapter 10, Maintenance of Breastfeeding: The Mother).

Peer Counseling Services

La Leche League International, some WIC offices, and other breastfeeding support organizations offer peer counseling and should be available to breastfeeding

women. Many women feel more comfortable exchanging breastfeeding information with mothers from similar ethnic and cultural backgrounds.

Community-Based Breastfeeding Groups

Good resources for information can be found in any number of community-based breastfeeding groups. Examples include local La Leche League groups, peer counselors, and support groups offered through practices or culturally appropriate groups in the community. Physicians can expand the network of support for breastfeeding by providing in-kind and financial support for local breastfeeding support groups.

Printed Materials

Any material offered to women, especially if it is provided to families during their first perinatal contact, should be checked for accuracy and content. Excellent alternatives for literature from manufacturers include resources from the AAP, American College of Obstetricians and Gynecologists (ACOG), American Academy of Family Physicians, Academy of Breastfeeding Medicine, and La Leche League International.

Potential Barriers to Effective Breastfeeding

Barriers to breastfeeding should be anticipated and addressed—especially those that may be encountered early in the postpartum period. New mothers often have questions about returning to work and using electric breast pumps. In one study, 1 of the top 3 reasons women gave for not breastfeeding was "could not breastfeed because had to return to work." Anticipating this concern and providing instruction about milk expression and milk storage assistance and support could improve breastfeeding initiation and duration. See Chapter 10, Maintenance of Breastfeeding: The Mother, and the Breast Pumps and Other Breastfeeding Accessories section later in this chapter for a discussion on employment and the use of breast pumps. Physicians can encourage employers in their community to adopt workplace practices that support breastfeeding.

The Business Aspect of Breastfeeding

The lactation aspects of a pediatric practice could be viewed in a business model for the improvement of the practice. In any service industry, if 75% of the clients want or need your product, you have made a good decision to apply your services to that group. Thus, the national average of more than 75% of women initiating breastfeeding provides a substantial reason for focusing a practice toward assisting these mothers. Physicians can be key leaders in promoting and

supporting breastfeeding. They need to appreciate breastfeeding from a larger business context.

Breastfeeding Support Services

Many practices may be able to provide delivery of outpatient breastfeeding medicine services. These services may incorporate many of the personnel mentioned earlier, including lactation specialists, nursing staff, doulas, and peer counselors. Depending on the model, breastfeeding support services can be profitable, neutral, or operated with net losses. If operated efficiently and effectively, breastfeeding support services can be sustainable and a significant asset for a primary care practice and its patients.

Coding, Billing, and Payment

The AAP has resources available to assist physicians with payment for outpatient breastfeeding services, including Supporting Breastfeeding and Lactation: The Primary Care Pediatrician's Guide to Coding, found at https://downloads.aap.org/AAP/PDF/coding_breasfeeding_lacation.pdf. AAP (https://www.aap.org/coding) and ACOG have *ICD-10-CM* resources available, as well.

Breast Pumps and Other Breastfeeding Accessories

In some practices, renting and/or selling breast pumps and other breastfeeding accessories can be a value-added service that is profitable. However, ordering, stocking, insuring, maintaining inventory, dealing with defective or damaged equipment, and other issues do require time and effort.

National Initiatives

Breastfeeding Residency Curriculum

To provide pediatricians with the latest scientific information, educational materials, and strategies for increasing breastfeeding rates toward Healthy People 2030 national goals, the Breastfeeding Curriculum (available on the AAP website at https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Breastfeeding/Pages/Breastfeeding-Curriculum.aspx) has expanded the educational training for pediatricians, obstetricians, and family physicians. These resources are designed to be implemented into physicians' training programs with an emphasis on culturally appropriate breastfeeding promotion and support to families from racially and ethnically diverse backgrounds. Implementation of the curriculum improves breastfeeding management and success.

Business Case for Breastfeeding

The Business Case for Breastfeeding is a comprehensive resource for those who help breastfeeding women as they return to the workforce. It is a program designed to educate employers about the value of supporting breastfeeding employees in the workplace. The program highlights how such support contributes to the success of the entire business and offers tools to help employers provide worksite lactation support and privacy for breastfeeding mothers to express milk in a non-bathroom setting. The program also offers guidance to employees on breastfeeding and working.

Patient Protection and Affordable Care Act Breastfeeding Provisions

Section 4207 of the Patient Protection and Affordable Care Act states that employers shall provide breastfeeding employees with "reasonable break time" and a private, non-bathroom place to express breast milk during the workday, up until the child's first birthday. The Affordable Care Act additionally provides for access to a breast pump through insurance. Breast pumps are also often available to mothers who receive benefits from WIC.

Internal Revenue Service Tax Incentives

If working mothers have a flexible spending account, the Internal Revenue Service allows them to use pretax money from these accounts to cover the cost of breast pumps that are not covered through insurance, along with other breastfeeding-related supplies. Mothers who do not have flexible spending accounts may deduct breastfeeding supply costs on their taxes if their total unreimbursed medical expenses exceed 7.5% of their adjusted gross income and if they itemize their tax returns.

Strategies for Implementation

Providing support, time, and effort up front is valuable and cost-effective when it comes to establishing breastfeeding (**Box 11-1**). The following examples are included to stimulate thinking about implementation possibilities in the hospital and the office practice:

- Hospital strategies to promote breastfeeding at various hospitals have been successful.
- The 3- to 5-day follow-up visit should be scheduled before discharge from the hospital so that the newborn can be evaluated in the office or clinic

Box 11-1. Summary of Supportive Breastfeeding Office Practices

1. Have a written breastfeeding-friendly office policy.
2. Train staff in breastfeeding support skills.
3. Discuss breastfeeding during prenatal visits and at each well-child visit.
4. Encourage exclusive breastfeeding for approximately 6 months.
5. Provide appropriate anticipatory guidance that supports the continuation of breastfeeding for as long as desired.
6. Incorporate breastfeeding observation into routine care.
7. Educate mothers on breast milk expression and returning to work.
8. Provide noncommercial breastfeeding educational resources for parents.
9. Encourage breastfeeding in the waiting room but provide space on request.
10. Eliminate the distribution of free formula.
11. Train staff to follow telephone triage protocols to address breastfeeding concerns.
12. Collaborate with the local hospital or birthing center and obstetric community on breastfeeding-friendly care.
13. Link with breastfeeding community resources.
14. Monitor breastfeeding rates in your practice.

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shortly after arriving home. At that time, history, weight, and physical examination can be completed and breastfeeding can be observed. If, after the routine visit between 3 and 5 days, the mother or the physician has concerns about breastfeeding, a problem-focused visit can be scheduled before the next routine checkup or a referral can be made to a qualified lactation specialist.

- Developing partnerships and a collaborative breastfeeding agenda with others in the community is an effective way to strengthen breastfeeding management (**Box 11-2**).

Box 11-2. Selected Strategies Used to Encourage Breastfeeding in the Office

- Work with family life educators and home health nurses to ensure that the same breastfeeding messages are given.
- Offer prenatal classes that are beneficial for patients.
- Employ lactation specialists in the practice, under the team leadership of the physician.
- Provide positive feedback to mothers (eg, presenting a certificate of achievement for breastfeeding at each visit).
- Develop and support office and community-based breastfeeding activities.
- Encourage breastfeeding education in schools.
- Introduce breastfeeding benefits during an adolescent's office visit.

- The World Health Organization growth curves should be used to monitor the growth of all newborns and infants (see Chapter 8, Breastfeeding in the Hospital).
- Providing anticipatory guidance in subsequent visits is outlined in checklists pertinent to each health supervision visit (see Chapter 9, Maintenance of Breastfeeding: The Newborn and Infant).

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CHAPTER 12

Breastfeeding and Human Milk for Preterm Newborns and Infants

Mother's milk contains an array of active biological components that are important for immunity and growth. Mother's milk is known to reduce the risk of necrotizing enterocolitis, late-onset sepsis, feeding intolerance, retinopathy of prematurity, and adverse neurodevelopment (**Box 12-1**). Mothers of preterm newborns face many barriers to producing milk, and many do not reach their intended feeding goals. Maternal barriers include (1) preexisting and pregnancy medical morbidities that contribute to delayed milk letdown (lactogenesis stage 2) or reduced milk production, (2) prolonged mother-baby separation that may last weeks to months while the newborn or infant is still hospitalized, (3) maintenance of milk production predominately by breast pumping rather than oral feedings at the breast, and (4) return to work or other logistical challenges that make frequent milk expression and infant visitation difficult. Preterm newborns have immature sucking and swallowing

Box 12-1. Breastfeeding Lessens the Risk for These Health Issues in Preterm Newborns

- Necrotizing enterocolitis
- Feeding intolerance
- Hospital-acquired infections
- Longer neonatal intensive care unit hospital stays
- Developmental delays
- Lower IQ on cognitive tests

Source: Ip S, Chung M, Raman G, et al. Breastfeeding and maternal and infant health outcomes in developed countries. Evidence Report/Technology Assessment No. 153. Rockville, MD: Agency for Healthcare Research and Quality; 2007.

abilities, which often require tube feeding or special support when feeding directly at the breast, and nutrition requirements in macronutrients and micronutrients that exceed healthy newborns, requiring fortification of mother's milk to optimize growth and development.

Pasteurized donor human milk is milk provided by another mother that has been pasteurized (ie, heat treated) to remove bacterial and viral contaminants. Pasteurized donor milk is recommended for newborns and infants with very low birth weight (VLBW) when their mother's milk is unavailable, because donor milk is associated with a reduced risk of necrotizing enterocolitis and feeding intolerance; however, the use of donor milk is not associated with the array of health benefits that a mother's own milk provides.

Breastfeeding and human milk are important for all preterm neonates, but 2 subgroups will be discussed in this chapter: neonates weighing less than 1,500 g at birth (designated as VLBW) and those born between 34 and 36 weeks of gestation (defined as *late preterm* newborns).

Newborns With Very Low Birth Weight

There are many hospital routines that support mothers in maximizing the production of their own milk. Pediatricians, in conjunction with other hospital practitioners, play a critical role in this process. The goal should be to provide newborns with their own mother's milk for as many feedings as possible.

Hospital Routines

Maternal Education

When a mother is expected to deliver a VLBW newborn, the prenatal consultation should include discussions about the benefits of human milk, initial expression of colostrum, and an overview of the practical considerations of frequent milk expression for a preterm newborn (see Chapter 14, Lactation Support Technology). Counseling has been shown to increase the maternal intent to provide milk and reduce the stress surrounding maternal milk production when the newborn is in the neonatal intensive care unit (NICU). Education should be continued after birth and should include information on proper milk collection and storage, the oral delivery of colostrum, skin-to-skin care, and transition to oral feedings at the breast. Maternal education and encouragement should be provided by all hospital staff, including physicians, nurses, and lactation consultants.

Oral Colostrum Care and Early Mother's Milk Feedings

Protective immune factors, including secretory immunoglobulin A, are higher in the colostrum of women who deliver preterm newborns than in those who deliver at term, which suggests that preterm colostrum may be especially protective during the first days after birth. *Oral colostrum care* refers to the delivery of a small volume of colostrum directly into the buccal mucosa of preterm newborns in the first hours after birth, before enteral feedings are established. Active immune components of the milk can be absorbed through the buccal mucosa. Oral colostrum is ideal when the mother has only produced drops of milk, and this quantity of milk cannot be delivered through tube feedings. When there is enough mother's milk, trophic feedings given via tube should be started as soon as possible. Early trophic feedings with colostrum may prevent intestinal mucosal and villous atrophy and stimulate the development of the gastrointestinal tract by increasing intestinal trophic hormone release and improving intestinal motility. Early feedings with mother's milk can decrease the time needed to progress to full enteral feedings and shorten the length of hospitalization. Clinicians generally recommend feeding colostrum to the newborn preferentially, in the order it was pumped, even if it has been frozen.

Milk Expression

Mothers should be supported in expressing their first milk as soon as possible after birth, ideally within 6 hours. Mothers should express milk with the use of an effective and efficient double electric breast pump, both in the hospital and at home. While the number of pumping episodes that are needed per day to produce a sufficient milk supply to feed their newborn(s) varies among mothers, generally, pumping at least 6 to 8 times a day or more is needed. Mothers may use hand expression in the first hours or days after birth or to augment milk expression with breast pumps. Mothers should be supported in navigating common issues faced with pumping, such as flange fit, suction strength, and pain with pumping. Mothers should be taught to label, handle, and store their milk appropriately (see Chapter 14, Lactation Support Technology).

Skin-to-Skin Contact

Increased production of mother's milk is only one of many important benefits of skin-to-skin contact among mother-baby dyads with newborns with VLBW. Skin-to-skin contact aids with temperature regulation of the newborn, physiological stability, and bonding. Mothers should be encouraged to perform skin-to-skin contact for as long as desired; it can be performed safely among intubated newborns, newborns receiving continuous positive airway pressure, and those

with secured umbilical lines. However, hospital staff may be needed to assist with transferring newborns safely from incubators into skin-to-skin positioning.

Transition to Oral Feedings

Initial oral feedings at the breast, more frequent breastfeeding episodes, and earlier gestational age at the time of the first breastfeeding attempt are associated with longer duration of breastfeeding during the hospital and post-discharge periods.

However, newborns with VLBW require tube feedings during the initial part of their hospitalization because they are medically unstable, are developmentally unable to latch on to the breast, have uncoordinated swallowing and breathing patterns, or fatigue easily with oral feeding. Tube-feeding techniques should be modified to provide human milk without any nutrient losses (see Chapter 14, Lactation Support Technology). The need for tube feedings can last for weeks to months of the hospitalization period. During this time, mothers should be encouraged to perform skin-to-skin contact, during which time preterm newborns and infants can suckle at the breast after a mother just pumped or emptied her breasts (nonnutritive suckling). Nonnutritive breastfeeding may encourage suck-swallow coordination.

Nutritive oral feeding at the breast, or direct breastfeeding, occurs when milk is transferred from the breast into the baby's mouth. With support, mothers should be encouraged to begin direct breastfeeding as soon as their newborn shows physiological readiness (ie, feeding cues) and breathes normally without intensive respiratory support. The timing of physiological readiness for oral feeding at the breast varies considerably among newborns with VLBW, but it has been described as early as 31 to 33 weeks of corrected postmenstrual age. Assessments of readiness to directly breastfeed should be performed serially and include signs of sucking (on a finger, nipple, tube, or pacifier). In addition, signs of rooting behavior, the ability of the newborn to latch onto and stay on the breast, sucking ability, duration of suck, behavioral state, skin color changes, vital signs, and the newborn's comfort level during the feeding are factors to be evaluated and documented. Corrected gestational age alone is an unreliable marker for readiness to breastfeed.

It is best to begin breastfeeding when the newborn is alert and hungry, demonstrating appropriate cues, and not crying, frantic, or overly stimulated. The mother should be seated in a comfortable chair with an upright back with the newborn on a nursing pillow, which allows the newborn to be closer to the mother and at the level of her breast. When a VLBW newborn first begins direct breastfeeding with milk transfer, a mother who has a strong letdown reflex, with copious milk flow, may need to pump prior to the breastfeeding session.

This reduces the newborn's risk of choking on high milk flow. Some preterm newborns require the use of nipple shields to optimize milk transfer during direct breastfeeding (see Chapter 14, Lactation Support Technology).

Proper positioning of the newborn is essential. The baby may be placed in the typical holds discussed in Chapter 7, Breastfeeding Initiation. Mothers commonly underestimate their preterm newborn's weak neck muscles, positional airway challenges, and weak sucking efforts, and assistance should be provided to the mother-baby dyad by certified lactation specialists or others experienced in breastfeeding. The cross-cradle hold works best for most mothers of preterm newborns, as this allows the mother to control her baby's head and breast simultaneously to ensure the best possible latch. The mother may use a U-hold (achieved by placing the thumb on one side of the breast behind the areola, with the other fingers placed on the opposite side) to ensure that the weight of her breast does not interfere with the newborn's ability to suckle. In the latter hold, the hand can provide additional jaw support.

Behavioral cues should be used to identify times for feeding sessions, when the newborn is awake and alert. If the baby continually falls asleep during attempts at breastfeeding, the mother may try switching to the opposite breast or using a feeding device such as a supplemental nursing system to reduce fatigue during suckling. If the newborn does not initiate suckling, the mother can express some milk onto her nipple so that her baby tastes her milk when she places her nipple and areola into the newborn's mouth. Usually, if the newborn suckles for a short period, the mother should pump afterward to drain her breasts and maintain her milk supply.

Weighing the baby before and after a breastfeeding by using an electronic infant scale helps to document milk transfer. The change in the baby's weight in grams approximates the amount of milk transferred in milliliters. If possible, bottle-feeding should be avoided until mother and baby have a secure, confident breastfeeding technique.

Fortification of Human Milk

Rationale

Extrauterine growth restriction, or weight for gestational age less than the 10th percentile at the point of hospital discharge, affects most newborns and infants with VLBW. Causes are multifactorial and include delayed onset of enteral nutrition, volume restriction of enteral feedings, and variable composition of mother's milk. The nutritional objective for hospitalized VLBW newborns is to maintain a growth trajectory similar to fetal growth. Consumption of human

milk alone cannot meet this objective, as the nutritional requirements of newborns with VLBW exceed those of term newborns for protein, energy, fatty acids, minerals, and macronutrients. Multi-nutrient fortifiers should be added to human milk to offset nutritional insufficiencies.

There are several types of commercially available human milk fortifiers (HMFs). Some are bovine based and some are human milk based. Among the bovine-based fortifiers, there are powdered and liquid forms, and they vary by protein content and the degree to which proteins are hydrolyzed. Powdered bovine-based HMF has been associated with microbial contamination and infant infection because it cannot be terminally sterilized. Its use in the NICU is discouraged. Liquid bovine HMF is currently the recommended choice compared with powdered HMF. Optimal timing of fortification is unclear, but recent randomized controlled trials of fortification at feeding volumes less than 80 mL/kg/d showed no associations with feeding intolerance or necrotizing enterocolitis. The maximum concentration listed by manufacturers should be followed.

Milk Fat Content

The fat content is the most variable of all nutrients in human milk. Variance in fat content occurs among women throughout lactation, during the course of the day, and within a single feeding. Fat losses result, because fat separates from the milk and adheres to collection containers and feeding devices. The inability to predict milk fat content and, therefore, its energy content is of concern because fat is the major determinant of milk calorie content. Newly approved whole-milk macronutrient analyzers are used by some NICUs for individualized nutrition.

Hindmilk

The fat content of human milk increases from the beginning to the end of a single milk expression. The terms *foremilk* and *hindmilk* refer to milk collected at the beginning of a single milk expression and toward the end of the expression, respectively. Hindmilk feedings have been shown to enhance a newborn's growth by supplying 2- to 3-fold greater fat content, and therefore calorie content, than foremilk. Although differing in fat and energy contents, foremilk and hindmilk fractions have similar contents of protein and minerals. Mothers of newborns with VLBW who produce more milk than their babies require (approximately 130% of what is needed by the newborn, or 500 mL/d) can be taught to fractionate their milk into foremilk and hindmilk. An arbitrary practice is to collect all milk produced in the first 3 to 5 minutes of pumping as foremilk and then to collect the remaining milk separately, as hindmilk.

Hindmilk can be used in conjunction with HMFs to enhance growth of preterm newborns. Hindmilk alone should be used with caution because it may result in an imbalanced protein-calorie ratio. This may occur because hindmilk has greater fat and calorie contents but similar protein and mineral contents when compared with foremilk.

Nutritional Monitoring

Assessments of growth and biochemical indices of nutritional status are important in managing the newborns with VLBW who are fed human milk. Growth parameters should be monitored serially (daily, weight; weekly, length and head circumference). Weight gain of approximately 20 g/kg/d (or 20–30 g/d if body weight is >2,000 g) is a typical goal. Length and head circumference should increase by approximately 1 cm each week. Biochemical evaluation of nutritional status generally includes serial measurements of electrolytes (sodium levels decline throughout lactation, and acidosis resulting from reduced buffering capacity of fortified human milk has been observed), urea nitrogen (to assess short-term protein adequacy), phosphorus, and alkaline phosphatase (to assess bone mineral status). Phosphorus monitoring is useful if the alkaline phosphatase level is increased to differentiate rapid growth (normal phosphorus) from deficient calcium and phosphorus intake. These biochemical evaluations may be obtained every 2 to 3 weeks if abnormalities are observed. Additional nutrient supplementation should be considered when babies are not reaching growth trajectory goals.

Donor Milk

Donor milk should be provided when a mother's milk is unavailable or contraindicated for newborns with VLBW. Only pasteurized donor milk obtained from an approved human milk bank should be given to VLBW babies to reduce the risk of infectious agent transmission through the milk and for safety regarding donor health habits. Donor milk is most often contributed by mothers of term infants who are several months of age. Therefore, donor milk has lower protein and electrolyte content when compared with mother's own milk. Thus, because of these nutritional inadequacies, inadequate growth rates are higher among newborns with VLBW who are predominately fed donor milk. Close monitoring of growth and subsequent titration of fortification is needed to optimize outcomes. Nevertheless, the VLBW newborn has improved feeding tolerance and fewer infection-related events, such as necrotizing enterocolitis, when fed donor milk compared with formula.

Cytomegalovirus

Postnatal acquisition of cytomegalovirus (CMV) through consumption of mother's milk among newborns with VLBW can occur. Newborns with VLBW may present with a sepsis-like syndrome, with respiratory decompensation and thrombocytopenia, or they may be asymptomatic. Cytomegalovirus infection should be considered when newborns who are consuming their mother's milk present with signs of late-onset sepsis. Follow-up studies in preterm neonates who acquired CMV through human milk, however, have conflicting findings, with some studies demonstrating long-term deficits compared with gestational-age matched newborns, and others failing to show specific effects of CMV infection. Current evidence is insufficient to recommend avoidance of mother's milk due to risk of acquired CMV infection. Freezing of mother's milk may reduce viral titers but does not eliminate CMV and does not reduce the risk of severe sepsis-like syndrome from CMV infection, particularly among the most premature neonates.

Discharge Planning

Discharge planning must be ongoing, initiated well in advance of the actual date of hospital discharge, and include parent input. Ongoing lactation support should be a routine part of NICU discharge planning. Post-discharge feeding plans should balance a mother's goals for breastfeeding versus bottle-feeding of expressed breast milk, concerns for growth failure, and the growth and nutrition needs of her newborn or infant. If the hospital team has minimal concern for ongoing growth failure and the mother wishes to exclusively breastfeed, this should be considered with close lactation follow-up. If concerns for ongoing growth failure are greater (eg, slow growth in the hospital, inadequate oral feeding ability, abnormal biochemical measurements), post-discharge nutritional supplementation for at least some of the baby's feedings may be considered. Post-discharge supplements often include term or preterm formula powders that may be added to a mother's milk to augment the caloric intake (22–30 kcal/oz). If the baby is receiving a combination of mother's milk and formula at the point of discharge, post-discharge feeding regimens may include a combination of breastfeeding, fortified mother's milk, and formula, depending on the baby's nutritional needs. Some clinicians use HMF after discharge if they are following up with the baby closely.

Post-discharge follow-up should include close monitoring of lactation, newborn or infant feeding ability, and growth. Nutrient supplementation strategies are expected to change as infants grow in the weeks and months after discharge from the hospital. Feeding plans should be clearly communicated to post-discharge health care practitioners, and ongoing lactation support is important.

Vitamins and Iron Supplementation

If the preterm baby is exclusively breastfed or fed expressed human milk in the post-discharge period, multivitamin and iron supplementation is suggested. Multivitamins should be given as 1 mL/d orally. Ferrous sulfate should be given at a dose of 2 mg/kg/d of elemental iron. If the baby is receiving formula or fortifier as a supplement to breastfeeding, the dosage of multivitamin and iron supplementation should be reduced on the basis of the proportion of formula fed to the baby. There have been case reports that suggest a risk for zinc deficiency in exclusively breastfed preterm infants several months after hospital discharge. If infant growth is less than optimal, poor feeding is noted, and perioral or perianal rashes are present, zinc deficiency may be present, and zinc supplementation of 1 to 2 mg/kg/d should be considered.

Late Preterm Newborns

Late preterm newborns, born between 34 $^{0}/_{7}$ and 36 $^{6}/_{7}$ weeks' gestation, account for nearly three-quarters of preterm births in the United States. Despite having appearances comparable with their term counterparts, late preterm newborns lag behind in cardiorespiratory, metabolic, immunologic, neurological, and motor development. In these newborns, the development of jaundice, sepsis, respiratory distress, poor feeding, temperature instability, and hypoglycemia during the birth hospitalization is more likely; in addition, these newborns are more likely to be readmitted to the hospital soon after discharge for jaundice, feeding difficulties, dehydration, sepsis, and apnea. Of particular concern, breastfeeding is the greatest risk factor for rehospitalization of the late preterm newborn, especially for jaundice or dehydration, a finding that is largely attributed to insufficient human milk intake as a result of oral feeding difficulties, potentially inadequate breast draining due to an underdeveloped ability to extract milk effectively, resultant reduced milk production, and other causes commonly seen in late preterm newborns.

Given the known increased risk of medical problems in the late preterm newborn when compared with the term neonate, close observation and monitoring, especially in the first days after birth, is required. Although rooming-in to support breastfeeding is especially beneficial for these newborns, delivery service personnel need to determine the necessary level of care, depending on the condition and gestational age of the newborn. For the stable, more mature newborn, breastfeeding within the first hour, rooming-in, and ad libitum breastfeeding should be encouraged. For newborns who are admitted to the NICU, policies should be developed by the NICU to support the mother-baby dyad and breastfeeding and should describe milk collection, transport, and use for the

baby separated from the mother. Breastfeeding sessions should be evaluated for adequate milk transfer, and the newborn should be followed up to monitor any weight loss, dehydration, or jaundice.

In late preterm newborns, discharge from the hospital should not occur before 48 hours. Discharge criteria should be established and should include stable weight (see Chapter 8, Breastfeeding in the Hospital), stable temperature, an adequate supply of mother's milk or a plan for nutritional supplementation, documented effective milk transfer, a bilirubin level that has been assessed with follow-up planned, a written post-discharge feeding plan, and a scheduled outpatient visit within 24 to 48 hours of discharge. The outpatient visit should include a careful history, with assessment of additional neonate weight loss, voiding (with a goal of 6–8 voids per day), stools (with a goal of yellow, seedy stools by day 4 if breastfeeding), jaundice, and ability to breastfeed. Breastfeeding problems and concerns should be addressed, and the need for nutritional supplements should be evaluated. Triple feedings are commonly needed for the late preterm newborn who continues to lose weight or fails to gain weight. The triple-feed technique consists of breastfeeding, bottle-feeding (human milk or formula), and expressing human milk to maintain the mother's milk supply. Weighing a newborn before and after breastfeeding may be helpful in assessing the adequacy of milk transfer during breastfeeding and in determining the amount of supplemental feeding that may be needed (see Chapter 14, Lactation Support Technology). Some clinicians recommend the use of a post-discharge formula as a supplement to the breastfeeding late preterm baby until the ability to feed orally improves. Late preterm newborns should receive 2 mg/kg/d of iron to maintain iron sufficiency because of their rapid growth rates and their lack of iron accretion during the last part of gestation. They should also receive a multivitamin preparation if they are receiving only human milk or minimally supplemented human milk. All newborns should receive a vitamin D supplement.

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CHAPTER 13

Breastfeeding in Special Circumstances

Oral feeding is a major challenge for newborns and infants with congenital oral malformations. Breastfeeding can be particularly difficult because it involves 2 mechanisms that may be compromised in these conditions: suction and compression. Whether these can be achieved, and to what degree, depends on the type and size of the malformation, as well as the maturity of the newborn or infant.

Cleft Lip and Cleft Palate

Effective breastfeeding is more likely to occur in babies with an isolated cleft lip than in patients with cleft palate or cleft lip and palate. These patients benefit greatly from having certified lactation consultants involved early in their care.

There is some evidence that newborns or infants with cleft palate and cleft lip and palate who breastfeed have reduced rates of otitis media, which is known to occur more frequently in this population. Improved school outcomes have been reported in children with clefts who had longer breastfeeding duration. Experts suggest that breastfeeding promotes oral and facial muscular development.

If direct breastfeeding is ineffective for proper growth and nutrition, mothers should receive appropriate instruction on milk expression techniques. The expressed breast milk can be delivered to the baby via alternative feeding systems. The baby may also be noted to calm down or comfort even with non-nutritive suckling.

Families should be encouraged and supported to provide breast milk for their babies with cleft lip, cleft palate, and cleft lip and palate. It is recommended that practitioners use a patient-centered approach in which each family's wishes on how to feed their baby are considered. The counseling should be supportive and

honest about the likelihood of breastfeeding success. Families may also benefit from peer support groups.

Isolated Cleft Lip

Cases of isolated cleft lip are more likely to be associated with breastfeeding success. These newborns and infants are capable of generating negative pressure, provided occlusion of the lip is maintained. This can be accomplished by using the thumb of the hand to support the breast in the C-hold to fill in the cleft and form a seal (**Figure 13-1**). The C-hold can be achieved by placing the breast in the palm of the hand, using the fingers to wrap around the inferior aspect of the breast, and placing the thumb on the superior aspect of the breast to form the shape of the letter C. Some experts suggest that breastfeeding is more effective than bottle-feeding in newborns and infants with isolated cleft lip because the breast is more pliable and can therefore create a better seal than an artificial nipple.

Newborns and Infants With Cleft Hard Palate

Cleft malformations usually do not allow for appropriate suction to be created in the oral cavity, which is needed to facilitate oral feeding. Newborns and infants with cleft malformations commonly have nasal regurgitation of milk and excessive intake of air. Additionally, they often fatigue during prolonged attempts to breastfeed. These obstacles often result in inadequate milk intake, with subsequent poor weight gain during the first months after birth. If some negative pressure can be generated, breastfeeding may succeed; if not, a soft artificial nipple with a large opening can be used or milk can be directly expressed into the baby's mouth. Palatal prostheses are available to improve the ability to generate negative sucking pressure. Caution should be used with prostheses and nipples to prevent irritation or erosion of palatal edges.

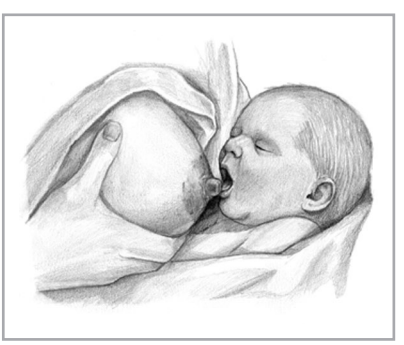


Figure 13-1. With the C-hold, the breast is placed in the palm of the hand, using the fingers to wrap around the bottom of the breast and placing the thumb above the areola, to form the shape of the letter C.

Newborns and Infants With Cleft Lip and Palate

Newborns and infants with cleft lip and palate are the least likely to breastfeed successfully because they cannot generate negative pressure and usually have poor oral-motor function. These babies usually require an individual feeding plan that involves the use of a feeding device (see Chapter 14, Lactation Support Technology). Techniques to assist the mother in breastfeeding a newborn or infant with cleft palate or cleft lip are outlined in **Box 13-1**. Meanwhile,

Box 13-1. Breastfeeding Techniques for Newborns and Infants With Cleft Lip or Cleft Palate

1. Feed frequently (every 2–3 hours) and know/teach techniques to allow milk letdown and latch-on.
2. Hold the breast with the C-hold or palmar grasp technique (ie, thumb above and fingers below the areola). The U-hold from under the breast can also be used (using the hand on the same side as the breast, place the palm of the hand flat against the rib cage, the thumb at 3 o'clock, and the index finger at 9 o'clock to cup the breast; keep the thumb and index finger 1 or 2 inches away from the areola) (**Figure 13-2**).
3. Hold the newborn or infant at breast level. For newborns or infants with hypotonia, the trunk and head should be placed at the same level as the breast by using pillows.
4. Use semi-upright positions, such as the clutch or football hold, to avoid nasal regurgitation, reflux of milk into the eustachian tubes, and airway occlusion.
5. Use the straddle position (with head support, the baby sits upright on the mother's lap and straddles her abdomen) for newborns and infants with bilateral cleft lip and palate to promote gravity-based delivery of milk and decreased nasal regurgitation and aspiration.
6. Position the breast toward the side of the baby's palate that has the most intact bone, and position the nipple downward so that it is not pushed into the cleft.
7. Massage the breast rhythmically to enhance milk delivery. Mothers may need to manually express their milk into the baby's mouth to compensate for absent suction and to stimulate the letdown reflex.

Adapted from Wagner C (personal communication).

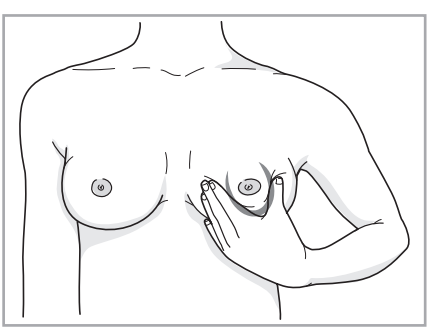


Figure 13-2. The U-hold. By using the hand on the same side as the breast, place the palm of the hand flat against the rib-cage, the thumb at 3 o'clock, and the index finger at 9 o'clock to cup the breast; keep the thumb and index finger 1 or 2 inches away from the areola.

the mother should be encouraged to express her milk to maintain an adequate supply.

Surgical Repair

Cleft lip is usually surgically repaired in the first few months after birth (at 1 to 4 months of age), whereas the palate is repaired at approximately 9 to 12 months of age. Historically, infants who underwent surgical repair of a cleft lip were fed with a cup, dropper, or spoon during postoperative recovery. There are data to support unrestricted breastfeeding immediately after repair, with no difference in complications when compared to artificial feedings. There is weak evidence that breastfeeding versus spoon feeding after cleft lip repair results in better weight gain. Thus, in some cases, breastfeeding should resume as soon as possible in the postoperative period.

Pierre Robin Sequence

The Pierre Robin sequence includes micrognathia, glossoptosis (tongue deformity), and often also cleft palate, all of which may affect feeding ability and lead to feeding problems. Micrognathia leads to problems with latch-on. The cleft palate does not allow for appropriate suction to be created in the oral cavity (see the Cleft Lip and Cleft Palate section earlier in this chapter). Additionally, the coordination of simultaneous sucking and swallowing is difficult for these newborns and infants. During oral feeding, milk gets into the nasopharynx, which, together with swallowing dysfunction and abnormal tongue position, creates an increased risk of aspiration.

Other swallowing difficulties result from the glossoptosis. The tongue is displaced posteriorly, and newborns and infants are unable to compress the nipple efficiently, so they have difficulty extracting sufficient milk into the oropharynx. In cases in which the tongue has been tacked down anteriorly (glossopexy) to prevent choking and aspiration, babies still encounter difficulty with latch and have tongue mobility problems and ongoing swallowing difficulties.

Newborns and infants with Pierre Robin sequence may have higher-than-average caloric needs as a result of breathing difficulties and chronic airway obstruction. Some will achieve adequate caloric intake through modified breastfeeding and modified nipple-feeding techniques. Those who are unable to tolerate oral feedings will require supplemental nasogastric or gastric tube feedings to provide adequate nutrition.

These babies have an increased risk of aspiration, associated respiratory infections, otitis media, and hearing deficits. The use of human milk is advantageous

because it is associated with a decrease in otitis media and upper respiratory infections. Mothers should be encouraged to pump milk early to establish an adequate milk supply for newborns and infants who are unable to breastfeed effectively.

Down Syndrome

Newborns and infants with Down syndrome, also known as trisomy 21, are known to be at higher risk for ear, respiratory, and other infections; congenital anomalies; and other problems such as malocclusion. Breastfeeding has been associated with improved outcomes in all of these conditions. Many newborns and infants with Down syndrome can breastfeed successfully, and provision of human milk should be encouraged and supported.

Babies with Down syndrome may require special interventions and support for successful breastfeeding. Their oral structures may include a variety of abnormalities that affect feeding: an enlarged, protruding, and/or furrowed tongue; a narrow palate; a submucosal or frank cleft palate; and micrognathia. They also have midface hypoplasia and, as a result, have smaller volumes in their nasopharynx and oropharynx. They have a small nose with a flat nasal bridge.

Babies with Down syndrome frequently present with generalized hypotonia and may exhibit ineffective suckling or tongue thrusting, resulting in difficulty with latch-on. The baby cannot form a trough with the tongue around the areola, which results in milk going down the side of the mouth instead of into the back of the mouth to be swallowed. Oral feeding competency usually improves as the generalized tone improves. Both sucking pressure and frequency increase by 4 months after birth. See **Box 13-2** for suggested techniques for breastfeeding newborns and infants with Down syndrome.

Multiple Births

Newborns and infants of multiple births, including twins and triplets, can breastfeed successfully and without the need for supplementation in many cases. Separation of the mother and her babies should be avoided, to allow for frequent feedings to occur and also to support the establishment of her milk supply. The family should be encouraged to protect the mother from unnecessary interruptions during breastfeeding, and she should be given the necessary support. A consultation with a certified lactation consultant is recommended. Breastfeeding multiple babies creates higher nutritional needs for the mother—the current recommendation for energy supplementation for the mother during breastfeeding is an additional 500 to 600 kcal *per baby* per day.

Box 13-2. Breastfeeding Techniques for Newborns and Infants With Down Syndrome

1. Feed at frequent, short intervals (every 2–3 hours).
2. Place the baby's trunk and head at the same level, while supporting the head to facilitate head control.
3. Positioning
   a. Use of the C-hold, with the thumb on top and the fingers below the areola, helps to control the nipple (see **Figure 13-1**).
   b. Support the baby's jaw from below with a finger. The index finger can be used to provide additional support for the jaw or to provide gentle downward pressure on the chin to open the baby's mouth wider.
   c. For babies with hypotonia, a modified U-hold (see **Figure 13-2**) supports the baby's chin by allowing the mandible to rest within the interdigital space. The thumb is placed on one cheek and the index finger on the other. The remaining fingers continue to support the breast.
4. In cases of frequent choking and gulping air, place the back of the baby's head superior to the nipple. The mother can lean back (eg, in a recliner) so that the baby's throat is higher than the nipple. If this is effective, combine with frequent burping.
5. For newborns and infants with macroglossia, assist them in opening their mouths and latching. The C- and U-holds can be helpful.
6. To overcome the tongue thrusting
   a. Breastfeed with the baby's chin pointing downward, almost touching the baby's chest.
   b. Gently stroke the baby's cheek toward his or her mouth, brushing the lips a few times.
   c. Use a clean index finger with well-trimmed nail to massage the outside of the baby's gums. Begin at the midline of the gum and move toward the sides of the gum.
   d. As the baby's mouth opens, press down firmly on the tongue tip with the tip of the index finger and count 1-2-3.
   e. Release the pressure and move the finger back on the tongue, repeating this 1 or 2 more times. Avoid gagging the baby.
   f. Repeat this procedure 3 or 4 times before each breastfeeding session.
7. A nipple shield may be useful in newborns and infants with hypotonia or who have weakness as a transition to breastfeeding (see Chapter 14, Lactation Support Technology).

Adapted from Wagner C (personal communication).

There are a variety of ways that a mother can nurse multiple babies. It is usually recommended to start breastfeeding each baby individually because (1) it takes time for the mother to recover from the delivery, (2) it takes time to learn how to position and feed one baby, (3) the babies do not necessarily have the same suckling ability, and (4) the new situation is often overwhelming for the parents. Twins may be breastfed in any of 3 modes: simultaneously; separately on

an individual demand schedule; or separately on a modified-demand schedule, in which one baby is fed on demand and then the other is fed immediately afterward. Simultaneous breastfeeding saves time and also has a physiological advantage in that the baby who is breastfeeding more vigorously on one side may stimulate the letdown reflex for the other twin. When feeding twins, it is recommended to alternate sides so that each breast receives a balanced level of stimulation.

Encouraging the partner or extended family members to help with feedings alleviates some of the stress for the breastfeeding parent. They can assist with positioning and latch of the second baby, simultaneous hand expression and pumping, and other forms of support. Many mothers and babies adapt rapidly, and mothers can soon choose their preferred schedule. Some mothers breastfeed exclusively, while others prefer a combination of breastfeeding and mechanical milk expression and bottle-feeding (or feeding with other devices, such as syringes or spoons).

Tandem Nursing

Tandem nursing refers to continuation of breastfeeding into the next pregnancy and after delivery of the next neonate. A normal pregnancy is not an indication for immediate weaning. Current evidence does not suggest an increased risk of preterm birth in low-risk pregnant women who are breastfeeding. Some cultures practice weaning when pregnancy is confirmed on the basis of cultural, religious, or other social tenets, while others do not.

A review of pregnant mothers who wanted to continue breastfeeding an older infant or child found that about one-half of the breastfeeding children weaned spontaneously. This occurred mostly at the end of the first trimester of the new pregnancy, when mothers reported a sharp decline in milk production. The main reasons for mother-initiated weaning were breast and nipple pain and fatigue. In such cases, providing emotional support for a rapidly weaned infant or toddler is important.

If tandem breastfeeding occurs, care must be taken to ensure that the new baby has priority at the breast and that milk intake and growth of the new baby are not compromised by the continued breastfeeding of an older infant or child. Often, the previously breastfeeding older child will continue to nurse in large part for comfort and, in a developmentally appropriate way, to assert a continuing claim on the mother. Some studies demonstrate slower weight gain in newborns whose mothers are tandem nursing, possibly due to qualitative longitudinal differences in the milk composition. In terms of milk volume, the

mother will produce milk at the same rate that it is removed; if she is nursing 2 or more newborns, infants, or children, she will produce greater amounts of milk to accommodate their needs.

Feeding Human Milk Without Birthing

Parents who do not give birth to their baby may wish to breastfeed or *chestfeed* (a term that describes feeding a baby from the chest and avoids using the word *breast*). These may include foster and adoptive parents, surrogate parents, partners of birthing parents, and parents of all sexes, genders, and sexual orientations. For example, some trans men with intact mammary glands may wish to breastfeed or chestfeed. The medical professional can provide guidance and support through this process, which can be both rewarding and stressful.

Breastfeeding by a non-birthing parent with mammary glands may be accomplished after preparation of the breasts to induce milk production. Estrogen and progesterone may be used to mimic the proliferation of mammary tissue that occurs during pregnancy. Once hormonal therapy is complete, pharmacotherapy and galactagogues may be used to increase prolactin levels. The effectiveness of these agents varies, and side effects should be considered carefully.

The next important step in the induction process is nipple stimulation. Over a period of time, the nonpregnant mammary gland may undergo changes in response to the physical stimulation of suckling or pumping the breast. If the breast is stimulated, prolactin may be secreted, and milk may be produced. The increase in prolactin and milk production, however, is variable. Milk production may take from 1 to 6 weeks (on average about 4 weeks) to begin, after initiating pumping or suckling.

Another key component to successful lactation is the letdown reflex, which is directly dependent on adequate levels of circulating oxytocin. Letdown may be facilitated by exogenous oxytocin.

The amount of milk produced varies, depending on the physiological anatomy and the pregnancy history of the parent. Frequent stimulation of the breast is essential. Current evidence suggests that achieving a full milk supply in a non-birthing parent is unlikely.

It may be useful and often necessary for the parent to use a supplemental feeding device (eg, an at-breast lactation aid device with a small feeding tube attached at the breast) while breastfeeding or chestfeeding. This technique allows the baby to receive supplemental nutrition while suckling. Parents in these circumstances find that bonding with their baby is enhanced with suckling or

breastfeeding, even when there is little to no milk being produced. Use of the at-breast lactation aid device to provide nutrition (via human donor milk or commercial formula) also allows parents who wish to avoid exogenous agents to still participate in chestfeeding.

It is advised that this process begin well before the arrival of the baby, which can be stressful and may interfere with milk production. A consultation with a medical professional or medical team that specializes in lactation, as well as a knowledgeable lactation specialist, is advised. Recommendations, and pharmacological agents, if needed, should be tailored to each family's circumstances.

Relactation

Relactation may be desired by mothers who initiated lactation and stopped for any number of reasons. When compared with non-birthing mothers who initiate lactation to nurse an adopted baby, birthing mothers who have previously lactated are more likely to achieve a full milk supply. With renewed stimulation to the nipple, the neuroendocrine loop can be reactivated, and milk production may ensue. Evidence for the use of galactagogues is mixed in these cases. Research suggests that successful relactation can happen in most cases, when the newborn or infant is young (especially younger than 6 weeks) and even more so when the mother is also young (younger than 25 years) and has a good support system.

Additional Resources

For more details, refer to the Academy of Breastfeeding Medicine protocol, "Guidelines for Breastfeeding Infants with Cleft Lip, Cleft Palate, or Cleft Lip and Palate." The American Cleft Palate–Craniofacial Association offers instructions for newborn nurseries (https://cleftline.org/wp-content/uploads/2018/05/Tips-for-Hospital-Nurseries-2017.pdf).

For more details on Down syndrome, refer to the Academy of Breastfeeding Medicine protocol, "Breastfeeding the Hypotonic Infant."

The following organizations have useful information for patients:

- The Canadian Down Syndrome Society (https://www.ndsccenter.org/wp-content/uploads/CDSS_breastfeeding_brochure.pdf)
- The Australian Breastfeeding Association (https://www.breastfeeding.asn.au/bf-info/down)

For Multiples

Local organizations, often named Mothers or Parents of Multiples, may be helpful for breastfeeding and emotional support.

Useful guidance for practitioners, as well as sample scripting for patients, can be found at the Stanford Newborn Nursery website (https://med.stanford.edu/newborns/professional-education/breastfeeding/babies-at-risk/mothers-with-multiples.html).

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CHAPTER 14

Lactation Support Technology

Lactation support technology refers to the equipment and methods used to support successful breastfeeding. These include breast pumps, breast shells, nipple shields, feeding tube devices, weighing scales, and proper milk storage—any or all of which can be useful in supporting women in initiating and maintaining their breast milk supply and, ultimately, to breastfeed.

Manual and Mechanical Milk Expression

Both manual and mechanical milk expression techniques are effective in helping to initiate and maintain milk production during mother-baby separation, maternal or baby illness, inability of the newborn or infant to latch on to the breast, poor maternal milk production, or poor milk transfer.

Manual Milk Expression

Manual milk expression works well during short-term separation and to alleviate breast engorgement or sore nipples (**Figure 14-1**). The simple manual expression steps in **Box 14-1** can be mastered by the mother after some practice.

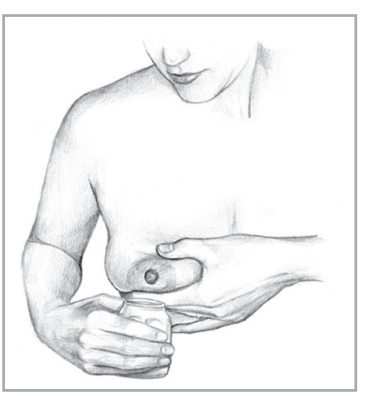


Figure 14-1. Manual milk expression.

Box 14-1. Manual Milk Expression Technique

1. Wash hands thoroughly.
2. Gently massage the breast from the outside quadrants toward the areola; avoid applying deep pressure or friction.
3. A clean washcloth with warm water may be placed on the breast about 5 minutes before milk expression.
4. Place the hand with the fingers below and the thumb above the nipple base, about 3 cm away from it. Press toward the chest wall and then compress the thumb and fingers together, rolling them toward the nipple. Move the hand around the areola to reach all of the areas that cover the pooled milk in the lactiferous sinuses. Use the free hand to massage the breast from the outer quadrants toward the nipple. Do not squeeze the nipple.
5. The manual method can take 20 to 30 minutes for adequate draining of both breasts.
6. For a video demonstrating this technique, see http://med.stanford.edu/newborns.html.

High-quality educational videos for instructing mothers in this technique are available online at http://med.stanford.edu/newborns.html.

Mechanical Expression

Mechanical expression of milk can be accomplished by using a manual, small, battery-operated or hospital-grade electric breast pump (**Figure 14-2**). Mechanical expression works best for those planning to express their milk on a regular, ongoing basis, such as for a return to work or school, or in case of maternal or baby illness. See **Box 14-2** for a list of common questions used to evaluate breast pumps before purchase. Parents should also check with their health insurance plans before purchase, as many of them now cover electric breast pumps.

Battery-Operated and Electric Pumps

Battery-operated and electric pumps are generally lightweight and have variable frequency (2–76 cycles/min), suction pressures (8–360 mm Hg), and capabilities for double-breast pumping. The electric breast pump with automatic cycling yields milk that has a higher calorie content (secondary to increased fat concentration from complete breast drainage) than milk expressed via manual methods. Guidelines for mechanical milk expression are listed in **Box 14-3**. Certain breast pumps and breast pump features appear to be superior or more acceptable to mothers who are dependent on the use of pumps (eg, mothers of preterm babies) than others. Advances in pump technology have added features that allow wireless pumping, hand-free pumps, and app-controlled pumps, which

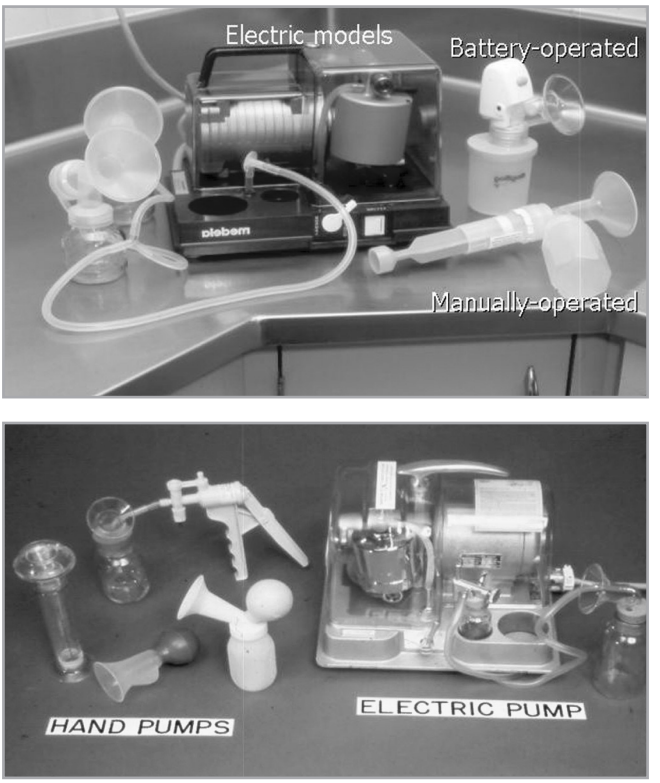


Figure 14-2. Various styles of electric and manual breast pumps.

Box 14-2. Questions to Answer Before Obtaining a Breast Pump

1. Is the pump for short- or long-term use?
2. What will the pump cost?
3. How much does the pump weigh?
4. How comfortable is the pump?
5. Does it drain the breast efficiently?
6. How easy are the pump and collection kits to clean?
7. Are there clear written instructions on how to use the pump?
8. Can a standard bottle be used to collect milk with the pump?
9. How many suction cycles are there per minute?
10. Does the pump cycle on its own?
11. Are variable flange sizes available?
12. Are there mechanisms to prevent pump contamination?
13. How quiet is the pump?
14. How long are the electrical cords?
15. Can it pump both breasts at the same time?

(*continued*)

Box 14-2 (*continued*)

16. Is the pump approved for use in the hospital, if applicable?
17. What is the manufacturer's warranty?
18. Is the pump meant for a single owner or for multiple users?
19. Does the pump come with a case or a tote bag?
20. Do you have to use 2 hands to operate the pump?
21. Is the pump efficient and effective?
22. Can the pump be worn discreetly or wirelessly while on the go?
23. Is this pump covered by my health insurance?

Derived from Slusser W, Frantz K. High-technology breastfeeding. *Pediatr Clin North Am.* 2001;48(2):505–516.

Box 14-3. General Guidelines for Mechanical Milk Expression

1. Wash hands before beginning to express milk.
2. To initiate and maintain milk supply for a hospitalized newborn, begin as soon as possible after birth (preferably within the first 8 hours) and continue expressing milk at a frequency of 8 times in 24 hours. After an adequate milk supply is established, the frequency of milk expression can be reduced; this generally occurs 2 to 3 weeks after birth, or when milk production of 500 mL per 24 hours is achieved. For other situations, the frequency of milk expression can be less.
3. During each expression, 10 minutes of pumping each breast is usually sufficient for maintenance of adequate milk production; however, this can vary from woman to woman, as some women may require pumping for more time (15–20 minutes)—preferably pumping from both breasts simultaneously.
4. Develop relaxation techniques, such as sitting in a comfortable environment. When pumping, a mother can sit at the bedside of the hospitalized newborn, think about the newborn, or look at a photograph of the newborn to encourage letdown. Gently massage the breast before and during milk expression.
5. It is unnecessary to discard the first few milliliters of expressed milk.
6. A pump collection kit should be used by only one mother. Verify the manufacturer's instructions before sterilizing.
7. Pumps categorized for in-home single users should be used by only one mother.
8. Routine microbiological surveillance of the pump and the milk is costly and is not indicated.
9. Review pump recommendations with the patient verbally and in written form, or washing and cleaning of pump equipment. (Instructions usually accompany the pump.)

seem to make pumping more convenient and possibly more effective. However, it is critical that mothers with babies in the neonatal intensive care unit (NICU) or who are away from their babies for long periods receive the most effective, efficient, comfortable, and convenient electric breast pump available.

A lactation specialist who works in the NICU can be a valuable asset to mothers of preterm newborns and can assist in providing the best pump and training.

Breast Pump Maintenance

- *Assembly.* A knowledgeable person should demonstrate to the family how to assemble and disassemble the pumping equipment.
- *Cleaning.* Each mother should have her own collection kit and storage containers, which should be rinsed to remove milk residue; cleaned with hot, soapy water; and dried in the air after each use. Dishwasher cleaning is also adequate. Bottled or boiled water should be used for cleaning pump parts where the water supply is potentially contaminated. Manufacturer's instructions should be followed. When more than one mother is using the same breast pump, as in a hospital lactation room, hospital staff should be responsible for cleaning the pump daily, examining the pumping equipment for milk backup, and regularly checking the suction settings.
- *Double-breast pumping system.* Long-term mother-baby separation and mothers returning to work warrant the provision of a breast pump that is capable of simultaneous double (bilateral) pumping because of the time saved, the higher amount of prolactin released, and the potential for greater milk production (**Figure 14-3**). Nursing bras that assist mothers with the positioning of both flanges simultaneously are now available.
- *Fitting the flange.* The opening where the breast meets the collection kit needs to be wide enough to allow the nipple to easily move in and out without pain but not so large that milk removal is impaired. Some collection kits have breast shield inserts to accommodate different nipple sizes. A poorly fitted flange, used repeatedly, can cause nipple trauma and pain.



Figure 14-3. A, An electric breast pump that allows collection of milk from both breasts simultaneously is best for mothers who express milk on a routine basis—especially if they have a hospitalized newborn. B, Double pumping system.

Finding the proper size for a breast flange is based on the diameter of the nipple, not the areola (the softer pigmented skin around the nipple). When the tunnel of the flange is placed on the breast, it should only have a few millimeters (3–5 mm) of wiggle room around the nipple. The tunnel of the flange fits over the nipple and forms a seal around the areola. The pumping action mimics the nipple stimulation of a baby nursing. Vacuum is created by the pump, and the nipple is gently pulled into the flange tunnel. A good fit allows the nipple to move freely and comfortably within the shaft of the flange, minimizing friction points. The areola is gently compressed, allowing for rhythmic expression of milk. A woman's breasts may be different sizes and may require 2 different flange sizes.

Manual Breast Pumps

Manual breast pumps are available in 3 styles.

- *Piston or cylinder pumps.* For intermittent pumping, these are simple and effective devices; however, the use of these pumps is unlikely to be adequate to increase milk production or maintain supply if there is prolonged mother-baby separation. Mothers who choose to use a hand pump need to be instructed on how to use it properly, because lateral epicondylitis (tennis elbow) has been associated with the use of trombone-action–style hand pumps.
- *Squeeze-handle pumps.* These are effective at removing milk, but some women develop fatigue in their hand after prolonged use.
- *Rubber bulb (bicycle horn) pumps.* These pumps are not recommended because of the potential for bacteria buildup inside the rubber bulb and contamination of the milk.

Economics of Pump Purchase or Rental

If a physician prescribes a breast pump for a patient, most health insurance companies and the Special Supplemental Nutrition Program for Women, Infants, and Children will cover the cost of a breast pump rental or purchase. In addition, many employee breastfeeding support programs will cover the cost of purchasing or renting equipment. Physicians are advised to remind patients to verify their coverage benefits for breast pumps as well as be prepared to write letters of medical necessity for breast pumps on behalf of their patients.

Collection Method for Catching Milk From the Non-nursing Side ("Milk Savers")

Many mothers are concerned about having an adequate volume of milk production and want to capture every drop of milk possible. The concern with milk loss from the breast that is not being suckled or when only a single pump is being

used troubles mothers who perceive significant milk loss from that breast. This has resulted in the development and use of various "milk catchers" that use a suction attachment to passively capture milk. These devices are simple and easily cleaned and have, thus far, not been noted to cause any damage to breast tissue. While not all mothers have such noticeable letdown, those who do are very pleased to capture that 1 to 3 ounces with these new devices that they would otherwise have lost. The only challenge occasionally noted in mother reviews thus far has been the loss of suction, causing the device to fall off and result in milk loss when it falls. Recent case studies have suggested that these devices may lead to oversupply and engorgement, which can be a setup for mastitis.

Nipple Shields

Made of latex or silicone, nipple shields provide a thin protective barrier over the nipple and areola, with holes at the tip to allow the transfer of milk (**Figure 14-4**). Nipple shields are used to help a newborn or infant latch on to a flat or inverted nipple or an engorged breast, protect sore nipples, reduce an excessively rapid milk flow, and sometimes entice a newborn or infant to feed at the breast if the baby is accustomed to being fed with the nipple of a bottle. Ultrathin silicone nipple shields have been shown to improve milk transfer in preterm newborns who are transitioning from tube or bottle-feeding to breastfeeding. The use of the nipple shield for preterm newborns may be advantageous in establishing and maintaining breastfeeding; however, the use of nipple shields should not be routine but should be considered when preterm or ill newborns or infants have demonstrated persistent difficulty with sustained breastfeeding and milk transfer.

A review of 13 published reports of nipple shield use demonstrated little support for current practices regarding common nipple shields and did not demonstrate safety in the long term for milk supply, infant weight gain, or duration of

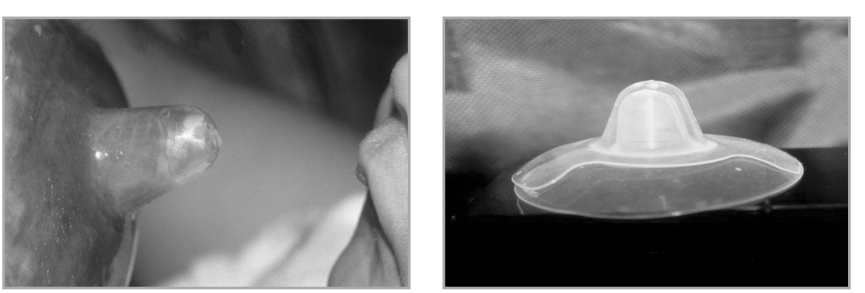


Figure 14-4. Nipple shields.

breastfeeding. Because of the potential of nipple shields to interfere with milk transfer and reduce stimulation of the areola, while nipple shields are being used, clinicians should monitor baby weight gain to ensure adequate milk intake. Health care professionals should consider nipple shields an unknown risk and limit their duration of use whenever possible.

Breast Cups and Shells

Made of hard polypropylene, silicone, or other hard plastic, breast cups and shells are designed in a cup shape with air holes on one side and one larger hole on the other side for the nipple to protrude through the opening into the cup or shell. They aid in the relief of sore nipples and in preventing milk from leaking onto a mother's clothes. The most important features of breast cups and shells are the air holes for ventilation, selecting a sufficient size to prevent overflow of milk onto the mother's clothes, and selecting a large enough nipple opening for comfort. They are worn inside the bra between breastfeeding episodes. Although they are sometimes used for correcting inverted nipples during the prenatal and postpartum period, there is no evidence that they are effective.

Supplemental Feeding Methods

For the newborn or infant who is unable or unwilling to suckle at the breast, there are other methods of providing expressed milk, such as with feeding tube devices, cups, and bottles, and use of the finger-feeding technique. Unfortunately, there is little evidence of the safety or effectiveness of most alternative feeding methods and their effect on breastfeeding. When selecting an alternative feeding method, clinicians should consider cost and availability, ease of use and cleaning, stress to the newborn, whether adequate milk volume can be fed to the baby in 20 to 30 minutes, whether anticipated use is short term or long term, maternal preference, and whether the method serves to enhance development of baby breastfeeding skills.

At-Breast Lactation Aid Devices

At-breast lactation aid devices are very thin, soft feeding tubes made of plastic that are attached to a milk container at one end, with the other end placed adjacent to the mother's nipple and fixed to the breast with a small piece of tape (**Figure 14-5**). This device has the advantage of supplying appropriate supplementation while simultaneously allowing stimulation of the breast to produce more milk, thereby reinforcing the baby's feeding at the breast. Use of an at-breast lactation aid device may also be helpful when a mother wishes



Figure 14-5. Use of a feeding tube device is demonstrated.

to relactate or induce lactation by providing banked breast milk, a proprietary human milk substitute formula, or the mother's own milk (if available) through the system while simultaneously allowing stimulation of the breast to produce more milk. The use of feeding tube devices usually requires supervision by a certified lactation specialist. Most of these systems are awkward to use, difficult to clean, and expensive and require moderately complex learning. Although the feeding tube device improves stimulation at the breast so that a breast pump may not be needed, in some cases, mothers will use both the feeding tube device and a breast pump.

Feeding With a Cup

Feeding a newborn or infant breast milk from a cup is an alternative method to bottle-feeding when breastfeeding is not an option or when parents are opposed to the use of bottles (**Figure 14-6**). Many clinicians are unaware that feeding with a cup has been compared with bottle-feeding in term babies in a controlled clinical trial. Feeding with a cup was found to be equivalent to bottle-feeding in terms of duration of the feeding session, volume of milk ingested, and newborn



Figure 14-6. Breast milk can be fed to the infant in a cup.

or infant physiological stability (ie, heart rate, respiratory rate, and oxygen saturation level). In addition, feeding babies breast milk in a cup may help preserve breastfeeding duration among those who require multiple supplemental feedings. The benefits of cup feeding for preterm newborns also have been reported.

For some newborns and infants, bottle-feeding may interfere with the establishment of breastfeeding, so feeding breast milk in a cup is a reasonable alternative, provided an experienced practitioner feeds the newborn or infant with the cup and then teaches the parents how to use the method. Using this method entails using a small plastic or glass medicine cup filled with breast milk. Babies are fed in a semi-upright position, with the head and upper back supported. Babies can be stimulated to root by stroking the lower lip with the edge of the cup. The baby then sips or laps the milk when the cup is placed against the baby's lower lip and tilted so that the milk is available but not poured or dripped into the baby's mouth. Some newborns and infants may not be able to sustain the sipping or lapping effort to get an adequate volume, or they may lose significant amounts of milk because of dribbling. Videos of this method can be found online.

Bottle-feeding

Although bottle-feeding is the most commonly used method of supplementation in the United States, it is of concern because of distinct differences required for tongue and jaw movements during feeding, differences in milk flow rates, and possible long-term adverse consequences in the development of the mouth, jaw, and oral-motor structures. In general, bottles are not recommended for the first few weeks after birth, until breastfeeding is well established. Because the tongue, lips, and mouth are used differently for bottle-feeding and breastfeeding and because breastfed newborns become accustomed to the soft, supple human nipple when feeding, bottle nipples may not be accepted readily. During bottle-feeding, the baby should be held in a somewhat flexed position and resting in the arms of the caregiver. The bottle should be introduced by touching the lower lip of the baby to elicit the rooting reflex, then slipping the bottle nipple in the mouth once the baby's mouth opens. In some newborns, early introduction of bottles may lead to ineffective suckling at the breast or result in refusal of the breast. Using slow-flow or stage 1 nipples for women who desire to continue a nursing relationship may address this challenge because the baby will not get accustomed to the faster flow of bottles, which sometimes encourages the baby to refuse the nipple or feeding at the breast over time.

There may be a need to introduce bottles to infants whose mothers expect to be separated from them soon, such as when returning to work or school (see Chapter 10, Maintenance of Breastfeeding: The Mother).

Other Temporary Feeding Methods

When breastfeeding is not possible, other temporary feeding methods of delivering milk to the newborn or infant include using a medicine spoon, a dropper, or a syringe, as well as finger feedings, in which a feeding tube is held with a finger near the junction of the hard and soft palates. These methods prevent the delivery of milk via bottle and artificial nipple. When using a syringe or a medicine dropper, avoid squeezing or pushing the milk into the baby's mouth. Entice the baby to suck the milk out by placing a few drops on the lip. No long-term studies have been conducted to examine the risks and benefits of these alternative methods.

Intragastric (Orogastric, Nasogastric) Tube Feeding

Intragastric feeding is usually used when a newborn or infant is preterm or too ill to suckle at the breast. There are 2 ways that milk can be fed by this method: via an intermittent bolus and via continuous infusion. For the bolus technique, gravity assists the milk in flowing into the tube. A continuous infusion requires that the syringe of milk be placed on a syringe infusion pump and then attached to the feeding tube. Because the fat will separate from the milk upon standing, efforts should be made to ensure that the separated fat is not left behind when the milk is fed to the baby. A single-syringe infusion pump with the shortest length of tubing is used to ensure the best delivery of fat by using the continuous tube-feeding method. The syringe should be oriented with the tip upright and the syringe emptied completely after each use (**Figure 14-7**). With continuous feedings, syringe systems should be changed every 3 to 4 hours.



Figure 14-7. The orientation of the syringe in a continuous tube-feeding system.

From Schanler RJ. Special methods in feeding the preterm infant. In: Tsang R, Nichols BL, eds. *Nutrition in Infancy.* Philadelphia, PA: Hanley & Belfus; 1988:315–325.

Test Weighing

Test weighing is a procedure used to measure milk intake by weighing the newborn or infant before and after a feeding, under identical conditions. The net intake in grams (which closely approximates the volume in milliliters) is obtained by subtracting the pre-feeding weight from the post-feeding weight. Test weighing can be easily used in the hospital and at home as a tool to assess the adequacy of milk intake and evaluate milk production after changes in lactation performance. Short-term use of an electronic baby scale can be useful for estimating milk intake in the preterm newborn during the transition from the hospital to the home. A sensitive scale (±2 g sensitivity) with a digital readout and computerized integration to correct for baby movement is recommended. Numerous controlled, blinded clinical trials have demonstrated that test weighing is accurate, acceptable to mothers, and superior to other tools or scoring systems previously used to estimate milk intake. However, test weighing with a nonelectronic scale is not reliable and not recommended. Although test weighing has been used to estimate milk intake from a single feeding, for best estimates of milk intake, it should be performed at each feeding for at least 24 hours, because there is variation from feeding to feeding. The baby must wear the same clothing and diaper before and after the feeding to obtain an accurate reflection of intake.

Milk Storage

Human milk should be stored in a cool, safe place to maximize its preservation and minimize contamination. Human milk has significant immunologic protection that also protects it from contamination. However, when expressed into collection containers, some skin bacteria mix with the milk. Nevertheless, bacterial counts decrease in stored milk. See **Table 14-1** for milk storage guidelines.

Table 14-1. Suggested Guidelines for Milk Storage and Use for All Newborns and Infants

Storage Method and Temperature	Maximum Amount of Time for Storage
Room (25°C [77°F])	4 h[a]
Refrigerator (4°C [39°F])	96 h
Previously thawed refrigerated milk	24 h
Freezer (−18°C = 0°F)	6–12 mo

[a] Continuous milk infusions for tube-feeding neonates generally remain at room temperature for 3 to 4 hours.

The infographic available at https://www.cdc.gov/breastfeeding/pdf/preparation-of-breast-milk_H.pdf may be used for quick reference for office and families.

General Storage Guidelines

Room Temperature (25°C [77°F])

The consensus is that fresh human milk can be maintained or used at room temperature for up to 4 hours. Continuous intragastric tube-feeding syringes used in neonatal nurseries generally remain at room temperature for up to 4 hours.

Refrigeration (4°C [39°F])

Several studies have demonstrated the safety of refrigerating human milk, through the evaluation of the bactericidal capacity of stored milk as a marker for milk quality, milk constituents, and bacterial growth in the stored milk samples. Bactericidal capacity of stored refrigerated human milk declines significantly by 48 to 72 hours. However, studies of expressed human milk indicate that it can be stored at refrigerator temperature (4°C [39°F]) in the NICU for as long as 96 hours. These data were obtained in refrigerators that were opened several times a day, with temperature verification occurring daily.

Freezing (−18°C [0°F])

The preferred method of storing milk that is not intended to be fed to a newborn or infant within 48 hours of expression is freezing. Single milk expressions should be packaged individually. Unlike heat treatment, freezing preserves many of the nutritional and immunologic properties of human milk. When frozen appropriately, milk can generally be stored for at least 6 months before levels of free fatty acids increase (which constitutes evidence for rancidity). Milk should not be stored in the door of the freezer. Milk bank freezers should have a thermometer and an alarm and should be opened only infrequently—especially if used for long-term storage. Under these conditions, the long-term storage of human milk has been allowed for up to 12 months. It should be noted that freezer thermometers with alarms are also easily available for purchase for personal use (not just for milk banks).

Thawing

Milk should be thawed by using a waterless warmer or by holding the container of milk under running tepid (not hot) water. Milk should never be thawed in a microwave or left unattended in a container of water. After milk is fully thawed, it should not be refrozen; instead, it should be stored in a refrigerator until used. Thawed milk should be used within 24 hours or discarded. For hospitalized

newborns and infants, expressed human milk that remains in a bottle after a feeding should be discarded.

Milk Identification

In the hospital setting, all containers for frozen expressed milk must carry a standardized label that includes the baby's name, the medical record number, and the date and time the milk was expressed. Some hospitals request that mothers list medications or current illnesses on the label to ensure communication about the acceptability of the milk with hospital staff. Policies should be developed to avoid misadministration of human milk—that is, feeding one mother's milk to someone else's baby. In the child care setting, milk also must be labeled clearly.

Milk Storage Containers

For rigid milk storage containers, caps that provide an airtight seal should be used. Milk storage containers include

- *Rigid plastic* storage containers made of polycarbonate (clear hard plastic), polypropylene (frosted hard plastic bottles), or other hard plastic. These are recommended for long-term storage of expressed human milk.
- *Glass* containers. These can also be used for long-term storage, but care must be taken to ensure they do not get overfilled and/or crack in the freezer.
- *Soft plastic* (polyethylene) storage bags. These have potential for contamination from nicks in the bags, loss of nutrient properties (especially fat and fat-soluble vitamins), loss of milk because of spillage, and high cost. They are not recommended for hospitalized preterm newborns, and some experts discourage their use for all newborns and infants. Polyethylene bags specifically designed for storing human milk, however, may be convenient for the workplace or school if mothers bring their milk home at the end of the day. If they are used, the milk should be poured into rigid containers before freezer storage.

Additionally, new adapters for breast pumps allow many women to pump directly into milk storage containers or storage bags, or directly into their baby's bottles, which eliminates the need to pour and transfer milk, thereby decreasing the risk of wasting milk or introducing contamination.

Cleaning Collection and Storage Containers

Milk collection and storage containers should be rinsed to remove adherent milk, then washed with hot, soapy water and left to air-dry. Dishwasher cleaning is also adequate.

Donor Human Milk

The American Academy of Pediatrics (AAP) has produced a policy statement on the use of donor human milk (**Appendix B**). *Donor human milk* is milk that is contributed by lactating women other than the biological mother of the baby receiving the milk. Donor milk is generally used as a replacement if a mother's milk is not available. The potent benefits of human milk are such that the AAP now recommends all preterm newborns should receive human milk. A mother's own milk, fresh or frozen, should be the newborn's primary diet, which should be fortified appropriately for newborns born weighing less than 1.5 kg. If the mother's own milk is unavailable, despite receiving significant lactation support, pasteurized donor milk should be used. In the United States, donor human milk must be collected and stored through a milk bank. Because of the risk of infectious disease transmission, banked donor human milk must be pasteurized. The AAP, the Centers for Disease Control and Prevention, and the US Food and Drug Administration all caution against using unpasteurized donor human milk, donor milk that is obtained via the internet from unscreened donors, or milk from a milk bank that does not follow the protocols of the Human Milk Banking Association of North America (HMBANA). Although pasteurization methods used by milk banks in the United States differ, methods currently used have been shown to effectively eradicate HIV, human T-cell lymphocytic virus, cytomegalovirus, hepatitis B virus, hepatitis C virus, and bacteria.

Use of banked donor milk should be preceded by a discussion of the potential benefits of pasteurized human milk versus the potential risks of its use, such as unknown exposure to drugs, medications, herbal products, or infectious agents. Some experts advocate obtaining written, informed consent for its use; others do not. The HMBANA is one source for information, policies, and procedures related to donor milk banking. All member banks of the HMBANA are required to follow established guidelines, such as carefully selecting and monitoring donors, following strict procedures for heat treatment and storage of donated milk, and evaluating processed milk for sterility after pasteurization. Health care professionals interested in the potential uses of donor human milk should consult the HMBANA (www.HMBANA.org) or one of its member milk banks. Alternatively, Prolacta Bioscience (www.prolacta.com) is another source of donor human milk and milk products that have undergone scientific study.

Bacteriologic Surveillance of a Mother's Milk

Human milk can potentially be a mode of transmission of infection. This is particularly a concern when breast pumps and other equipment are used. Mechanical breast pumps that are disinfected inadequately may also serve as a potential source of infection in neonatal nurseries. Expressed milk samples commonly contain a diversity of bacteria.

Bacteriologic Cultures

Bacteriologic cultures of a mother's own milk may, under rare circumstances, be indicated when assessing unexplained infections in newborns and infants. Some clinicians culture milk if a baby becomes infected with an unusual organism. There are reports of group B streptococcus, *Staphylococcus aureus*, and other pathogenic infections occurring in babies in the NICU that were linked to colonization or mastitis in the mother. Despite this possibility, routinely obtaining cultures of a mother's milk is costly, creates undue concern, and is not recommended. Indeed, a cause-and-effect relationship between a mother's breast milk and an infected baby has not been proven in most case reports. Simultaneous exposure of a mother and her baby to pathogenic organisms may be more likely. Moreover, results from an initial milk culture do not necessarily correlate with results of subsequent milk cultures in the same mother.

Bacteriologic Screening Results

Bacteria found at screening are usually identical to the strains found on the mother's skin and nipples. A wide variety of bacteria contaminate human milk from donor mothers. These include both gram-positive organisms (usually $<10^5$ organisms/mL) and some gram-negative organisms. In the United States, milk banks uniformly culture pooled milk samples after pasteurization as a screening test of the adequacy of heat treatment.

How to Deal With a Positive Culture Result

In the event of a positive culture result, if the organism is pathogenic and/or present in large quantities, in addition to further testing and/or treatment, the breast pump and the mother's pumping equipment should be examined for contamination. The mother's milk expression technique should also be evaluated. If the organism found at culture is a significant pathogen, at a minimum, blood cultures in the newborn or infant, a screening complete blood cell count, a C-reactive protein level, and close monitoring are indicated. If the culture

was performed as part of a sepsis workup in a symptomatic baby, treatment with antibiotics is warranted.

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CHAPTER 15

Supporting Breastfeeding During Mother-Infant Separation

There are circumstances, such as maternal hospitalization, newborn or infant illness, return to work, or school attendance, in which an interruption in the continuity of breastfeeding may occur by necessity. The physician can help the mother by providing guidance on specific strategies and appropriate plans to be able to continue breastfeeding.

Maternal Employment and School Attendance

Attending work and school are the most frequent reasons for consistent mother-infant separation during lactation. Health care professionals should provide anticipatory guidance for continued breastfeeding during these times. Counseling and discussion of strategies should begin prenatally, continue during visits to the office, and be included in the instruction provided in breastfeeding classes and other resources.

Support for Breastfeeding in the Workplace

On-site Child Care

Direct breastfeeding is preferable to be able to sustain an adequate milk supply. For mothers employed outside of the home, child care facilities on-site or close to the workplace can allow the mother to breastfeed during breaks. Alternatively, employees may be permitted to bring their young infant to the office, with or without a caregiver, during the day for breastfeeding. This may not be feasible in all work settings.

Off-site Child Care

Some employers offer lactation programs to encourage continued breastfeeding for mothers who return to work. These may include on-site lactation specialists, a contract with community or hospital lactation specialists, a designated space for breastfeeding women to breastfeed or express milk, and/or a fully equipped lactation room. In the absence of corporate on-site child care programs, at a minimum the breastfeeding mother should have access to appropriate facilities at work for milk expression (**Box 15-1**). The creative use of scheduled breaks and lunchtime, combined with a double-pump kit that allows milk to be expressed from both breasts simultaneously, may facilitate optimal maintenance of milk supply. Milk expression should occur at least once every 2 to 4 hours during periods of mother-infant separation, to approximate the schedule of the infant's feedings. The off-site child care selected should be compatible with the parents' beliefs and the mother's desire to continue breastfeeding. Areas to be addressed when interviewing a prospective caregiver are listed in **Box 15-2**.

Box 15-1. Facilities Necessary to Support Breastfeeding in the Workplace

- A private, clean place for milk expression (eg, office, break room, lounge), preferably with a lock on the door and an electrical outlet. A bathroom is not appropriate.
- A breast pump, supplied by the workplace or brought by the mother.
- A sink for washing hands before handling pump equipment or milk and for rinsing equipment after milk expression.
- A storage refrigerator that is separate from the refrigerator used for storing food in a common break area, to avoid milk tampering. Or, alternatively, a cooler with ice packs for storing milk immediately after expression and for transferring milk to the home or child care facility.
- Comfortable seating for milk expression or breastfeeding.

Box 15-2. Questions for Parents to Ask a Prospective Child Care Professional

- What has your previous experience been with breastfeeding and the use of expressed breast milk?
- Do you agree with our/my general philosophy and style of parenting?
- Do you have a refrigerator to store expressed breast milk?
- Will you follow specific instructions in terms of feeding the infant expressed breast milk?
- Will you be willing to attempt to soothe the baby or wait a brief period for the baby to be breastfed if I am delayed at work?
- Will you follow our/my plan for introducing cereal, solids, and juices?

Options for Continued Breastfeeding After Return to Work or School

All options for continued breastfeeding should be considered before mother-baby separation begins. Ideally, prior to family planning, maternity leave, or childbirth, the mother should discuss with her supervisor, human resources director, school guidance counselor, and/or administrator her desire to breastfeed and continue breastfeeding or milk expression after her return to work or school. The physician also may need to advocate for breastfeeding or milk expression with the employer or school official.

Strategies for Preparing for the Return to Work or School

Strategies for the mother to prepare for separation of her infant are listed in **Box 15-3**.

Box 15-3. Suggested Strategies for the Mother Who Is Returning to Work or School

Preparation Before the Day of Separation

- Arrange as long a period of maternity leave as feasible.
- Make breastfeeding arrangements with the employer or school before the day of return, preferably before maternity leave begins.
- Practice using the breast pump at least 2 weeks before the planned separation.
- Begin milk expression early to allow for storage of a sufficient milk supply.
- Introduce alternative methods of feeding the infant in advance of separation.
- Experiment with different types of bottle nipples or cups to find one that the infant prefers.
- Arrange for the father, partner, or other relatives or friends to provide assistance with household chores or the care of other children to ease the transition.
- Leave the infant with the caregiver for brief periods before the first day of separation.
- Let the caregiver practice giving the baby a bottle or cup before the separation begins.

Preparations at the Work or School Site

- Enlist the support of coworkers, supervisors, teachers, principals, or guidance counselors who are breastfeeding or who have breastfed in the past.
- Arrange for a gradual return-to-work schedule if possible, beginning with half days.
- If returning to work full time, consider starting on a Thursday or Friday to avoid having to work a full 5-day period the first week back at work.
- Breastfeed just before leaving the infant and as soon as mother and infant are reunited at the end of the workday or school day.
- Allow the infant to breastfeed as often as desired in the evening and overnight to encourage a continued milk supply. Having the baby close by at night may facilitate frequent feedings. Maximize skin-to-skin contact.
- Remember to clean and pack the breast pump, kit, bottles, and other equipment ahead of time.
- Take a cooler or bag with freezer packs for transporting expressed milk or for storage while away.

(*continued*)

Box 15-3 (*continued*)

- Take a picture of the infant (or consider having a blanket with the baby's smell or an audio or video file of the baby's coos, squeals, or cries) to use when expressing milk to facilitate the milk ejection reflex (letdown).
- Have a change of clothing available in case of milk leaks or spills.
- Wear 2-piece outfits or clothing that is designed for breastfeeding women to allow easy access to the breasts for feeding or expressing milk.

Mothers Who Are Medical Students, Residents, or Fellows

Breastfeeding mothers who are medical students, residents, or fellows can find themselves in unique situations because of arduous schedules and workload demands. Medical trainees often do not receive adequate support to reach their own breastfeeding goals. Breastfeeding and parenting are sometimes not adequately supported by residency programs. In a survey of general surgery residency program directors, only 58% reported availability of space for breastfeeding mothers to express milk. In addition, 61% of general surgery program directors said that becoming a mother negatively affects a female trainee's work.

Residents who have successful experiences with breastfeeding themselves, either personally or by supporting their spouse or partner, are more likely to be knowledgeable about breastfeeding and can become strong advocates and role models for their peers and patients when they become practitioners. Medical school administrators and residency training program directors and faculty should support and encourage breastfeeding among students, residents, and faculty. In addition to providing typical workplace breastfeeding support, clinical training facilities should ensure that lactation rooms are close to the trainees' work areas and have a computer workstation, a phone connected to the hospital or clinic system, and, ideally, a hospital-grade pump to improve work efficiency and pumping efficiency for lactating trainees. Medical teams should work with a breastfeeding trainee to protect 20 to 30 minutes for milk expression at least every 3 hours to be able to maintain appropriate milk production. Providing optimal support may involve offering flexibility in terms of work assignments or accommodation of part-time scheduling for a period. There is emerging evidence that enhanced lactation support may be cost-effective for residency programs. In a pilot study, a hospital-grade breast pump was provided in dedicated space for pediatric residents including a computer, telephone, and dictation system. Residents were able to complete clinical-related paperwork and attend scheduled didactic conferences while pumping. Residents spent overall less

time pumping and away from clinical duties while having an overall increase in breast milk production with modest investment by the residency program. The American Academy of Family Physicians has published a policy on breastfeeding and lactation for medical trainees that addresses key components of model breastfeeding support (https://www.aafp.org/about/policies/all/breastfeeding-accommodations-trainees.html).

Separation Because of Newborn or Infant Illness

Preterm birth or neonatal illness may preclude continuous rooming-in at the hospital or necessitate discharge of the mother from the hospital before the newborn's discharge can occur. Strategies to promote continued bonding and stimulation of milk production include skin-to-skin contact and facilities that permit overnight stays of the mother to maximize the amount of time she can spend with the newborn. These "mother-in-residence" programs also allow the newborn to remain in the room with the mother either continuously or intermittently. Many newer intensive care nurseries are designed with individual patient rooms and sleeping accommodations for parents. Mothers of newborns who remain hospitalized should have access to hospital lactation specialists. If physical separation of mother and baby is required, the mother should be provided with a hospital-grade electric pump and kit for double-breast pumping, and she should be assisted with the collection and storage of pumped milk. Strategies to assist breastfeeding when the newborn is ill are addressed in Chapter 12, Breastfeeding and Human Milk for Preterm Newborns and Infants; Chapter 13, Breastfeeding in Special Circumstances; and Chapter 14, Lactation Support Technology.

Separation Because of Maternal Illness or Surgery

Acute Minor Maternal Illness

For acute minor illness in the mother, including fever, breastfeeding should not be interrupted. By the time maternal symptoms develop, the infant has already been exposed to the infectious agent. Continued breastfeeding may be protective to the infant (see Chapter 9, Maintenance of Breastfeeding: The Newborn and Infant, and Chapter 10, Maintenance of Breastfeeding: The Mother).

Planned Elective Surgery

If it cannot be postponed, elective surgery should prompt a discussion with the surgeon and anesthesiologist to select the most appropriate medications for anesthesia, pain control, and other therapies (see Chapter 7, Breastfeeding Initiation; Chapter 9, Maintenance of Breastfeeding: The Newborn and Infant; Chapter 10, Maintenance of Breastfeeding: The Mother; and Chapter 16, Medications and Breastfeeding). Rooming-in to allow continued nursing or having the infant visit at regular intervals to breastfeed should be considered whenever possible. Arrangements should be made for family or friends to assist in caring for the infant during such visits. In some hospitals, breastfeeding infants may be kept with their mothers in postoperative units. Consideration should be given to expressing milk to store in advance of the procedure, in case there is a longer-than-expected interruption in breastfeeding. In the event of a more serious maternal condition or emergency surgery, the mother should be provided with an electric pump and assisted in the collection and storage of breast milk. This should occur even for mothers in intensive care, in which case nurses and/or lactation specialists may need to assist.

Milk Expression

Throughout the period of separation, milk expression should continue on a regular basis to maintain the milk supply and prevent maternal breast engorgement.

Unanticipated Separation

The frequency of milk expression should approximate the frequency of breastfeeding (approximately every 2 to 3 hours for the newborn and every 3 to 4 hours for the older baby) to maintain an adequate milk supply.

Anticipated Separation

In situations in which there is elective surgery or a return to work or school, milk should be expressed before the anticipated absence and stored for later use. Milk volume can be increased by increasing the frequency of milk expression 1 to 2 weeks before the anticipated return date.

Bottle-feeding

If the mother desires for her baby to learn to drink from a bottle, she should consider introducing the bottle gradually, a few weeks before the bottle will be

needed. Acceptance of a bottle is more likely if someone other than the mother offers it. The breastfed infant will typically accept expressed human milk from the bottle better than infant formula. If the bottle is not accepted on the first attempt, repeat introductions may be necessary, approximately once every day or two. Trying another style, size, or shape of nipple may also be helpful. If the baby does use a pacifier, a nipple that is similar in size and shape to the pacifier may be useful. Attempting the bottle-feeding when the infant is hungry but not crying inconsolably will enhance the chances for positive acceptance of the bottle. For older infants who continue to refuse bottles, a cup can be used to offer the breast milk. Individuals who use a bottle to feed a breastfed infant should be counseled in cue-based feeding, with appropriate volumes of milk given and a paced bottle-feeding, to allow for an easier transition between breastfeeding and bottle-feeding for the infant and the mother.

Legislative Protections for Working Breastfeeding Mothers

Legislative protections for breastfeeding mothers who return to work vary greatly and depend on the employer and employee. Federal and state laws exist to govern workplace requirements. Of note, the federal law does not preempt a state law that gives greater protection to breastfeeding mothers.

Hourly employees have specific federal protections under the Fair Labor Standards Act (FLSA) that are not generalized to salaried employees. Specifically, section 4207 of the Patient Protection and Affordable Care Act (PPACA) of 2010 amended the FLSA of 1938 and currently provides hourly employees with workplace provisions. The employee must be provided with (a) a reasonable amount of break time to express breast milk for her child for 1 year after the child's birth and (b) a place other than a bathroom that may be used to express breast milk that is private and free from intrusion from coworkers and the public. Further guidance on this legislation is provided by the US Department of Labor in its "Break Time for Nursing Mothers" under the FLSA. All employers covered by the FLSA are required to comply with this provision. However, employers with fewer than 50 employees may request an exemption from the FLSA break time requirement if the employer can demonstrate that compliance with the provision would impose an undue hardship. Whether compliance would be an undue hardship is determined by looking at the difficulty or expense of compliance for a specific employer in comparison to the size, financial resources, nature, or structure of the employer's business.

The legislative protections for breastfeeding mothers who are salaried employees vary based on the state. Twenty-nine states, in addition to the District of Columbia and Puerto Rico, have state-specific protections for breastfeeding

mothers in the workplace at the time of publication. Many of these state-level laws broaden the protection for nursing mothers in the workplace. Due to frequent changes in state laws, readers are encouraged to visit the National Conference of State Legislatures breastfeeding state laws website for further information about their state (www.ncsl.org/research/health/breastfeeding-state-laws.aspx).

Several large US cities are also enacting legislation to protect a woman's right to express breast milk in the workplace. For example, Philadelphia, PA, requires businesses, regardless of their annual revenue and size, to give all employees, whether receiving hourly pay or a salary, reasonable accommodations and break time for breastfeeding or expressing breast milk in the workplace. Businesses who fail to comply are subject to a fine.

In 2019, the Fairness for Breastfeeding Mothers Act was passed that requires certain public buildings, like federal courthouses, office buildings, and the Smithsonian, to provide a hygienic lactation room for employees and visitors. This law will aid visitors, advocates, and breastfeeding mothers whose jobs require frequent travel throughout the day (eg, police officers, bus drivers) by providing access to a private lactation space for expressing breast milk.

The PPACA mandates insurance coverage of lactation-support services and equipment, including breast pumps, without cost sharing for new health insurance policies. However, this change does not universally apply to women insured through the traditional Medicaid program. Individual state Medicaid programs may cover breast pumps. Breast pumps and other supplies used to assist in lactation are deductible medical expenses or can be reimbursed via flexible spending accounts or health savings accounts, according to the Internal Revenue Service.

Since the PPACA legislative and policy changes were enacted, the United States has seen increases in mothers who are breastfeeding at the time of hospital discharge, exclusive breastfeeding rates at 6 months after birth in infants, and overall duration of breastfeeding. However, only 40% of breastfeeding employees reported having access to both a private place for milk expression and adequate break time 3 years after enactment of the PPACA. Significant disparities exist in workplace breastfeeding support. Women who work in managerial or professional roles are the most likely to receive breastfeeding support in the workplace, while women who work in the service, production, and transportation industries receive lower levels of workplace breastfeeding support. If a breastfeeding mother is not receiving the accommodations to which she is entitled to express milk in the workplace, she can contact the US Department of Labor, the

US Breastfeeding Committee, or her state or local breastfeeding coalition for additional support and advocacy assistance.

Advocacy for Breastfeeding

Continued advocacy for breastfeeding in the workplace is needed.

Literature

Providing literature that presents the benefits of breastfeeding and demonstrates the cost savings of breastfeeding to the employer may be helpful. Health care professionals may need to write letters or contact employers or school administrators in support of the health care interests of the mother and infant and the need for continued breastfeeding. The US Office on Women's Health has a comprehensive website that shows how to support breastfeeding women in the workplace, including videos of successful support strategies for women employed in different workplace settings, such as education, health care, restaurants, and retail. The Pregnant Scholar website (thepregnantscholar.org) and the Center for Worklife Law (worklifelaw.org) provide information on school and workplace accommodations, including laws by state and sample letters for health care professionals to give to lactating patients.

The Professionals' Role

Health care professionals should advocate at the federal, state, and local levels for expansion of workplace breastfeeding coverage to all women, regardless of their employment field, status, and employer type. Health care professionals should continue to advocate for coverage of lactation-support services and equipment without cost sharing by all insurance types, including Medicaid. Finally, health care professionals should advocate for expansion of paid family leave at the state and federal levels. Several states, including California, New Jersey, New York, and Rhode Island, have passed legislation for paid family leave at a state level. Women who return to work before 6 weeks' postpartum are 3 times more likely to stop breastfeeding earlier than women who receive longer maternity leaves.

The Business Case for Breastfeeding

Seventy-four percent of women of childbearing age in the United States are in the workforce, and it is essential for businesses to be prepared to support breastfeeding mothers. For every $1 that companies invest in breastfeeding support, they save approximately $3. The US Department of Health and Human Services Health Resources and Services Administration, Maternal and Child Health Bureau, and Office on Women's Health offer guidance and toolkits for

human resources personnel, business owners, managers, and employees to be able to provide assistance to breastfeeding employees and their employers. These documents outline the business savings in terms of decreased employee absenteeism, lower health care costs, lower turnover rates, and higher productivity when employed women are supported in breastfeeding. The Business Case for Breastfeeding program has trained health care professionals in workplace support and also provides technical assistance and tools to businesses in developing worksite lactation programs.

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CHAPTER 16

Medications and Breastfeeding

The use of a medication by the breastfeeding mother continues to be a reason for unnecessarily stopping breastfeeding. Often, this occurs because the mother receives misleading or confusing advice on the safety of the drug for the breastfed newborn or infant. Even equivocation by a health care professional on the safety of a medication is often interpreted by the mother as the drug being unsafe for her baby. The goals of successful maternal therapy during lactation are providing necessary medications to the breastfeeding mother; minimizing the amount of drug passed through the milk to the newborn, infant, or child to avoid adverse effects in the baby or toddler; and preventing decreases in the mother's milk supply. Decisions about the choice of a particular therapy for a nursing mother need to be individualized on the basis of the mother's condition, her tolerance of risk, and the age and condition of her nursing baby. Although information on specific drugs is often limited and of questionable quality, most maternal drugs do not pose a serious risk to the breastfed baby. Providing reassurance to the mother can allay her concerns and help her to continue nursing while taking needed medications.

Drug Passage Into Milk

During pregnancy, direct transplacental passage may result in a similar serum concentration of a drug in both the fetus and the mother. In a lactating woman, however, the steps of passage of a drug into human milk and then its absorption across the baby's gastrointestinal (GI) tract and possible metabolism usually results in a newborn or infant serum level well below the maternal value.

Small water-soluble nonelectrolytes (eg, alcohol, urea) pass into and out of human milk via simple diffusion through spaces between cells (pores) in the mammary epithelium. Equilibration between maternal plasma and human milk is rapid, and human milk levels of these types of drugs approximate maternal plasma levels at all times. However, few drugs pass into milk in this way. For

larger molecules, only the unbound, nonionized forms cross the mammary epithelium via passive diffusion driven by the concentration gradient between maternal plasma and human milk. Because this is a passive process for most drugs, they can diffuse in both directions across the epithelium. As the drug concentration in the mother's blood decreases below the concentration in the milk because of maternal metabolism and excretion, the drug can pass from the milk back into the mother's plasma.

Some physical and chemical factors of drugs, such as low molecular weight, low protein binding, weak bases, and high lipid solubility, favor greater passage of the drug into the mother's milk. However, none of these factors can always be applied in isolation to predict drug passage, because they interact with each other. For example, higher lipid solubility also results in higher plasma protein binding among β-blockers, so water-soluble β-blockers attain higher concentrations in human milk than lipid-soluble β-blockers.

Extensive protein binding (>85%) and high molecular weight (> approximately 800 Da) are fairly reliable predictors of poor passage into human milk, but some large molecules that are analogues of endogenous substances normally found in human milk (eg, synthetic insulins and interferons) have been found in the milk of mothers receiving them, possibly because of active or facilitated transport. A few small molecules (eg, acyclovir, cimetidine, nitrofurantoin) are actively transported into milk. Pharmacokinetic studies are the optimal method to ascertain the extent of drug passage into human milk. However, new computer simulation methods are promising alternatives to studies in nursing mothers and babies.

The ratio of concentrations of a drug in milk and in plasma (the milk to plasma, or M:P, ratio) can be used as a measure of a drug's passage into human milk. However, the M:P ratio has shortcomings that render it meaningless as a measure of drug safety. The ideal method of assessing drug safety during breastfeeding is to compare the dosage the newborn or infant receives in milk to the known newborn or infant dosage. But because so many adult drugs have no established newborn or infant dosage, a different method of assessment is required. The currently accepted method is the weight-adjusted percentage of maternal dosage or relative infant dose (RID), defined as follows:

$$\text{RID} = \frac{\text{Daily infant dosage in breast milk (mg/kg infant weight)}}{\text{Daily maternal dosage (mg/kg maternal weight)}} \times 100$$

The RID has greater value than the M:P ratio in consideration of the safety of medication use during breastfeeding and is reported in well-designed pharmacokinetic studies and in LactMed, *Hale's Medications & Mother's Milk,* and some other drug databases. In general, an RID less than 10% of the mother's dosage

is usually considered acceptable for breastfeeding, and an RID higher than 25% is considered unacceptable. There is a "caution" if the RID falls within the 10% to 25% range. About 90% of drugs fall below the 10% level, and only about 3% of drugs are passed to the baby in doses higher than 25%. Although this system works well for most drugs, a few exceptions can be made for drugs with long half-lives (eg, diazepam, fluoxetine), which can accumulate in the baby. Conversely, a few drugs with high RIDs (eg, lamotrigine) have relatively reassuring safety information. In addition, special consideration should apply to potentially toxic drugs with low RIDs (eg, cancer chemotherapy, some radiopharmaceuticals) and, in some cases, to babies who have unusual genetic susceptibility.

Clinical Factors

The age of the newborn or infant is an extremely important factor in determining the safety of maternal drug therapy. Most adverse reactions from drugs in human milk occur in the first 2 postpartum months, primarily during the first month. This increased susceptibility is probably related to neonates' slower metabolism and elimination of drugs, as well as factors such as red blood cell susceptibility to hemolysis, lower protein binding, and a relatively permeable blood-brain barrier.

Medications taken by the mother during pregnancy can result in exposures to the fetus that affect the newborn. Long-acting drugs can persist in the newborn's circulation after birth and cause adverse effects. Newborns of mothers who took certain medications during pregnancy can experience drug withdrawal (neonatal abstinence syndrome [NAS]) as neonatal serum levels decrease. Signs of neonatal abstinence that persist during breastfeeding result from low passage of the drug into human milk. However, enough drug may be passed into human milk to partially alleviate signs of withdrawal from some drugs (eg, anticonvulsants, antidepressants, methadone).

The risks of medication use during pregnancy have little to do with the drug's safety during breastfeeding because drug exposure of the fetus during pregnancy is usually much greater, often by 10-fold or more, than the exposure of the newborn via human milk after birth. This fact is sometimes not considered by clinicians who mistakenly apply pregnancy warnings or US Food and Drug Administration (FDA) pregnancy categories (A, B, C, D, X) to breastfeeding. (These categories will be phased out of package insert labeling of most prescription drugs by June 30, 2020.) A mother who is concerned about exposing her nursing newborn to a medication that she was taking during pregnancy can be comforted to know that her newborn's exposure to the drug during breastfeeding is substantially less than exposure to the fetus during pregnancy.

Adverse Reactions

Although rigorous prospective studies have not been performed, serious immediate adverse reactions in newborns and infants from medications in their mother's milk appear to be uncommon. A study of 838 infants whose mothers consulted a Canadian counseling service about medication use during breastfeeding reported no adverse reactions that required medical intervention. Only about 11% of infants had minor reactions reported by mothers, such as diarrhea, fussiness, and sedation.

Two groups of investigators who extensively reviewed and evaluated published case reports and a pharmacovigilance study in France came to similar conclusions about the nature of adverse effects in newborns and infants. The overall findings are that about two-thirds of adverse effects occur in newborns in the first month postpartum, and another 10% to 15% of adverse effects occur in infants in the second month postpartum. Unfortunately, the numbers of newborns and infants exposed to each drug via human milk are not available, and spontaneous reporting is notoriously hit-and-miss, so the actual rate of adverse reactions is unknown. However, data from US poison center call records provide a sense of how uncommon serious adverse effects are. Of 2,319 calls about newborns and infants exposed to a medication during breastfeeding from 2001 to 2017, only 8 were classified as major adverse effects, and 43 were classified as moderate adverse effects.

Only 2 well-documented deaths and 5 deaths with poorly documented causality from medications in breast milk have been reported in the literature. Of particular importance is that 5 of these reports involved opioids and the other 2 involved other central nervous system (CNS) depressants. Similarly, of the 8 major adverse effects reported by poison centers, 7 involved opioids and 4 involved benzodiazepines. All of these findings are consistent with neonatal susceptibility to CNS depressants.

Very few drugs or drug classes have been studied for their long-term effects on newborns and infants exposed to drugs in human milk. Additionally, drugs used for chronic conditions are often used throughout pregnancy and lactation, making it difficult to separate the effects of in utero exposure from human milk exposure. A few drug classes with moderately long-term data include some antidepressants and hormonal contraceptives. In these cases, "long-term" is about 1 year. Some infants exposed to certain common antiepileptics in human milk have been followed for up to 6 years.

Phases of Breastfeeding

Breastfeeding is often viewed as a single physiological state, or a "yes-or-no" condition, with a drug being either "safe" or "unsafe." In fact, medication safety during breastfeeding goes through several phases. Keeping these in mind can help in assessing the safety of a particular medication in a nursing mother. Immediately after birth, during the first 48 to 72 hours, only a small volume of colostrum is produced. During the colostral phase, large molecules such as proteins and monoclonal antibodies can pass readily into breast milk from maternal serum because tight junctions between the mammary epithelial cells are relatively open. Although a daily value of 150 mL of milk per kilogram of newborn weight is usually used to estimate milk intake of the exclusively breastfed newborn, the value is less than 20 mL/kg/d on the first day postpartum. Therefore, the dose of drug that a newborn receives in colostrum is low, and risky drugs such as postpartum opioids may not affect the newborn. However, during this time, the mother's milk supply is quite susceptible to disruption by drugs, and the newborn's metabolism and excretion of medications are very limited.

After lactogenesis stage 2 on day 3 to 5 after birth, women can produce 500 to 750 mL of milk daily and, by day 14 postpartum, they can produce 700 to 1,000 mL per day. Consequently, the dose of medication the newborn receives increases in proportion to the increased milk volume, and the same maternal medication dose will have a much greater effect on the newborn. Because newborns often nurse every 2 to 3 hours around the clock, trying to reduce drug exposure to the newborn by timing medication doses with respect to nursing is not possible. Also, during the first postpartum month, interference with nursing, by medications or inappropriate advice by health care professionals about the risks of the medications to the newborn, can have a profound effect on milk production and breastfeeding success. Furthermore, because newborns at this stage still do not eliminate drugs well, careful choice of maternal medications is critical during this time. Drugs that do not affect the newborn after a single dose might accumulate and cause adverse effects with regular use.

By 4 to 6 weeks' postpartum, infant drug elimination is increasing, and lactation is usually well established and more resilient. The risks of maternal medications for the infant and for lactation are somewhat lower after this time, and they continue to decrease as infant metabolism and excretion continue to mature.

Once the infant begins to take a proportion of nourishment as solid foods or formula, the dosage of any medication via human milk declines proportionately, and adverse reactions after this point are rare.

Informative Resources

High-quality online resources on medication use during breastfeeding are available. MotherToBaby (866/626-6847; https://mothertobaby.org) is a nationwide network of free information services that provide information and counseling to mothers and health care professionals about medication use in lactation and pregnancy. The InfantRisk Center (www.infantrisk.com) is also a source of reliable information, albeit with a charge.

The *Physicians' Desk Reference* and the package insert do not necessarily contain all available information on the safety of medication exposure to the newborn or infant via human milk, and this resource tends to recommend not breastfeeding during medication use much more often than is warranted. Unfortunately, these warnings are often replicated in commonly used drug information databases. The FDA Pregnancy and Lactation Labeling Rule requires that language be added to point out the benefits of breastfeeding, although it does not apply to older drugs and over-the-counter products. The policy statement, "The Transfer of Drugs and Therapeutics Into Human Breast Milk," from the American Academy of Pediatrics (AAP) Committee on Drugs, which refers readers to LactMed as a more reliable source of information, has been included as an appendix to this publication (**Appendix G**).

Drug Categories

When breastfeeding, the following categories of drugs are of particular interest because they are commonly used or have toxicity concerns.

Social and Recreational Drugs

Cigarette Smoking and Vaping

Newborns and infants are exposed to nicotine and other compounds, including heavy metals, cyanide, thiocyanate, and carbon monoxide, from cigarette smoking—both directly through a mother's milk and indirectly via secondhand smoke. Vaping and e-cigarette use pose the same issues with nicotine but may have different risks with the various excipients in these products that have been poorly studied. Breastfeeding mothers who smoke and nonsmoking mothers who are regularly exposed to secondhand smoke have milk with a lower milk fat content, use formula supplements more often, and wean their infants from breastfeeding earlier than nonsmokers do. Cigarette smoking increases the risk of sudden infant death syndrome and reduces the antioxidant capacity of human

milk. If a nursing mother is smoking, this may result in behavioral changes in the newborn or infant. Additionally, babies who are exposed to secondhand smoke who are not exclusively breastfed appear to be susceptible to increased adiposity later in childhood. Insufficient information is available on the effects of vaping nicotine or e-cigarette use on breastfeeding or the breastfed baby.

Despite these concerns, mothers who smoke should be encouraged to breastfeed because of the protective qualities of human milk against respiratory illnesses, which are more common in newborns and infants who live in a home with smokers, and because it provides numerous other benefits to babies. Pregnancy and lactation are opportune times to counsel the mother on smoking and e-cigarette cessation to protect her baby's health, as well as her own. Nursing mothers should be advised to cease or limit smoking or vaping to the greatest degree possible, breastfeed before rather than after smoking, and never smoke or vape in the house, in the car, or in close proximity to their baby. Some clinicians also recommend a change of clothing or the use of an outer garment while smoking or vaping that is removed when in contact with the baby, to prevent the transfer of nicotine and other harmful agents via the clothing or skin.

Smoking and Vaping Cessation

Smokers may achieve smoking cessation through counseling, with or without the use of pharmacological aids. In general, medical forms of replacement therapy are likely better than smoking. Use of e-cigarettes is not a safe alternative to smoking or a proven method of cessation. The aerosol emitted from electronic cigarettes contains a suspension of fine particles in a gas, composed of nicotine, flavors, and numerous toxicants and carcinogens, none of which are safe for babies to inhale. Specific studies on the effects of vaping on fetuses and breastfeeding newborns and infants have lagged behind the quick rise in e-cigarette use. E-cigarettes contain a significant amount of nicotine in each puff, which can lead to vomiting, diarrhea, and rapid heartbeat. No information is currently available on the most effective ways to reduce or stop e-cigarette usage during breastfeeding.

Nicotine patches deliver a constant amount of nicotine transdermally. With a 21 mg/d transdermal patch, nicotine passes into human milk in amounts equivalent to smoking 17 cigarettes daily. Lower patch strengths of 7 and 14 mg provide proportionately lower amounts of nicotine to the breastfed baby. Achievement of smoking cessation with the aid of serially decreasing strengths of nicotine patches is probably preferable to continued smoking because of the lack of particulates and other toxins that are present in tobacco smoke. The nicotine patch did not significantly change human milk intake in one study.

Animal studies indicate that newborn and infant exposure to nicotine during nursing might interfere with normal lung development, so other forms of smoking cessation might be preferable. Because nicotine appears in human milk, there is a risk that the breastfed baby may exhibit signs of restlessness, jitteriness, poor feeding, and abnormal sleep patterns. Other forms of nicotine replacement (eg, gum, inhalers) may produce more variable plasma levels, so the use of these methods is not recommended during breastfeeding.

Bupropion is an atypical antidepressant that is also used to aid in smoking cessation. Bupropion transfer to the baby via human milk seems to be low and it is usually well tolerated, although published data obtained during nursing are limited. A seizure was reported in one infant that was questionably related to bupropion in stored human milk.

Varenicline is a partial nicotine agonist used to assist in smoking cessation. No information is available on the passage of varenicline into human milk or use of varenicline during breastfeeding, so other drugs for smoking cessation are preferred.

Alcohol

Alcohol is one of the few substances ingested by the lactating mother that can achieve high concentrations in human milk. After ingestion of large quantities of alcohol, newborns and infants may refuse their mother's milk or change their feeding patterns. Babies may also be sleepy and feed poorly. Mothers should be counseled about the risks of accidental injuries to the baby while caring for a baby after excessive alcohol intake. Alcohol (ethanol) consumption by the mother decreases the amount of milk ingested by the newborn or infant, disrupts newborn and infant sleep patterns, and interferes with mother-baby interactions. The daily heavy use of alcohol (> 2 drinks daily) may affect a breastfed baby's development negatively. Binge drinking interferes with milk letdown. Both daily use and binge drinking appear to cause dose-related decreases in newborn and infant cognitive abilities. Alcohol rapidly equilibrates between maternal plasma and human milk, so waiting for maternal blood alcohol levels to decline before breastfeeding or expressing milk will decrease the baby's exposure to any alcohol in the mother's breast milk. It takes about 2 hours per drink (ie, 4–6 fl oz of wine, 1 beer, or 1 mixed drink) for the alcohol levels in breast milk to decrease to zero for women of average body weight and 2½ hours for smaller women. Mothers should be counseled to limit their alcoholic intake to 1 drink or less per day and wait for an appropriate period before nursing or expressing milk. Some sources recommend that mothers avoid alcohol altogether for the first month postpartum when newborns are nursing frequently and are less able

to metabolize alcohol. Excessive use of alcohol might affect the mother's ability to care for her baby.

Caffeine

The negative side effects of caffeine in newborns and infants (eg, jitteriness, irritability, poor sleep) appear only when mothers consume large amounts or in preterm newborns or newborns who have limited hepatic metabolism. The amount of caffeine in beverages and foods can vary widely, depending on the product and the preparation. Also, the serving size of beverages has increased markedly in recent years. A maternal intake of 300 mg of caffeine daily (two 8-fl oz servings of coffee or two 16-fl oz servings of tea or soda) is a safe limit that is unlikely to affect most breastfed babies. Individualized assessment of caffeine intake may be necessary when maternal consumption exceeds these amounts.

Cannabis

Recent studies have found detectable levels of cannabinoids in the milk of mothers who use cannabis products, although the effects of these amounts are not clear. Studies differ on the duration of excretion of the psychoactive ingredient, delta-9-tetrahydrocannabinol, into breast milk. Detectable amounts have been found in human milk for periods from 6 days to more than 6 weeks after cannabis discontinuation in various studies, probably depending on the extent of prior use. Delta-9-tetrahydrocannabinol enters the baby's bloodstream in small amounts via breast milk after maternal smoking of marijuana, but quantitative data are very limited. Only 2 small, older studies involved the exploration of infant outcomes at 1 year of age. The studies demonstrated little effect on the breastfed infants of mothers who smoked marijuana, although a slight decrease in motor, but not cognitive, function was seen in in infants in one study. The current wider availability of much more potent cannabis products, both smoked and orally ingested, may pose a greater risk to breastfed babies, but adequate outcome studies have not been performed. Other concerns include newborn and infant exposure to smoke and other contaminants in cannabis, concurrent maternal use of other psychoactive substances, and impairment of maternal judgment. Professional organizations are consistent in recommending that no cannabis be used during breastfeeding. The continuation of breastfeeding by mothers who do not wish to stop cannabis use is a more difficult situation. The AAP, the American College of Obstetricians and Gynecologists (ACOG), and the Academy of Breastfeeding Medicine currently recommend the continuation of breastfeeding in mothers who use cannabis; however, they encourage mothers to stop or minimize cannabis use and avoid other direct and secondhand forms of newborn and infant exposure to cannabis as discussed with tobacco smoking.

All nursing mothers should be counseled on the current state of knowledge on cannabis used during breastfeeding.

Cocaine

Cocaine has not been adequately studied in lactating women, but it is possibly the most dangerous street drug for mothers who are nursing newborns, because neonates metabolize cocaine poorly and can have convulsions if they are exposed to even small doses. Smoking "crack" cocaine in the presence of the newborn is also very dangerous. The judgment of mothers with ongoing use of cocaine may be impaired, indirectly adversely affecting their baby. Cocaine use is contraindicated during breastfeeding. Nursing mothers who use cocaine on a single occasion should withhold nursing for 24 hours after ingesting the drug. Persistent users should not breastfeed.

Blood Coagulation Drugs

Anticoagulants

Unfractionated or low-molecular-weight heparins (eg, dalteparin, enoxaparin) given to the mother are safe for the breastfed newborn and infant, because the high molecular weight of these drugs prevents their transfer into milk. Warfarin is also safe because its extensive protein binding minimizes the concentration in breast milk. Newer anticoagulants have not been adequately studied during breastfeeding, although dabigatran and rivaroxaban concentrations in milk were very low in a few individuals who have been studied to date. These newer drugs are best avoided until more data become available.

Antiplatelet Drugs

Antiplatelet drugs have not been well studied during breastfeeding. Low-dose aspirin is an acceptable drug, and the manufacturer reports that that no adverse effects have been observed in a small number of cases of infants breastfed during maternal clopidogrel use. Other antiplatelet drugs have not been studied during breastfeeding and should probably be avoided.

Antifibrinolytic Drugs

Tranexamic acid is an antifibrinolytic drug that is being used in women with postpartum bleeding disorders. The manufacturer reports that milk levels are only 1% of the maternal serum concentration. Two studies showed no increased risk of clotting disorders among breastfed infants whose mothers were given the drug postpartum. Use of maternal tranexamic acid does not contraindicate breastfeeding, but monitoring the newborn or infant is advisable.

Corticosteroids

No adverse effects have been reported in breastfed newborns or infants with maternal use of any systemic corticosteroid during breastfeeding, and no waiting time before nursing is necessary with the use of oral corticosteroids. Even with maternal intravenous (IV) doses of methylprednisolone 1 g, fully breastfed newborns and infants would receive doses less than their daily cortisol output on the day of infusion. Avoiding breastfeeding during the infusion and for as little as 2 hours after a 1-g IV dose markedly reduces newborn and infant exposure. Breastfeeding abstinence for 2 to 4 hours would further reduce the newborn and infant dose. The long-acting drugs dexamethasone and betamethasone have not been studied during nursing. Betamethasone administered to the mother late in pregnancy for fetal lung maturation can delay lactogenesis stage 2, so additional maternal breastfeeding support may be required.

Inhaled and topical corticosteroids result in little or no systemic absorption and can generally be used without concern. One exception is application of potent corticosteroids to the breast and nipple, where the baby can directly ingest the drug. Use of less potent topical creams (eg, hydrocortisone, desonide) with gentle wiping of the nipple before nursing is preferable. Avoid using ointments on the nipple, because babies can directly ingest the paraffins contained in the ointment base.

Asthma

Inhaled Drugs

Albuterol and other β-agonist inhalers result in low serum levels after inhalation and appear to be safe for use during breastfeeding. The anticholinergic drugs such as ipratropium and the inhaled corticosteroids are likewise safe to use.

Leukotriene Inhibitors

A breastfed newborn or infant receives less than 1% of the maternal dosage of montelukast; manufacturer data indicate that milk levels for zafirlukast are also less than 1%. Zileuton has been studied only in animals. Montelukast is the drug of choice in nursing mothers.

Maternal Depression

Maternal depression, which is often accompanied by anxiety, carries a risk for abnormal child development (see Chapter 10, Maintenance of Breastfeeding: The Mother). Therapy should take into account individual benefits and risks. Mild depression may be best treated with psychological therapy. Antidepressants

are indicated if the mother is moderately to severely depressed, if her condition declines, and if she has an inadequate response to psychological therapy. Most experts agree that an antidepressant that is effective in a particular mother should not be switched to another drug because of breastfeeding; instead, the antidepressant should be continued, with close monitoring of the infant (please see ACOG Practice Bulletin No. 92, "Use of Psychiatric Medications During Pregnancy and Lactation"). Antidepressant use during pregnancy and after birth can delay lactogenesis stage 2, so additional breastfeeding support might be necessary.

Older antidepressants, such as the tricyclic antidepressants nortriptyline and amitriptyline, have a good safety profile in breastfeeding, including long-term infant neurodevelopmental outcomes. However, because of maternal adverse effects associated with tricyclic antidepressants, selective serotonin reuptake inhibitors (SSRIs) are now the most widely prescribed antidepressants. Newborn and infant restlessness, irritability, colic, poor weight gain, and sleep disorders have been reported in association with maternal SSRI treatment, predominantly for SSRIs that have greater excretion into human milk (eg, citalopram, escitalopram, fluoxetine). Sertraline and paroxetine have lower excretion into milk and are the preferred SSRIs during breastfeeding, with careful monitoring for adverse effects. Breastfed babies exposed to an SSRI during the third trimester of pregnancy have a lower risk of poor neonatal adaptation than formula-fed babies. Long-term neurodevelopmental outcome data for infants exposed to SSRIs via human milk are relatively limited.

Limited data indicate that duloxetine, mirtazapine, and trazodone are probably also acceptable to take during breastfeeding, but watch for excessive drowsiness. Other antidepressants (eg, bupropion, venlafaxine, vilazodone) have not been extensively studied and are not considered first-line therapy unless the patient responded well in the past. Nefazodone has caused drowsiness and poor feeding in one newborn, so it is best avoided.

Anxiety

Long-acting benzodiazepines (eg, diazepam, clonazepam) may accumulate in milk, especially with chronic use, and produce symptoms in the newborn or infant, such as lethargy, sedation, and poor suck. Sporadic use of long-acting drugs and the use of short-acting drugs (eg, lorazepam, midazolam, oxazepam) pose a lower risk.

Diabetes

Insulin

Insulin is a normal component of human milk. Small amounts of the semisynthetic insulins (eg, aspart, glargine) have been detected in the milk of some mothers who use these drugs, but there appears to be no harm to the newborn or infant, probably because insulin is destroyed in the GI tract. Breastfeeding may reduce maternal insulin requirements, so careful blood glucose monitoring is important during breastfeeding in insulin-dependent mothers.

Oral Antidiabetic Medications

Substantial experience with metformin in nursing mothers with diabetes or polycystic ovary syndrome indicate that the drug is acceptable during breastfeeding. The sulfonylureas glipizide and glyburide are minimally excreted in milk and are compatible with breastfeeding. Although hypoglycemia has not been reported, newborn and infant blood glucose monitoring may be indicated. The α-glucosidase inhibitors (ie, acarbose, miglitol) have almost no oral bioavailability and are acceptable to use. Colesevelam is a bile acid–binding resin that lowers A_{1c} levels to about the same extent as low-potency antidiabetic agents. Colesevelam is nonabsorbable orally, so it is a good choice for nursing mothers, especially those who need concurrent cholesterol-lowering therapy.

Newer Agents

The thiazolidinediones (eg, pioglitazone, rosiglitazone), dipeptidyl peptidase IV inhibitors (eg, alogliptin, linagliptin, saxagliptin, sitagliptin), and various newer injectable antidiabetic agents (ie, dulaglutide, exenatide, lixisenatide, liraglutide, pramlintide, and semaglutide) have not been studied during breastfeeding and are generally discouraged by the product labeling because of a lack of data. If required, saxagliptin and linagliptin might be preferred during breastfeeding, because their passage into milk is expected to be less than other drugs in the class. Pioglitazone is the preferred thiazolidinedione because it is not contraindicated in breastfeeding according to the drug's labeling. Acarbose and miglitol are poorly absorbed by the mother, so it is unlikely that these drugs would affect the newborn or infant through breast milk, although no reports of their use by nursing mothers have been published.

Sodium–glucose cotransporter 2 inhibitors (ie, canagliflozin, dapagliflozin, empagliflozin, and ertugliflozin) have no human lactation information and are not recommended because of the theoretical risk of injury to the developing kidney.

Gastrointestinal Disorders

Acid-Reducing Agents

Famotidine, nizatidine, and other H_2-receptor blocking agents appear to be safe for use during lactation. Cimetidine is not preferred because of extensive excretion into human milk and potential hepatic enzyme inhibition. The proton pump inhibitors omeprazole and pantoprazole are minimally excreted into milk and are not expected to cause adverse effects in breastfed newborns or infants. Other proton pump inhibitors have not been studied during breastfeeding. Oral antacids (eg, aluminum hydroxide, calcium carbonate, magnesium hydroxide) are safe to use during breastfeeding.

Laxatives and Cathartics

Docusate, magnesium salts, psyllium, polyethylene glycol, and polycarbophil are all poorly absorbed from the maternal GI tract, so they are safe to use during nursing. Senna in usual doses does not affect the breastfed newborn or infant, but high doses of senna and standard doses of cascara can cause infant diarrhea, so they should be avoided in nursing mothers.

Drugs specific for constipation-predominant irritable bowel syndrome have not been well studied during breastfeeding, but lubiprostone is not detectable in rat milk. Linaclotide and plecanatide are broken down in the gut to their constituent peptides, so they are unlikely to reach the breast milk or the baby via breastfeeding. According to the product information, prucalopride has been used in Europe with no reports of adverse events in breastfed babies. Amounts in human milk are about 6% of the maternal dosage.

Antidiarrheals

Loperamide excretion into milk appears to be minimal, so it is acceptable to use. The bile acid sequestering resins cholestyramine, colesevelam, and colestipol are not absorbable and are safe during breastfeeding. They can be used in nursing mothers with diarrhea caused by increased amounts of bile acids in the gut lumen. Eluxadoline is a opioid μ receptor agonist and a opioid δ receptor antagonist used in diarrhea-predominant irritable bowel syndrome. Diphenoxylate is also an opioid. Because of their opioid properties, eluxadoline and diphenoxylate are best avoided during breastfeeding.

Hypertension and Preeclampsia

The treatment of adult hypertension often involves administering combinations of drugs.

Diuretics

Diuretics appear to be safe for use during lactation with typical antihypertensive doses. Hydrochlorothiazide and chlorothiazide have been used for decades, and no problems have been described in breastfed newborns or infants. High doses of diuretics can suppress lactation, but low doses of loop diuretics, such as furosemide and torsemide, appear to not affect milk production if the mother continues to nurse her baby.

β-Blocking Agents

β-Blocking agents that seem to be safest for use during breastfeeding are propranolol, labetalol, and metoprolol. Atenolol and acebutolol may present problems to the breastfed newborn or infant because of the greater excretion into milk and slower elimination by the baby. It is prudent to avoid these drugs in the breastfeeding mother. The baby of a mother taking any β-blocking agent should be monitored—especially for bradycardia, feeding problems, respiratory patterns, and activity.

Renin–Angiotensin System Inhibitors

The angiotensin-converting enzyme inhibitors that have been studied in breastfeeding mothers and babies include benazepril, captopril, enalapril, perindopril, and quinapril. These drugs are excreted in limited quantities into milk. There are no reports of infant problems with these drugs. The related angiotensin receptor blockers (eg, losartan) have not been well studied during breastfeeding, but levels of candesartan were very low in 3 mothers. Because of their chemistry and bioavailability, angiotensin receptor blockers are unlikely to affect nursing newborns and infants. Aliskiren has an oral bioavailability of only 2.5% in adults, so it might not reach the baby in clinically relevant amounts—but no safety information is available. Pending further data, all of the drugs that lack information for use during breastfeeding should be avoided, if possible, in mothers of neonates and preterm newborns.

Calcium Channel Blocking Agents

Calcium channel blocking agents that have been studied during breastfeeding include amlodipine, diltiazem, nifedipine, nitrendipine, and verapamil. Little of these drugs is present in milk, and they appear to be acceptable during breastfeeding. Nifedipine 10 mg taken 3 times daily is often used to treat nursing mothers with Raynaud phenomenon of the nipple. Other calcium channel blockers have not been studied during breastfeeding.

Central α-Adrenergic Agonists

Maternal clonidine has caused adverse effects in breastfed newborns and infants. Clonidine and guanfacine should be avoided in nursing mothers. Methyldopa is acceptable for use in nursing mothers, but it may cause excessive maternal sedation, so it is not a preferred agent.

Magnesium Sulfate

Magnesium sulfate used for preeclampsia can delay lactogenesis stage 2 and the onset of lactation, thereby interfering with the newborn's ability to nurse effectively—so additional maternal breastfeeding support may be required. Intravenous administration of the drug does not increase human milk magnesium levels, and magnesium has poor oral availability, so it does not directly affect the breastfed baby.

Immunomodulating Agents

Anti–Tumor Necrosis Factor Agents

Because anti–tumor necrosis factor (TNF) agents are large monoclonal antibodies, they are transmitted into mature milk in levels that are either undetectable (eg, adalimumab, certolizumab) or extremely low (eg, etanercept, infliximab). Any drug that makes it into the milk is likely digested by the newborn or infant. Expert opinion holds that these agents are acceptable for use during breastfeeding.

Interleukin 6 Inhibitors

Sarilumab and tocilizumab are also monoclonal antibodies. No information is available on sarilumab use during breastfeeding. Some data on tocilizumab indicate that its passage and milk levels are similar to those of the better studied anti-TNF monoclonal antibodies. To date, no adverse effects have been seen among several infants who have been exposed to this drug via breast milk.

Chloroquine and Hydroxychloroquine

Chloroquine and hydroxychloroquine have been studied in nursing mothers and their babies. The amounts of these drugs found in human milk are low, and no adverse effects have been seen with follow-up of breastfed infants up to 1 year of age. Clinical guidelines consistently indicate the acceptability of these drugs during breastfeeding.

Immunosuppressants

A considerable amount of pharmacokinetic and clinical evidence indicates that cyclosporine usually does not affect the breastfed newborn or infant. Less evidence is available for tacrolimus, but it is usually not detectable in the serum of breastfed babies. For both of these drugs, breastfed newborns and infants should be monitored carefully—possibly including measurement of serum levels to rule out toxicity if there is a concern for the baby's safety. The safe use of azathioprine and its metabolite mercaptopurine during nursing has been reported in patients with inflammatory bowel disease, lupus, and organ transplants. Most professional guidelines consider all these drugs to be acceptable during nursing.

Methotrexate should be avoided in dosages used for cancer treatment; however, some data indicate that only small amounts are transferred into human milk with single maternal doses up to 92 mg. Although many, but not all, professional guidelines contraindicate methotrexate, intermittent use of low doses may be acceptable—but the breastfed baby's complete blood cell count and differential should be monitored. Cyclophosphamide appears in milk in potentially toxic amounts; additionally, highly toxic active metabolites could add to the risk to the baby. Neutropenia has been reported in 2 infants whose mothers breastfed them while receiving cyclophosphamide. No cases of safe breastfeeding with maternal cyclophosphamide therapy have been reported. Apremilast, leflunomide, mycophenolate, and sirolimus have not been studied and are best avoided during breastfeeding.

Intravenous Immunoglobulin

Intravenous immunoglobulin is considered safe, and it is the drug of choice for treating multiple sclerosis during breastfeeding postpartum.

Janus Kinase Inhibitors

No information is available on the use of baricitinib or tofacitinib during breastfeeding. Most guidelines recommend avoiding Janus kinase inhibitors in mothers who are breastfeeding, out of concern for the toxicity level of these drugs—including possible carcinogenicity.

Mesalamine

Mesalamine and its derivatives (eg, balsalazide, olsalazine) are acceptable to use during breastfeeding, although the newborn or infant should be monitored for diarrhea, which may occur rarely. Sulfasalazine is best avoided because of its sulfonamide component.

Antimicrobial Agents

Almost all antimicrobial agents are transferred to human milk in small amounts. Many of them are also used for the treatment of infectious diseases in children. The doses received by the breastfed newborn and infant are always far less than what would be given directly to the baby for antimicrobial therapy.

Few reports of serious immediate adverse effects in newborns and infants from maternal antibacterial agents exist. Recently, some evidence indicates that exposure of the infant to antimicrobial agents during the first 6 months after birth might lead to an increased risk of obesity and allergy. Whether this concern extends to exposure via human milk is not clear. Broad-spectrum antibiotics, long-term and repeated courses of antibacterial agents for persistent maternal infections (eg, mastitis, sinus infections), can sometimes result in maternal and infant candidiasis, which must be treated with antifungal agents in the mother and the infant simultaneously.

Antifungal Agents

Nystatin and amphotericin B are not orally absorbed, so they pose no risk to the nursing newborn or infant. Maternal fluconazole is safe for the baby and has been used for direct newborn and infant therapy. Ketoconazole and itraconazole have been less well studied and are potentially more toxic, but they can be used with caution if no alternatives exist. Ketoconazole should not be used topically on the nipples because of possible direct ingestion by the newborn or infant. Clotrimazole and miconazole have poor bioavailability when ingested orally and are good choices for vaginal or topical use, including on the nipples.

Antiviral Agents

Acyclovir and valacyclovir are considered acceptable to use during breastfeeding. Of the drugs used to treat influenza, only oseltamivir has been studied, and while small amounts have been found in human milk, it is generally considered safe. Because zanamivir is inhaled and has poor oral absorption, it is also considered acceptable during breastfeeding. Amantadine, and probably rimantadine, can potentially suppress lactation, so it should be avoided.

Several drugs used to treat hepatitis have been safely used in the treatment of HIV infections in nursing mothers in Africa, in the same or larger doses than those used for treating hepatitis. These drugs include interferon alfa, lamivudine, ritonavir, and tenofovir. Although breastfeeding is not recommended

in HIV-positive mothers in higher-income/resource countries, the use of pre-exposure prophylaxis with tenofovir disoproxil fumarate and emtricitabine is considered safe to use in HIV-negative mothers.

Most drugs for hepatitis C have not been studied in breastfeeding, but many are so extensively bound to plasma proteins that their passage into human milk is likely to be negligible. These include daclatasvir, dasabuvir, elbasvir, glecaprevir, ledipasvir, ombitasvir, pibrentasvir, simeprevir, velpatasvir, and voxilaprevir. These drugs are not contraindicated during breastfeeding. Ribavirin is considered by some experts to be contraindicated in nursing mothers because of its toxic potential.

The therapy for treating coronavirus disease 2019 (COVID-19) is still evolving. However, some drugs that have been mentioned for treatment are chloroquine, hydroxychloroquine, and azithromycin. All these drugs are acceptable to use in a nursing mother based on milk levels and safe use during nursing. Additionally, remdesivir is an investigational drug being studied for treatment of the disease. No information is available on its excretion into milk or use in nursing mothers. However, it has been used safely intravenously in a newborn with congenital Ebola infection. Milk would be expected to provide a much lower oral dosage.

Cephalosporins and Penicillins

Cephalosporins and penicillins appear in milk in minute quantities and are generally safe for use during breastfeeding. There is a slight risk of allergic reactions in the newborn or infant.

Clindamycin

Clindamycin is an option for the treatment of methicillin-resistant *Staphylococcus aureus* infections (eg, mastitis), but the newborn or infant should be observed for diarrhea and bloody stools.

Fluoroquinolones

Fluoroquinolones that have been studied during breastfeeding include ciprofloxacin, gemifloxacin, levofloxacin, and trovafloxacin. They all appear in human milk in low levels. If there is no other choice for maternal therapy, a short (1- to 2-week) exposure may be acceptable. Fluoroquinolone eye drops or ear drops do not pose any risk for the breastfed newborn or infant.

Linezolid

An option for the treatment of methicillin-resistant *S aureus* infections, linezolid appears in human milk at lower amounts than those used in newborn and infant therapy.

Macrolides

Erythromycin, clarithromycin, azithromycin, and other macrolides are generally safe to use during breastfeeding, although there is weak evidence that erythromycin might increase the risk of hypertrophic pyloric stenosis in breastfed newborns, particularly in the first 2 weeks after birth. However, 2 meta-analyses discounted these findings.

Metronidazole

The caution against metronidazole is related to its in vitro ability to cause chromosomal damage—possibly leading to carcinogenesis. This has not been described in humans who receive the drug or in nursing newborns or infants of mothers who are treated with the drug, although a valid study would be almost impossible to perform. Metronidazole is occasionally used in newborns and infants for the treatment of *Giardia* and some anaerobic infections and is used in pregnancy. Metronidazole can be resumed 24 hours after the last dose of metronidazole and 3 days after a dose of the similar drug, tinidazole. Metronidazole seems to be safe for the breastfed baby in the short term, although there are reports of increased *Candida* colonization and poor feeding.

Sulfonamides

Rarely indicated, sulfonamides should be avoided in breastfeeding mothers because of an increased risk for kernicterus in newborns with jaundice and concerns for hemolysis in newborns and infants with a deficiency of glucose-6-phosphate dehydrogenase (G6PD). Trimethoprim-sulfamethoxazole is an option for treatment of methicillin-resistant *S aureus* infections (eg, mastitis) while breastfeeding an older infant without G6PD deficiency.

Tetracyclines

Short-term use of tetracyclines in nursing mothers is safe. The amount of tetracycline that appears in human milk is low, and oral bioavailability is poor because of the calcium in the milk. No adverse outcomes in breastfed newborns or infants have been reported; however, long-term or repeated daily use (eg, for

acne) is best avoided. Doxycycline is the preferred tetracycline because is it not contraindicated for use in children. Minocycline has caused milk to turn black.

Vancomycin

Vancomycin and the related drug daptomycin are excreted into milk in only small amounts and are not absorbed into the newborn's or infant's bloodstream. They are acceptable during nursing.

Vaccines

When routine childhood vaccines are given according to standard childhood immunization schedules, breastfeeding does not interfere with the newborn's or infant's response to any commonly used vaccine. Breastfeeding actually enhances babies' responses to some vaccines. Breastfed newborns and infants are also less likely to have fever and may be less likely to experience anorexia and reduced energy intake after undergoing routine childhood immunization than those who are not breastfed.

There is no evidence or reason to believe that maternal inactivated or recombinant vaccines would harm a nursing newborn or infant. Live attenuated vaccines given to the mother could conceivably infect the baby, but most live vaccines do not pass into milk or harm the baby. Therefore, no routine vaccines are contraindicated in nursing mothers according to the Centers for Disease Control and Prevention (CDC).

Diphtheria, Tetanus, and Acellular Pertussis

It is recommended that women receive the diphtheria, tetanus, and acellular pertussis (Tdap) vaccine with every pregnancy. Women, including nursing mothers, who have not received Tdap vaccine previously should be vaccinated with Tdap immediately postpartum. After vaccination, anti-pertussis antibodies appear in human milk within 1 to 2 weeks; however, conflicting results have been reported on whether breastfed newborns are protected from pertussis.

Haemophilus influenzae

Haemophilus influenzae vaccines are inactivated vaccines that are recommended only in adults with anatomical or functional asplenia, sickle cell disease, or hematopoietic stem cell transplant. Although there is some conflicting information on the effect of breastfeeding on newborns' and infants' antibody response to *H influenzae* type b vaccines, there is no evidence that breastfeeding reduces protection against the disease.

Hepatitis A and B

Vaccines for hepatitis A and B are indicated only in patients who wish for the vaccine or those with certain medical conditions or risks of exposure or who anticipate travel in countries with endemic hepatitis A or B. No information is available on hepatitis A vaccine during breastfeeding, but it is an inactivated vaccine, so no harm to the newborn or infant is expected. Breastfed babies of mothers who are positive for hepatitis B surface antigen have a different response in the development of immunoglobulin subtypes after vaccination with hepatitis B vaccine than do formula-fed babies. However, breastfeeding does not interfere with the baby's antibody response to hepatitis B vaccine.

Human Papillomavirus

The recombinant human papillomavirus (HPV) vaccine, which helps to prevent certain types of cervical cancer, is only recommended in women up to age 26 years, although it can be used in women up to 45 years of age. No information is available on the use of HPV vaccine during breastfeeding or its excretion into human milk. However, because the vaccine is not live, the risks to the breastfed newborn or infant are low.

Influenza

Receiving an influenza vaccination late in pregnancy or during breastfeeding can result in fewer episodes of infant respiratory illness with fever in the first 6 months' postpartum. The effectiveness of the vaccine is positively correlated with the extent of exclusive breastfeeding.

Measles, Mumps, and Rubella

Although rubella vaccine virus might be excreted into milk, the virus usually does not infect the newborn or infant. If an infection does occur, it is well tolerated because the rubella virus is attenuated. No clear evidence exists for live attenuated measles or mumps vaccine virus being excreted into human milk.

Meningococcal Vaccine

Meningococcal vaccine is an inactivated vaccine that is indicated in patients who wish to receive the vaccine or those who have certain medical or exposure risks. It is also indicated in previously unvaccinated first-year college students who live in residential housing. Breastfeeding is not a contraindication to receiving the meningococcal vaccine.

Pneumococcal Vaccine

In general, only patients older than 65 years should receive the pneumococcal vaccine. However, smokers, those with certain chronic medical conditions, immunocompromised patients, and those with cerebrospinal fluid leak or cochlear implant can receive it at a younger age. Immunization of pregnant women with pneumococcal vaccine increased the specific secretory immunoglobulin A content of milk and colostrum. These antibodies in colostrum help inhibit epithelial adhesion of pneumococci to pharyngeal epithelial cells. Some evidence of decreased pneumococcal disease has been found among breastfed infants of vaccinated mothers. Infants breastfed for longer than 90 days have a better antibody response to some pneumococcal strains in the vaccine at 13 months of age than those breastfed for fewer than 90 days.

Varicella

Varicella is a live vaccine that is indicated only for persons born in 1980 or later or in mothers who have no evidence of immunity. Mothers born before 1980 should usually receive the measles, mumps, and rubella vaccine. There appears to be little or no excretion of varicella vaccine into human milk.

Coronavirus Vaccines

The COVID-19 vaccines are recommended during breastfeeding. They cannot cause infection to the infant, as they do not contain live virus. In addition, there is emerging evidence that breastfeeding people who have received mRNA COVID-19 vaccines have antibodies in their breast milk, which could help protect their babies.

Travel Vaccines

Cholera, typhoid, and Japanese encephalitis vaccines are most commonly administered to travelers to endemic areas. Cholera vaccine is a live, attenuated vaccine. In one study, the administration of oral cholera vaccine to breastfeeding mothers decreased the risk of cholera infection in their breastfed infants by 47%. The typhoid vaccine is available as an oral live vaccine, an attenuated vaccine, or an injectable inactivated vaccine. No specific information is available on typhoid vaccines and breastfeeding; however, the CDC does not consider them to be contraindicated while breastfeeding. No information is available on the Japanese encephalitis vaccine, but it is a low-risk inactivated vaccine.

Vaccines to Avoid

Only 3 live, attenuated specialty vaccines should be avoided in nursing mothers: adenovirus type 4 and type 7, smallpox (vaccinia), and yellow fever. Smallpox vaccine has spread to a breastfed infant, causing vaccinia lesions on her upper lip, tongue, and cheek, after her mother developed vaccinia lesions on both areolas. Vaccinia can be spread by direct contact, so precautions should be used if any close contact of the infant receives the vaccine. Yellow fever vaccine, which is given before travel to endemic areas, has caused encephalitis in a few breastfed newborns whose mothers received the vaccine. It should not be given to mothers who are breastfeeding an infant younger than 9 months, unless it is absolutely unavoidable. Adenovirus type 4 and type 7 vaccines and smallpox vaccines are primarily administered in military personnel.

Migraine Treatment

Migraine treatment in adults is categorized as prophylaxis of attacks and treatment of acute episodes. Drugs for migraine prophylaxis that are the best choices during breastfeeding are amitriptyline, metoprolol, nortriptyline, propranolol, sertraline, topiramate, and valproic acid.

The initial therapy for acute migraine headache ranges from nonpharmacological measures, such as rest, a darkened room, biofeedback, meditation, acupuncture, and yoga, to some of the newest drugs. The use of acetaminophen and nonsteroidal anti-inflammatory drugs is acceptable during lactation, although short-acting drugs (eg, ibuprofen) are preferred while nursing a newborn. Products that contain a combination of acetaminophen with caffeine are considered safe during lactation (see Chapter 7, Breastfeeding Initiation).

Triptans

Data for sumatriptan and eletriptan demonstrate that the excretion in milk is low for these 2 drugs. Other triptans have not been well studied, but almotriptan, naratriptan, rizatriptan, and zolmitriptan have preliminary evidence in a few patients that levels in milk are low and unlikely to affect the newborn or infant.

Ergot Alkaloids

Ergot alkaloids (ie, ergotamine, dihydroergotamine) have not been measured in human milk. They lower prolactin levels, may interfere with nursing, and adversely affect the breastfed newborn and infant. They are not recommended during lactation.

Pain Management

The breastfeeding mother can usually achieve pain management by taking appropriate doses of acetaminophen or nonsteroidal anti-inflammatory drugs, such as ibuprofen. Oral opiates (eg, hydrocodone, oxycodone) can be added in low doses for short courses or as needed when the nonopioid analgesia is inadequate. Oral codeine is falling out of favor because of excess sedation in some mothers and infants (including one death) with pharmacogenomic variants. More severe pain, such as that occurring immediately after birth or after surgery, can be managed with the added use of IV or intramuscular narcotics, such as fentanyl or hydromorphone. Repeated doses or continuous infusion of meperidine should be avoided because its active metabolite can accumulate in the mother and her breast milk. Careful monitoring of newborns and infants for sedation and respiratory depression is necessary whenever opiates are given to their mothers. See Chapter 7, Breastfeeding Initiation, for a discussion of pain management during lactation.

Anesthesia

Modern anesthetic agents used in general anesthesia are mostly short-acting drugs (ie, desflurane, isoflurane, propofol, sevoflurane, and midazolam) that do not accumulate or persist in the mother or her milk after the procedure. As a general rule, a mother can breastfeed her newborn or infant as soon as she is sufficiently recovered to do so. The one exception is when she has received a large dosage of an opioid with a long half-life. In these cases, breastfeeding should be withheld until the opioid has been eliminated from her system. Studies on the effect of epidural fentanyl, remifentanil, and sufentanil on breastfeeding initiation and duration are mixed, because of the different combinations of drugs, dosages, and patient populations studied, as well as the variety of techniques used and the deficient designs of many of the studies.

Seizure Management

There are numerous case reports of adverse effects in breastfed infants of mothers who take anticonvulsants, but most infants do not have noticeable effects. Many of the reports were conducted in infants whose mothers also took the drug during pregnancy or were taking more than one anticonvulsant or psychotropic at a time. Newborns of mothers who took the drug during pregnancy may develop NAS, but breastfeeding can mitigate NAS to some extent.

Older sedating anticonvulsants (ie, phenobarbital, primidone) have caused sedation in breastfed newborns and infants who are exposed to the drug through

milk. Methemoglobinemia was reported in a neonate who was exposed to phenytoin during pregnancy and lactation. Reports of newborns and infant sedation and hepatic dysfunction have also been published with maternal carbamazepine use. Thrombocytopenia and anemia in one infant were possibly related to valproic acid in the breast milk that the infant ingested. Lamotrigine and ethosuximide taken by the breastfeeding mother may result in near-therapeutic plasma levels in her infant; however, adverse reactions have been uncommon among numerous infants who have been exposed to lamotrigine in breast milk. However, infants exposed to lamotrigine should be monitored for sedation, hypotonia, poor weight gain, elevated platelet counts, and elevated liver enzyme levels. Apnea has been reported with a high maternal dosage. Zonisamide is also extensively excreted into human milk. Lamotrigine and zonisamide are more likely to cause serious skin reactions, such as Stevens-Johnson syndrome, than other anticonvulsants. Newborns and infants who develop a rash when exposed to these drugs in human milk should stop nursing until the cause is elucidated. Drugs that have relatively low excretion into human milk include gabapentin, pregabalin, topiramate, and vigabatrin.

Infants who were breastfed by mothers taking carbamazepine, lamotrigine, phenytoin, or valproate as a single agent during pregnancy and postpartum had an average IQ that was 4 points higher than the non-breastfed infants at 3 years of age. The difference was driven by the valproate group, which had an average 12-point difference between the breastfed and non-breastfed groups. The other drugs did not have statistically significant differences in IQ between the groups. Periconception folate use was also an important variable, with an average 5.7-point higher IQ among the infants of folate users.

Regardless of which drug or drugs the mother needs for the control of her epilepsy, it would be prudent not only to clinically observe the baby but also to measure drug concentrations in the infant's plasma if adverse effects are suspected or to perform liver function tests if jaundice occurs—especially in the first 2 months after birth. Routine testing of the newborn or infant is probably not necessary.

Thyroid and Antithyroid Therapy

Levothyroxine is given at a dosage to replicate the normal serum levels of thyroid hormone in deficient individuals. With proper dosage adjustment, it will not affect the thyroid function of the newborn or infant. For women in the United States who have hyperthyroidism, propylthiouracil had been the preferred drug because of low transfer into human milk and a lack of effect on newborn and infant thyroid function. Propylthiouracil can cause irreversible hepatic failure, although there are no reports in newborns or infants during

breastfeeding. Therefore, methimazole is now preferred, despite its greater transfer into human milk. Methimazole dosages up to 20 mg per day do not affect the baby's thyroid function. Exposure can be minimized by waiting 3 hours after taking the dose before nursing the baby. Propylthiouracil and methimazole cause agranulocytosis rarely, but there are no reports in breastfed newborns or infants.

Ingestion of high doses of iodides should be minimized because these agents may cause hypothyroidism in breastfed newborns and infants. Exceptions are low iodine doses in iodine-deficient mothers and protection of the thyroid after environmental exposure to radioiodine, when potassium iodide should be given to both the mother and baby when indicated (see Chapter 19, Breastfeeding Issues During Disasters). Thyroid suppression has been reported in breastfed newborns and infants after maternal povidone-iodine application to the skin and mucous membranes and after daily ingestion of seaweed soup.

Contrast Agents

Currently used iodinated and gadolinium-based contrast agents do not pose a risk to the breastfed newborn or infant after maternal administration because of low excretion into human milk and poor oral absorption. Mothers do not need to withhold breastfeeding after the use of these agents. For mothers who wish to withhold breastfeeding, a period of 12 to 24 hours is sufficient.

Radioactive Isotopes

Ideally, elective diagnostic nuclear medicine procedures should be delayed until the mother is no longer breastfeeding. If a diagnostic radioisotope is to be administered to a breastfeeding mother, using an agent with a short half-life is preferred. She should be told how long she will likely be unable to breastfeed, counseled to express and discard her milk during the time required for the radioisotope to be eliminated from her system, and told whether she should avoid holding her newborn or infant close to her body for a period after the examination. Having this information in advance of the procedure will allow her to express and refrigerate or freeze milk for her baby's use during the period she is unable to breastfeed. With some agents, stored breast milk can be given to the infant after a storage period of 10 radioactive half-lives.

The most concerning diagnostic isotope is iodine 131. The American Thyroid Association recommends using technetium scanning for the diagnosis of hyperthyroidism in nursing mothers. If iodine 123 is used, the mother would withhold breastfeeding for 3 to 4 days. The Academy of Breastfeeding Medicine has published a clinical protocol on radiology and nuclear medicine studies in lactating women.

Mothers who receive therapeutic radioactive isotopes will not be able to breastfeed for an extended period because the dose of radiation remains high for a sustained period. Measurement of the radioactivity of pumped breast milk can help to determine a safe time to resume breastfeeding for a particular woman. A nuclear medicine physician should be consulted on an individual patient basis.

Galactagogues

Drugs that stimulate the production of milk, called *galactagogues*, should be used only after the usual efforts to increase milk production (eg, proper positioning, frequent breastfeeding, milk expression) are unsuccessful. A lactation consultant can be helpful in teaching mother the best techniques to use. Metoclopramide is a dopamine antagonist that increases serum prolactin and might increase milk production in some women, although study results are equivocal. The duration of metoclopramide use should not exceed 14 days, because it can cause maternal depression and tardive dyskinesia. The drug may also have short-term adverse effects in mothers, including tiredness, nausea, headache, diarrhea, dry mouth, breast discomfort, vertigo, restless legs, hair loss, and anxiety. Side effects reported in newborns and infants exposed to metoclopramide in human milk include occasional elevated serum prolactin levels and possible GI side effects.

Domperidone is not commercially available in the United States, but it is often used in or obtained from Canada and other countries. It works in a similar manner to metoclopramide. Meta-analyses have shown that it is modestly effective as a galactagogue, although the total number of patients included in well-designed studies is small. Domperidone has fewer side effects to the CNS than metoclopramide, but it can lengthen the QT interval, which has generated warnings from the FDA and Health Canada. Domperidone should not be used in women with a personal or family history of cardiac arrhythmias or in women who take drugs that inhibit CYP 3 A 4 (eg, erythromycin, fluconazole).

Other galactagogues, such as thyrotropin-releasing hormone and human growth hormone, may increase milk production through increasing prolactin secretion or working additively with prolactin to sustain normal lactation. There has been insufficient study of these hormones, and they are too expensive to be recommended for routine use to stimulate lactation. Oxytocin nasal spray was commercially available in the past to improve milk ejection. Its effectiveness as a galactagogue is questionable, and it is no longer marketed in most countries.

A plethora of herbal products are claimed to be galactagogues, but none has been adequately studied.

Herbal Remedies

Herbal remedies are frequently used for a variety of conditions. Lactating women who ask about using herbal preparations should be informed that the composition, purity, and effectiveness of these preparations are not well regulated and that they should use caution when procuring them. There are few data on effectiveness, but adverse effects have been reported in newborns and infants whose mothers took products that contained arnica (neonatal hemolysis), seaweed (hypothyroidism from excess iodine), stinging nettle (urticaria), and an herbal tea mixture (hypotonia, lethargy, emesis, weak cry, and poor sucking attributed to anethole in anise and fennel). Fennel should be avoided by mothers if they or their babies are allergic to carrots, celery, or other plants in the *Apiaceae* family because of possible cross-allergenicity. Likewise, because blessed thistle is a member of the ragweed family, allergy is a concern. St John's wort has caused possible colic, drowsiness, and lethargy in newborns and infants. It is a potent enzyme inducer and can lower the concentrations of a number of important drugs in the blood (eg, certain immunosuppressants, oral contraceptives, warfarin).

Fenugreek is widely used as a galactagogue, alone and in mixtures. It might have some minor effectiveness over placebo in some women. In one survey, 45% of women reported an adverse effect after taking fenugreek. Most maternal effects are minor, but lowering of blood glucose levels and enhancing the effect of warfarin can be serious. Fenugreek has also caused toxic epidermal necrolysis in one mother; it cross-reacts with allergy to legumes; and it imparts an odor to the urine like maple syrup.

Environmental Agents

It is difficult to separate the effects of human milk exposure of environmental agents on newborns and infants from in utero exposure on fetuses. However, there are a few instances in which morbidity has been described in an infant from a pollutant chemical in human milk, and there is good evidence that little, if any, morbidity occurs from the more common and well-studied chemical agents. The benefits of breastfeeding greatly outweigh the potential risks in nearly every circumstance of possible contamination.

Routine screening of human milk for environmental chemicals is not clinically indicated, in part because laboratory quality assurance methods are lacking and there are no established normal values. A mother who lives or works in a heavily contaminated area or has been exposed to a release of chemicals into the environment may have an intake greater than that of the general population. For more detailed information on specific environmental contaminants and

breastfeeding, see Chapter 15 of the AAP Council on Environmental Health manual, *Pediatric Environmental Health*. A few chemicals of current interest are discussed as follows.

Heavy Metals

Women who have risk factors for exposure to lead should be screened if they plan to breastfeed. Mothers with a blood lead level higher than 5 mcg/dL should have their baby's blood lead level tested. A woman with a confirmed blood lead level of 40 mcg/dL or higher should not breastfeed. She may pump and discard her milk until rescreening confirms a lower lead level and the source of exposure for mother and baby has been removed.

Mercury contamination comes mainly from seafood, where it enters the food chain from burning coal. In general, seafood found higher up on the food chain (eg, shark) contains more mercury than seafood lower down on the food chain. Although no adverse effects have been seen in newborns and infants that could be attributed to human milk exposure, carefully choosing seafood with low mercury levels can minimize maternal mercury levels and concern about mercury contamination.

Sunscreens

Topical sunscreen agents can be absorbed transdermally, and some of these agents are found in lipsticks and lip balms, allowing for their direct ingestion. Studies in several countries have shown sunscreen agents in the milk of 75% to 85% of nursing mothers. The main concern with these chemicals is that some of them have endocrine activity in animals. Exposures can be lessened if mothers abstain from using these products during their children's sensitive life stages.

Flame Retardants

Polybrominated diphenyl ethers are flame retardants used in clothing, furniture, and other consumer products. Some of these compounds have neurological or developmental toxicity in animal studies, but it is unclear whether exposure is sufficient to produce detectable toxicity in humans.

Phthalates

Phthalates are plasticizers used in a wide variety of consumer and medical products. They are of concern because they demonstrate antiandrogen activity in laboratory studies. Some human studies have shown lower serum testosterone levels and higher luteinizing hormone levels in boys whose mothers had increased levels of certain phthalates in their milk.

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CHAPTER 17

Contraception and the Breastfeeding Mother

During prenatal care, a woman should be encouraged to consider her future plans for childbearing and desired birth spacing and be given information and services that will help her meet her goals, so that she can devote her time and energy to her new baby. Providing supportive patient-centered counseling on contraceptive options and breastfeeding plans can allow for the mother to weigh the risks and benefits that are reflective of her personal intentions for both.

Contraceptive Counseling

Rationale

Having an unplanned pregnancy within a year after the birth of a child may not only cause nutritional and emotional stress for the mother, but it may also negatively affect her commitment to ongoing breastfeeding.

Opportunities for Counseling

Having frequent visits with a health care professional in the antepartum and postpartum periods provides many opportunities to discuss contraceptive plans.

Antepartum Visit

An antepartum visit presents an opportunity to explore a mother's attitudes about contraception, her experience with different contraceptive methods, her preferred method(s), and her thoughts on birth spacing or, alternatively, sterilization. Similarly, risk factors for difficulty with milk supply should also be assessed in the antepartum period so patients can receive anticipatory guidance for lactation. If the patient has attempted breastfeeding in a prior pregnancy,

any information about prior difficulties with breastfeeding and milk supply should also be considered when discussing the potential effects of contraception on milk supply. The advantages and disadvantages of different methods can be reviewed in relation to a mother's health profile and her decision to breastfeed.

Immediate Postpartum Counseling

At the time of hospital discharge counseling after birth, a mother's contraceptive plan can be reviewed and reinforced or revised. Consideration may be given to the potential risk of unintended pregnancy before a return visit if breastfeeding does not meet lactational amenorrhea criteria to ensure anovulation. Other factors that might adversely affect the patient's lactation goals can also be considered at this time.

Postpartum Office Visit

The postpartum office visit, which typically occurs 4 to 6 weeks after delivery, is an ideal time to assess the adequacy of breastfeeding frequency and duration in providing lactational contraception, in addition to evaluating a mother's milk supply. If the mother needs or wants more protection from unintended pregnancy, options can be discussed and initiated.

Contraceptive Options

Methods Not Involving the Use of Exogenous Hormones

Intrauterine Devices

Intrauterine devices (IUDs) offer safe, effective long-term contraception and may be considered for all appropriate candidates who seek a reversible, effective, and coitally independent birth control method. Intrauterine devices offer long-term pregnancy protection (3–10 years, depending on the product chosen). They may be conveniently inserted at the time of the postpartum visit. The main advantage to the use of IUDs is the long-term contraceptive effectiveness of 99% or greater. Additionally, copper IUDs have no proven adverse effects on breastfeeding. It should be noted that some IUDs contain progestin; the characteristics of progestin in relation to breastfeeding are described later. Intrauterine devices can be placed within 10 minutes after placental delivery or at 4 weeks' postpartum or later, after uterine involution. However, immediate post-placental placement is associated with a higher risk of expulsion by 6 months' postpartum.

Barrier Methods

The advantage of barrier methods of contraception, including pre-lubricated latex condoms, cervical cap, diaphragms, and spermicides, is the absence of any

effect on breastfeeding. Condoms have additional noncontraceptive advantages, including effective protection against sexually transmitted infections. The disadvantage of barrier methods is suboptimal effectiveness in typical use, with failure rates of approximately 10% to 20% across different barrier methods. These data are based on normally menstruating women and are, thus, likely applicable to the breastfeeding woman once her menses resume. It is recommended for condoms to be used at any time, but the breastfeeding mother should wait until 6 weeks' postpartum before using a contraceptive cap or a diaphragm. Diaphragms and cervical caps may need to be refitted after childbirth.

Lactational Amenorrhea Method

The lactational amenorrhea method (**Figure 17-1**) has been shown to be highly effective in a variety of cultural, health care, and socioeconomic settings, and it

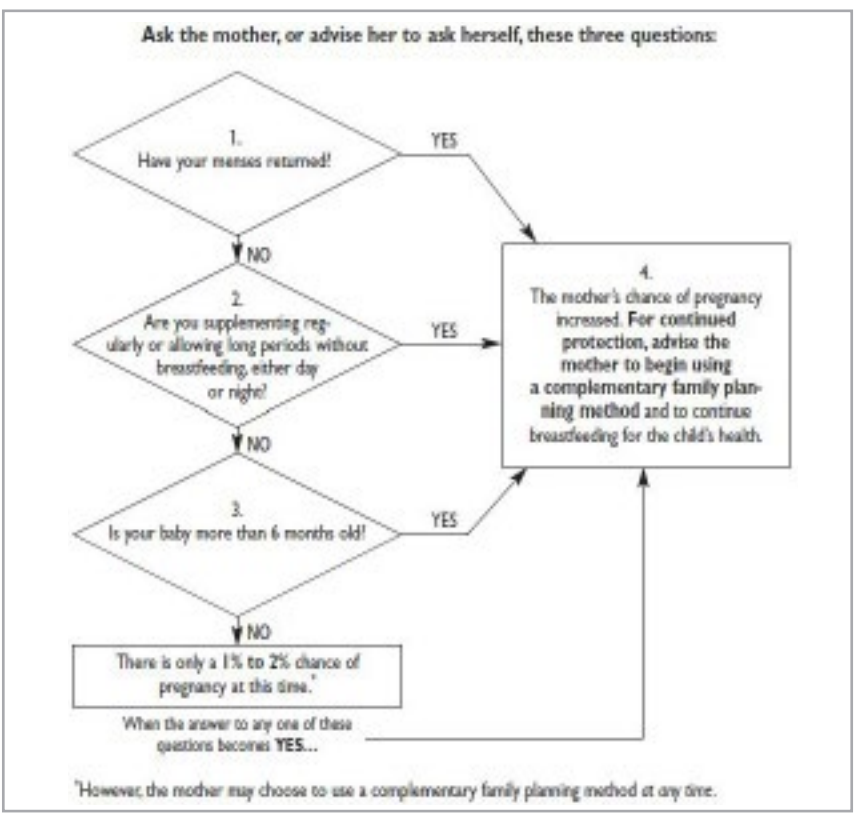


Figure 17-1. Algorithm for the lactational amenorrhea method. From Labbok M, Cooney K, Coly S. Guidelines: breastfeeding, family planning, and the lactational amenorrhea method—LAM. Institute for Reproductive Health, Georgetown University; 1994.

globally reduces preterm birth because of increases in child spacing. If the infant is breastfed exclusively (or is rarely given supplemental formula feedings) and if the mother has not experienced her first postpartum menses, breastfeeding provides more than 98% protection from pregnancy in the first 6 months after delivery, although rarely, ovulation may occur prior to the first menses. For optimal effectiveness, intervals between feedings should not exceed 4 hours during the day or 6 hours at night. Feeding practices other than direct breastfeeding, such as pumping, may reduce the vigor and frequency of suckling. This, in turn, may alter the maternal neuroendocrine response and, hence, increase the probability that ovulation will resume prior to the first bleeding episode. An alternative method of contraception should be used if the mother's description of the extent of her breastfeeding suggests it may not be adequate to suppress ovulation. Plans for alternative contraception if the patient no longer meets the criteria for suppression of ovulation from the lactational amenorrhea method should be noted in the patient's chart. Alternative contraception is indicated once the mother's menses resume, breastfeeding is no longer exclusive, formula or solids are introduced, or the infant reaches 6 months of age.

Methods Involving the Use of Exogenous Hormones

Exogenous hormones are a readily accepted and highly effective means of preventing pregnancy. There are, however, potential disadvantages that relate to the postpartum state in general and to breastfeeding mothers in particular, and these disadvantages vary by hormonal method. Most research on contraceptive use during lactation has focused on infant health and milk supply. Little research has focused on the reason for lactation difficulties or the reversibility of reported effects.

Progestin-Only Contraceptives

Progestin-only contraceptives include tablets (minipills), depot medroxyprogesterone acetate injections, etonogestrel implants, and IUDs that contain levonorgestrel.

- *Advantages*. Progestin-only methods have traditionally been considered the hormonal contraceptive of choice for breastfeeding mothers. The Centers for Disease Control and Prevention (CDC) has developed evidence-based medical eligibility criteria for contraceptive use, which state that for breastfeeding and non-breastfeeding women in the postpartum period, the advantages of progestin-only contraceptive options outweigh the risks for use. When compared with nonhormonal methods, progestin-only contraceptives have no proven effect on the quality or volume of human milk (**Table 17-1**).

Table 17-1. Centers for Disease Control and Prevention Medical Eligibility Criteria Guidance in Breastfeeding Women

Contraceptive Method	Postpartum Days 1–21	Postpartum Days 21–42	Postpartum Days 42+
IUDs	2[a] (< 10 min postpartum: Cu-IUD 1 and levonorgestrel IUD 2) Sepsis 4	2 until day 28, then 1	1
Progesterone-only contraception	2	1 (after day 30)	1
Combined estrogen and progestin contraception	4	3 (with risk factors/ age > 35 y) 2 (low risk)	2

Abbreviations: Cu-IUD, cooper-containing intrauterine device; IUD, intrauterine device.

[a] The numerals 1 through 4 in the Table refer to the following medical eligibility criteria: 1, There is no restriction for the use of the contraceptive method; 2, Advantages of the method generally outweigh theoretical or proven risks; 3, Theoretical or proven risks usually outweigh advantages of using the method; and 4, There is unacceptable health risk if this contraceptive method is used.

- *Timing*. No scientific evidence proscribes the initiation of progestin-only contraception in the early postpartum period. However, the typical 2- to 3-day postdelivery decrease of progesterone is part of the physiological process that initiates lactation. Thus, there is theoretical concern that giving the mother progestin in the first few days before lactation is established could interfere with optimal lactation. Contraception is not needed in the first 3 weeks' postpartum because of a delay in the return of ovulation in all women, and this delay is extended for women who breastfeed exclusively. Health care professionals should consider initiating progestin-only contraception 6 weeks after delivery in women who are breastfeeding exclusively and at 3 weeks after delivery in others. There may, however, be practical reasons for initiating contraception in the immediate postpartum period, such as uncertainty about the opportunities for follow-up visits and access to contraceptive care.

Contraceptives That Contain Estrogen-Progestin

Contraceptives that contain estrogen-progestin include daily pills, weekly patches, and monthly and yearly vaginal rings.

- *Disadvantages*. There are several disadvantages in the use of combination hormonal contraceptives in breastfeeding women. The first disadvantage, which applies to all postpartum women, is the potential contribution of the

estrogen component to the known hypercoagulable state of the postpartum period. Furthermore, the use of estrogen-containing contraceptives in the postpartum period can have potential negative effects on breastfeeding, including decreased milk production that can lead to a decreased duration of breastfeeding and an increase in supplementation needed for the baby. Estrogen also may be transferred into the milk (see **Table 17-1**).

- *Timing*. The most recent CDC guidelines state that women should not use combined hormonal contraceptives in the first 21 days after delivery because of an unacceptable risk of venous thromboembolism. Women with no risk factors may—only with caution—use combined oral contraceptives during days 21 to 42 postpartum. The most conservative recommendation—that of delaying combined hormonal contraceptives use until at least 6 months after delivery in breastfeeding women—largely emanates from earlier studies of combination oral contraceptives in which higher doses of estrogen were used. Most contemporary formulations have 35 mcg or less of estrogen, with some as low as 10 mcg. In situations in which an adverse effect on milk supply is of concern, the use of the lowest estrogen option started later in well-established lactation may be prudent if a combined hormonal option is desired. Although progestin-only preparations remain the oral contraception of choice for breastfeeding women, combination oral contraceptives can be considered after 6 weeks' postpartum if breastfeeding is well established and the infant's nutritional status is monitored.

Medical Eligibility Criteria

The CDC has published criteria for contraceptive use in the United States, and it provides specific recommendations for the postpartum period for breastfeeding and non-breastfeeding mothers. Of note, the recommendations do not distinguish between hormonal and nonhormonal IUDs. Additionally, recommendations for use of combined hormonal contraceptives take into account timing and individual risk factors, such as age and risk for venous thromboembolism.

This information is available as a free downloadable app (the US MEC US SPR Contraception app) on the Apple App Store for iOS users and the Google Play Store for Android users.

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CHAPTER 18

Complications and Contraindications to Breastfeeding

It is estimated that with adequate motivation and support, most mothers can establish and sustain prolonged breastfeeding. Even with motivation and support from their families, employer, community, and the medical system, mothers with certain medical and psychosocial conditions may not meet their breastfeeding goals. In rare situations, breastfeeding is not recommended because of maternal or newborn/infant indications. To provide appropriate guidance around breastfeeding, health care practitioners should review prior breastfeeding history, breast health and surgical history, and general medical history and examine the breasts as indicated.

Physical Conditions of the Breast

Breast Size

Breast size is not an indicator of breastfeeding success. Because most breast mass is fat tissue and not glandular tissue, small breasts normal in anatomic configuration almost always contain enough glandular tissue to produce sufficient milk for breastfeeding. Small breast size, however, may limit the volume of milk that can be stored within the glandular and ductal system, which may necessitate more frequent feeding to provide the baby with sufficient milk intake.

Hypoplastic and Tubular Breasts

Although uncommon, breast maldevelopment, which is sometimes characterized by a tubular shape, has been associated with a high risk of insufficient milk production. The intermammary distance on the chest wall is typically widened.

When this is noted at physical examination, an antepartum consultation with a lactation specialist can help to address potential challenges with lactation.

Breast Enlargement During Pregnancy

Breast enlargement during pregnancy is an important factor in lactation success. If the breasts do not enlarge during pregnancy, milk production may not occur, and exclusive breastfeeding may be difficult. Hormonal or anatomical factors may be the cause. Regardless of the cause, breastfeeding adequacy, and especially measures of appropriate milk intake, such as weight and growth of the newborn, should be monitored closely (see Chapter 8, Breastfeeding in the Hospital).

Breast Injury and Breast Surgery

Whether because of trauma, reduction mammoplasty, implantation, or removal of a mass, breast injury or surgery may be a cause for breastfeeding difficulties. Generally, breastfeeding should still be encouraged. Additional assistance, monitoring, and professional support should be provided during the first few days and beyond to ensure sustained, successful milk production. The potential challenges in establishing lactation should be discussed with the mother, and she should receive encouragement and support and have access to experienced certified lactation counseling.

Reduction Mammoplasty

Women who have undergone reduction mammoplasty with repositioning of the areolae and nipples often have difficulty producing an adequate milk supply. Peri-areolar incisions are likely to interrupt and block the flow of milk into the nipple ducts and may disrupt innervation of the areola. In this situation, exclusive breastfeeding success is rare; however, the mother may be able to produce some milk due to re-cannulization. In the case where the nipple and areola are left on a pedicle during surgery, the prognosis for successful lactation is improved. In advance of any procedure, women should be counseled to consider the effect on future breastfeeding with their breast surgeons.

Augmentation Mammoplasty

Breast augmentation surgery is compatible with successful breastfeeding, especially if the implant was placed behind the pectoral muscles for purely cosmetic reasons. However, excessively large implants may impinge on the capacity of the breast to enlarge during lactation and thereby limit the volume of milk that the mother can store, as well as restrict blood flow to the mammary gland tissue and, thus, restrict milk production. The woman's reasons for breast augmentation may need clarification. For example, augmentation may have been performed for abnormal

breast shape or breast asymmetry, which may indicate inadequate glandular breast tissue to support breastfeeding. Changes in the breast during pregnancy and milk production during the immediate postpartum period should be monitored closely.

Lumpectomy

The removal of a mass in the breast may affect breastfeeding if important nerves and ducts have been severed or removed. Of greatest concern are incisions around the periphery of the areola. Milk production and baby weight gain should be monitored closely.

Previous Treatment of Breast Cancer

Pregnancy after breast cancer treatment has not been shown to increase recurrence of cancer and may confer a survival benefit. If a woman desires to breastfeed after a subsequent birth, she is usually able to do so by using the unaffected breast and, in some cases, from both breasts if surgery or radiation therapy does not interfere. Radiation therapy after lumpectomy may lead to insufficient or absent lactation on the affected side. In addition, the newborn may show a preference for the unaffected breast, as the milk on the irradiated side may have a different taste or different fat content. Mothers should be encouraged to discuss their family planning goals with their oncologist early in the course of their cancer care.

Trauma and Burns

The effect of breast tissue trauma and burns on lactation performance varies, depending on how much direct injury to the ducts and mammary gland tissue occurred. Even mothers who have experienced severe burns to the chest that required extensive grafting in childhood have been able to breastfeed successfully.

Pierced Nipples

A history of pierced nipples has not been associated with breastfeeding difficulties, unless there is infection or scarring. Nipple devices should be removed before feeding to avoid the risk of the baby choking. Occasionally, women may continuously leak milk from larger tracts formed in the nipple from jewelry.

Absolute and Relative Maternal Contraindications to Breastfeeding

Infection Risk

The transmission of microorganisms from mother to milk has been shown to occur. The risk to the baby varies depending on the infectious organism.

HIV

In the United States, the Centers for Disease Control and Prevention (CDC) recommends that mothers living with HIV should not breastfeed or donate human milk because of the risk of transmitting the infection to the nursing newborn or infant. Even if mothers living with HIV are taking antiretroviral (ARV) medications and have undetectable viral loads, neither maternal nor baby postpartum ARV therapy is sufficient to completely eliminate the risk of transmission through breastfeeding, according to the CDC.

A recent survey of health care practitioners who care for women with HIV indicated that 75% had cared for a woman who requested to breastfeed, and 29% had cared for a woman who breastfed despite recommendations against breastfeeding. The US Department of Health and Human Services has recommended that women with HIV who have questions about breastfeeding should receive evidence-based counseling with an HIV expert about the risks and benefits of breastfeeding and that if they choose to breastfeed, they should be counseled to use harm-reduction measures to minimize the risk of HIV transmission. Some experts may consider continuing prophylaxis through 1 month after the cessation of breastfeeding. In that scenario, regular screening of the infant should continue during breastfeeding and for 6 months after breastfeeding cessation.

In contrast, in lower-income/resource countries, where infectious diseases and malnutrition are the predominant causes of infant mortality in children who are exposed to HIV and those who are not exposed, the health risks of not breastfeeding must be balanced with the risk of HIV acquisition. In 2016, the World Health Organization updated its recommendations for breastfeeding and women with HIV. For women living in low-resource countries, the recommendation is exclusive breastfeeding for 6 months and continued breastfeeding up to 24 months with ongoing antiretroviral therapy for mother and infant. All women should be specifically supported in appropriately feeding their babies by using a patient-centered and harm-reduction approach. Weaning should occur gradually over a month. In this scenario, ARV prophylaxis (maternal ARV therapy or extended infant prophylaxis) should be provided throughout breastfeeding and the weaning period. Overall, breastfeeding is contraindicated in HIV-infected mothers if replacement feeding is acceptable, feasible, affordable, sustainable, and safe.

T-cell Lymphotropic Virus

Mothers in the United States who are human T-lymphotropic virus (HTLV) 1 or HTLV-2 seropositive should be advised to neither breastfeed nor donate milk

to human milk banks. Of note, it should be taken into account that, in Japan, breastfeeding is initiated in mothers who have active infections with HTLV-1 and HTLV-2.

Tuberculosis

Because of the concern that tuberculosis could be transmitted by close contact with the mother, women with active pulmonary tuberculosis should not feed their newborn or infant themselves (by breast or bottle; the women should have no contact with the baby) until they have undergone appropriate antibiotic treatment of approximately 2 weeks' duration and are no longer contagious, as determined by their physician or public health official. The organism does not pass into the milk; thus, mothers should consider pumping their milk for another caregiver to feed the baby. Expressed milk can be fed to the baby, as long as there is no evidence of tuberculosis mastitis, which is a rare condition. If the mother is being treated for active pulmonary tuberculosis, such as with the regimen of isoniazid, rifampin, and ethambutol, a small dosage of isoniazid is secreted into the milk. There are no known effects of the secreted isoniazid on the breastfeeding baby. The baby only needs pyridoxine supplementation if he or she is taking isoniazid. In situations in which the mother has known active pulmonary tuberculosis, the baby should be receiving isoniazid therapy. Once the woman is not considered contagious, after 2 weeks of therapy and negative sputum test results, separation of the mother and baby is no longer necessary.

Varicella-Zoster Virus

Newborns of mothers who develop varicella around the time of delivery (5 days before birth to 2 days after birth) should be given varicella-zoster immunoglobulin and separated from their mother until her lesions are crusted over. However, her expressed milk is safe for feeding to the newborn. Because the secretion of attenuated varicella vaccine virus in human milk has not been documented, varicella vaccine may be given to susceptible breastfeeding mothers if the risk of exposure to natural varicella-zoster virus is high.

Herpes Simplex Virus

Mothers with herpetic breast lesions should not directly breastfeed from the affected breast and should cover the lesions to prevent contact with the newborn or infant. Mothers with these lesions can, however, safely breastfeed from the unaffected breast. The milk itself does not transmit herpes simplex virus; therefore, if there is no contact between the breast lesions and breast pump during expression, the milk may be safely used to feed the baby. However, if the pump does come into contact with the herpetic lesions, the milk should be discarded. Pumping should continue to maintain the mother's milk supply

and prevent breast engorgement and mastitis. Mothers with genital herpes can breastfeed, although proper handwashing procedures should be strictly followed.

Cytomegalovirus

Cytomegalovirus (CMV) may be found in the milk of seropositive mothers. In healthy term newborns and infants, symptomatic CMV disease as a result of transmission through breast milk is uncommon. There is some concern that preterm newborns and infants may be at greater risk for symptomatic disease that manifests as sepsis-like syndromes. Freezing mother's expressed milk may decrease CMV infectivity but does not inactivate CMV reliably. Additionally, freezing mother's milk has been documented to decrease asymptomatic CMV but not CMV sepsis-like syndrome; therefore, freezing the breast milk of women with CMV for use with preterm newborns or infants is not recommended. Clinicians and families of preterm and very low birth weight infants engaged in shared decision-making may consider the benefits of human milk versus the risks of CMV infection.

Women who deliver neonates at fewer than 32 weeks' gestation can be screened for CMV. Consideration should be given to Holder pasteurization (62.5°C [144.5°F] for 30 minutes) and short-term pasteurization (72°C [161.6°F] for 5 seconds) of human milk from CMV-positive women with very low birth weight neonates, because these procedures seem to inactivate CMV. It is important to note that short-term pasteurization may be less harmful to the beneficial constituents of human milk. There is insufficient evidence to support withholding mother's milk because of risk for CMV transmission.

Hepatitis B

Neonates born to mothers who are positive for hepatitis B surface antigen should routinely receive hepatitis B immunoglobulin and hepatitis B vaccine shortly after birth, eliminating concerns of transmission through breastfeeding. There is no need to delay the initiation of breastfeeding until after the neonate is immunized, because breastfeeding was not contraindicated even before the vaccine was available.

Hepatitis C

Both hepatitis C virus and hepatitis C antibody have been detected in human milk; however, there are no reports of newborn or infant acquisition of active hepatitis C infection through breastfeeding. Maternal hepatitis C infection is not a contraindication to breastfeeding. However, if the mother develops cracked or bleeding nipples while nursing, she should stop direct breastfeeding and pump and discard her milk until the nipples have healed.

Influenza (Including H1N1 [Swine Flu])

If a postpartum hospitalized mother is suspected of having or confirmed to have influenza, the CDC recommends that facilities consider temporarily separating her from her newborn. However, she should also be encouraged to provide expressed breast milk for the newborn. It is suggested that isolation continue until the mother is afebrile for longer than 24 hours and is able to control her cough and respiratory secretions. Breastfeeding during maternal treatment with antiviral medications for influenza is safe. Mothers who are receiving prophylactic antiviral treatment after exposure to decrease influenza severity should be encouraged to continue breastfeeding as long as they do not have symptoms of the flu, such as fever, cough, or sore throat. Influenza vaccine may be offered in breastfeeding women who have not been previously vaccinated and are breastfeeding during the influenza season.

Additional Infections

Women with untreated brucellosis should be advised not to breastfeed or provide their milk until they are treated, whereas women with West Nile virus, Zika virus, and SARS-CoV-2 may breastfeed. For the latter, mothers are advised to adhere to hand hygiene and wearing a mask while directly breastfeeding.

Human Papillomavirus Vaccination

The human papillomavirus (HPV) vaccine does not pose a risk to the breastfeeding newborn or infant, as it is an inactivated virus. Per vaccine labeling, adverse reactions in breastfeeding babies of mothers receiving HPV immunization are similar to breastfeeding babies of nonimmunized mothers, with the exception of an increased incidence of acute respiratory illnesses. Thus, some caution is warranted when offering HPV vaccination to mothers with babies who may be vulnerable to respiratory illnesses, such as preterm newborns, babies with congenital heart disease, and babies with chronic respiratory problems (see Chapter 12, Breastfeeding and Human Milk for Preterm Newborns and Infants).

All other vaccines, including COVID-19 vaccines, are safe and should be encouraged among those who are breastfeeding. Please consult the current *Red Book* by the American Academy of Pediatrics (https://publications.aap.org/redbook) for continual updates.

Substance Use and Substance Use Disorder

All pregnant mothers should be screened for substance use and misuse by using a validated screening tool. Those with positive screening or test results should be referred for appropriate support and services. Mothers with substance use

disorder, including opioids and other drugs, should be counseled about the risks of breastfeeding while actively using substances that may pose harm to the baby. Mothers should be encouraged to avoid breastfeeding or pump and discard their milk until they are no longer using drugs that may negatively affect their baby. Maternal cocaine use is a major risk for the breastfeeding baby (see Chapter 16, Medications and Breastfeeding).

Alcohol

Alcohol is one of the few substances ingested by the lactating mother that can achieve high concentrations in human milk. After ingestion of large quantities of alcohol, newborns and infants may refuse their mother's milk or change their feeding patterns. Babies may also be sleepy and feed poorly. Mothers should be counseled about the risks of accidental injuries to the baby while caring for a baby after excessive alcohol intake. Because alcohol levels in breast milk closely parallel blood alcohol levels, mothers should be advised to limit alcohol consumption during lactation (see Chapter 16, Medications and Breastfeeding). Moderate alcohol consumption by a breastfeeding mother (up to 1 standard drink per day) is not known to be harmful to the infant, especially if the mother waits at least 2 hours after a single drink before nursing or expressing milk to be fed to the infant. The peak alcohol levels enter the milk 30 to 60 minutes after ingestion of alcohol. Therefore, risk may be limited if the mother waits at least 2 hours after a single drink before nursing or expressing milk to be fed to the infant, and limits consumption to no more than one drink, defined as 5 ounces of wine, 12 ounces of beer, or 1.5 ounces of distilled spirits. Moderate alcohol consumption by a breastfeeding mother (up to 1 standard drink per day) is not known to be harmful to the infant, especially if the mother waits at least 2 hours after a single drink before nursing or expressing milk to be fed to the infant.

Cigarette Smoking and Electronic Cigarette Use (Vaping)

Metabolites of cigarette smoke have been found in newborns and infants who live in an environment in which tobacco is smoked. Maternal smoking is a major risk factor for sudden infant death syndrome (SIDS). As a result, mothers should be discouraged from smoking during pregnancy and lactation and should seek to be in a smoke-free environment by encouraging those around her to refrain from smoking. Mothers who were able to quit or reduce their cigarette use during pregnancy should be cautioned that the stresses of having a new baby may lead to restarting the smoking habit or gradually reverting to old patterns of behavior. However, if a mother continues to smoke, she should be encouraged to breastfeed for the protective properties of the breast milk, especially with respect to respiratory illnesses

and SIDS. A smoke-free home and environment should always be recommended. Mothers and all others around the baby should be advised not to smoke in the presence of newborns, infants, and children (see Chapter 16, Medications and Breastfeeding).

Use of electronic cigarettes (e-cigarettes) is not safe and is not a proven method of smoking cessation (see Chapter 16, Medications and Breastfeeding).

Cannabis

The potential risks of newborn and infant exposure to cannabis and its metabolites from breastfeeding are a concern. Mothers should be informed of the potential risks of exposure during lactation and should be encouraged to abstain from using any cannabis products while breastfeeding. If the mother persists in her use of cannabis, breastfeeding should still be encouraged for the protective properties of the breast milk, by using a harm-reduction approach (see Chapter 16, Medications and Breastfeeding).

Opiates

Mothers who are stabilized with medication-assisted therapy with documented abstinence from illicit opiates should be supported in breastfeeding their newborns and infants. Breastfeeding while taking methadone is considered safe; however, it may pose a risk of sedation and respiratory depression, especially if the baby was not exposed to methadone in utero. Only small amounts of buprenorphine enter human milk, with no adverse effects found in newborns and infants. Breastfed babies require less treatment for neonatal abstinence syndrome and have a shorter duration of treatment than non-breastfed babies.

Medications

Most medications are compatible with breastfeeding—or, if they are not compatible, a substitute medication most likely exists and should be considered instead (see Chapter 16, Medications and Breastfeeding). Resources that ensure medication compatibility with lactation include *Dr Thomas Hale's Medications and Mother's Milk*, Infant Risk Center at Texas Tech University (https://www.infantrisk.com); MotherToBaby medication fact sheets (https://mothertobaby.org/fact-sheets); and Appendix G of this book, "The Transfer of Drugs and Therapeutics Into Human Breast Milk: An Update on Selected Topics."

Cancer Therapy

Mothers with breast cancer or other cancers should not delay treatment so they can breastfeed. Depending on the therapy, a mother undergoing antimetabolite chemotherapy may be able to breastfeed by pumping and discarding her milk after each treatment until the chemical has been cleared. Radiation therapy is generally compatible with breastfeeding. Radiation treatment of the breast, however, may significantly damage glandular breast tissue and be detrimental to future lactation performance of the affected breast (see the Previous Treatment of Breast Cancer section earlier in this chapter).

Radiopharmaceuticals

Mothers who are given therapeutic radioactive isotopes or who have had accidental exposure to radioactive materials should not breastfeed for as long as there is radioactivity in the milk (see Chapter 16, Medications and Breastfeeding, and Chapter 19, Breastfeeding Issues During Disasters).

Newborn and Infant Contraindications to Breastfeeding

Galactosemia

Newborns and infants with classic galactosemia (UDP-glucose–hexose-1-phosphate uridyltransferase deficiency) cannot ingest milk that contains lactose. Because lactose is the principal carbohydrate in human and bovine milk, newborns and infants with classic galactosemia should not breastfeed or receive formula that contains lactose. However, in some of the genetically milder forms of galactosemia, partial breastfeeding may be possible.

Inborn Errors of Metabolism

Newborns and infants with other inborn errors of metabolism may ingest some human milk, but this recommendation depends on the desired protein intake and other factors. For example, phenylketonuria has been managed with a combination of partial breastfeeding and phenylalanine-free formula. Human milk contains relatively low levels of phenylalanine when compared with formula. A recent data review of breastfed infants with phenylketonuria demonstrated higher weight gain and lower serum phenylalanine levels in the first year after birth than non-breastfed infants, so breastfeeding should be encouraged.

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CHAPTER 19

Breastfeeding Issues During Disasters

A disaster, whether natural or human made, often deprives people of food, clean water, heat, shelter, clothing, medicine, and other necessary resources. Newborns and infants are among the most vulnerable population, as they are dependent on adults to feed them to be able to survive and thrive. Needs during recovery efforts will vary, but safe newborn and infant feeding is among the priorities to address. Access to potable water, clean feeding utensils, and electricity may often be limited in a disaster setting, requiring caregivers to make adjustments in their feeding preferences and methods so as to protect the health of their babies. Caregivers may or may not have the option to continue to use formula, but if they do it will require additional precautions to ensure safe newborn and infant feeding, according to the emergent circumstances. In these situations, human milk is highly recommended because it provides the cleanest and safest way to feed a newborn, infant, or young child in most situations. Breastfeeding provides readily available nutrients without dependence on supplies, is sanitary, requires no electricity or refrigeration for preparation or storage, and is delivered at the right temperature, without the need for warming or cooling. In addition, it keeps the newborn or infant in contact with the mother, which prevents hypothermia from exposure to the elements. Breastfeeding is protective against infectious diseases, especially diarrhea and respiratory illnesses, of which newborns and infants may be at increased risk during a disaster because of their underdeveloped immune systems, which are unable to fend off microbial infections in an effective manner. The security and warmth provided by breastfeeding is crucial for both mothers and babies in the chaotic circumstances of an emergency. Moreover, breastfeeding allows the mother to provide for her baby independently, despite the stress and sense of helplessness that can occur during a disaster.

In addition to these immediate concerns, the use of infant formula has many disadvantages during a disaster. Formula may not be available initially, or supplies may run out before the situation is resolved. Errors in formula preparation can occur at any time, especially during the chaos of a disaster. Water that is mixed with powdered or concentrated formula may be contaminated, and there may be no method available to sterilize the formula, bottles, or nipples, which introduces risk for the development of diarrhea and vomiting. Formula requires proper storage and handling at recommended temperatures to avoid spoiling, while the temperatures will depend on the prevailing climate in the area of the disaster. In addition, if there is no electricity available, opened or prepared formula cannot be preserved by means of refrigeration.

Emergency and disaster scenarios are stressful, and the indiscriminate distribution of formula in these situations may incorrectly influence mothers to believe that formula is a better alternative than breastfeeding and undermine their confidence in their capacity to provide adequate amounts of breast milk to their babies. Breastfeeding mothers may experience anxiety or other emotions that cause them to choose to feed their baby with formula, which is a less-safe infant feeding method under poor hygiene situations. They may choose formula because it is more easily accessible, because they are unable to drink enough water or other fluids to maintain their milk supply, or because they become more concerned that their baby is not getting enough milk, but when formula is given in poor hygiene conditions, risk to their newborns or infants increases. Breastfeeding support and encouragement are even more critical in these disaster situations. If mothers become reliant on formula, their breast milk supply will dwindle, and their babies would be in danger if the amount of formula provided to the disaster area declines. For this reason and more, media outlets that cover such disasters should be recruited to promote exclusive breastfeeding, among other emergency messages.

Furthermore, in extreme disaster circumstances when there will be delay in receiving help, the goal of relief for newborns and infants and the best way to save vulnerable babies must be to protect the breastfeeding relationship and to help women who have stopped lactating return to breastfeeding (relactation; see further discussion in Chapter 13, Breastfeeding in Special Circumstances). For babies who are breastfeeding successfully, providing food and clean water to the breastfeeding mother should be prioritized over the baby—a strategy that will help both the mother and the baby, while harming neither. Especially if there is a shortage of safe, complementary foods for infants older than 6 months, health care professionals can assure mothers that their milk can contribute significant nutrition in the absence of other foods for the first year after birth and beyond.

Human milk is the perfect emergency food source. It should be noted that during a disaster, assessment of the lactating mother should include hydration and nutritional status.

Disaster Preparation

Disaster preparation is essential for effective rescue and recovery. A disaster preparedness plan must include breastfeeding support strategies to ensure the safest and most effective way to feed newborns and infants. It is recommended that breastfeeding support and safe feeding strategies be adopted by emergency relief agencies, organizations, shelters, and hospitals. Emergency preparedness plans should include the following:

- A rapid newborn, infant, and young child feeding assessment, to obtain key information on the number of children that need feeding and their feeding needs. The unnecessary offering of formula to breastfeeding mothers should be avoided while conducting a careful evaluation of newborn, infant, and young child feeding requirements.
- Strategies to prevent the separation of mothers and babies during evacuation transport and sheltering, as well as a monitoring, tracking, and reunification plan for those who do become separated during an emergency. For breastfeeding mothers the separation may increase the risk of mastitis.
- The establishment of protected areas for mothers with newborns, infants, and young children, where they may breastfeed privately and safely as needed.
- Clean containers and bottles and bottle nipples in the list of supplies for immediate baby feeding in case the mother requires milk extraction. Hand expression can be successfully taught and used to feed babies who cannot obtain milk directly from their mother. Manual or electric breast pumps may be used when indicated, making sure that appropriate hygiene of equipment may be accomplished. The use of breastfeeding supplementary feeding devices and breast pumps should only be considered when their use is vital and where it is possible to clean them adequately. If milk is to be extracted for storage there must be adequate and safe refrigeration available.
- Inclusion of breastfeeding support specialists in the community to help support the difficulties that may arise for mothers to sustain breastfeeding after a disaster and teach them relactation skills and milk extraction techniques, if necessary. Even women who previously did not breastfeed may try establishing breastfeeding with appropriate stimulation and by following relactation strategies (see Chapter 13, Breastfeeding in Special Circumstances). Maintaining good attachment and positioning during suckling are necessary to successfully initiate and sustain breastfeeding and may require the support

of a person who is knowledgeable in the correct technique for breastfeeding (ie, attachment and position) (see the Infant Feeding in Disasters and Emergencies: Breastfeeding and Other Options document at the end of this chapter).

- An education plan for emergency relief agencies (ie, all supervisory, technical, and nontechnical staff and volunteer workers) to ensure adequate implementation of strategies that appropriately support and protect breastfeeding via health care professionals who are knowledgeable in the strategies to support breastfeeding in a disaster. These trainings should include appropriate breastfeeding support methods, including provision of emotional support to pregnant or breastfeeding mothers, as well as training on how to approach fathers and other family members, so that they may understand why it is critical for mothers to continue breastfeeding, remain hydrated, and receive appropriate nutrition and support. The education plan should also address the cultural expectations and personal experiences of staff and volunteers that may represent barriers to understanding and implementing breastfeeding support.
- Established standards to ensure the safe storage and distribution of purchased and donated infant formula for babies who, despite best efforts, will need it. Acquisition and distribution must consider the special dietary needs of those babies who are formula fed (eg, those who will require specialized formula). Ready-to-feed formulas should be chosen over other formulas that require access to bottled or clean water to mix into the formula before feeding. Besides clean storage containers, bottles, and nipples, formula feeding will also require cleaning supplies (eg, water, soap, brushes, clean surface, access to bleach or heat so as to sanitize feeding utensils and parents' hands). It will also require a space that is not a bathroom to prepare, store, and clean items, which may be a challenge in a shelter situation. In circumstances where there is limited access to clean water and bottles and nipples can be hard to clean effectively, disposable cups may be made available. Emergency relief volunteers should be trained on how to safely cup-feed babies.

Breastfeeding Support During a Disaster

During a disaster, the role of health care professionals becomes even more crucial, as they must be able to identify emerging needs and advocate for the implementation of strategies to sustain breastfeeding as a lifesaving measure for newborns, infants, and young children. In the immediate post-disaster period, it is important for health care professionals to advocate to keep families together

and foster the creation of safe havens for pregnant and breastfeeding mothers. These havens should provide security, counseling, clean water, and food, as well as a safe environment for breastfeeding or expressing milk, including providing a private area or a way to breastfeed discreetly if the mother desires it. Health care professionals can contribute to the creation of such havens by dedicating office space and hospital areas or by forming these areas within other shelters. Pregnant women and breastfeeding mothers should be identified on arrival at the shelter and provided with education, assurance, and support to sustain and increase their milk supply. Those who give birth during a disaster should be advised of the lifesaving importance of breastfeeding and should be supported in initiating and continuing exclusive breastfeeding. Additionally, breastfeeding women should be included on the priority list for clean water and food. In Puerto Rico after Hurricane Maria in 2017, obstetricians handed out water filters to pregnant and postpartum women in an effort to promote breastfeeding and to provide an adequate source of drinking water for hydration. This was a collaborative effort among the Puerto Rico District of the American College of Obstetricians and Gynecologists; the Puerto Rico Chapter of the American Academy of Pediatrics (AAP); the Special Supplemental Nutrition Program for Women, Infants, and Children; and the Puerto Rico Department of Health–denominated Water for Milk initiative. This campaign serves as a model for other communities or areas affected by disasters. For more information, contact the Puerto Rico Chapter of the AAP (aap.prped@gmail.com).

Mothers should be assured that stress does not cause their milk supply to dry up and that even women who are malnourished can breastfeed successfully. Breastfeeding mothers should be encouraged to exclusively breastfeed as much as is feasible, taught that optimal human milk supply is maintained by baby demand, and further supported by appropriate nutrition and hydration. Mothers of recently weaned infants and young children should be informed that relactation is a realistic possibility. Women who desire to relactate should have access to health care professionals or lactation consultants who are knowledgeable in how to establish relactation and availability of necessary materials and fact sheets to aid mothers. Mothers should be shown how to express milk by hand, in case mother and baby are separated and breast pumps are not available, so as to not interrupt milk production and avoid mastitis. Those who express milk by hand should make sure their hands are clean and sanitized. This also applies when using breast pumps or preparing formula. In the absence of clean water, hand sanitizing may be accomplished by using an alcohol-based hand sanitizer that contains at least 60% alcohol.

Lactating women may be immunized as recommended for adults and adolescents to protect against measles, mumps, rubella, tetanus, diphtheria, pertussis,

influenza, *Streptococcus pneumoniae*, *Neisseria meningitis*, hepatitis A, hepatitis B, varicella, and polio. Antibiotics and other medications can also be given to lactating women during a disaster, because they are usually compatible with breastfeeding. It is highly recommended that mothers are vaccinated for influenza vaccine to protect their newborns and infants, who may not be vaccinated until reaching 6 months of age. Although little diethyltoluamide gets into human milk, if it is recommended for use as an insect repellent, it is best to limit the amount to which the lactating mother is exposed. It should be applied only to clothing and exposed skin, such as the hands and face, and never to the breast area, and if the use of sunscreen is recommended it should be applied before the repellant.

Health care professionals should advocate for optimal feeding options for (a) orphaned infants and infants who are separated from their mothers and (b) those whose mothers cannot lactate. When a mother's own milk is not available, the next best option is donor human milk. Although pasteurized donor milk from a regulated milk bank is preferred, it has to be transported into the disaster area frozen and maintained frozen or refrigerated until ready to be prepared for feeding babies. The nature of a disaster is that this option is often not present in the early days, so use of pasteurized donor milk will likely not be an option until later in the disaster recovery process. Depending on the nature, scope, and location of the disaster, the time frame can be extremely variable. Another option is termed *informal* human milk donation—that is, wet nursing, delivered by direct breastfeeding, or feeding babies expressed human milk from volunteers, delivered immediately by using disposable cups or clean bottles and nipples. If informal human milk donation is used, the parent or person responsible for the baby must be informed of the risks and benefits of feeding unpasteurized human milk to babies. The benefit of informal human milk donation over formula is that it may be readily available; it does not require mixing with water, which may be unsanitary; and it provides nutritional and immunologic protective factors that are so important to the infant during a disaster. Promoting breastfeeding and breast milk feedings may decrease infant mortality and morbidity in a disaster. If there is a need to feed an infant formula, the health care professionals on site should recommend ready-to-feed formula. The preparation of concentrated or powdered formula should be done in a clean, sanitary, and uncontaminated area assigned for this purpose and used only if bottled or boiled water is available. Water that has been treated with iodine or chlorine tablets should not be used, except as a last resort, because of the risk of errors in the concentrations of these substances in the water when these methods of disinfection are used. Baby feeding practices and resources should be assessed,

coordinated, and monitored throughout the disaster. Mothers who are separated from their babies should be encouraged and assisted in expressing their milk to maintain their milk production, help prevent mastitis, and, possibly, serve as a human milk donor to other babies until they are reunited with their own. All considerations previously discussed in the use of donor milk apply.

As the shelter environment stabilizes over time, priority should be given to providing refrigeration and transportation support for pasteurized donor human milk and providing appropriate complementary foods for infants and children older than 6 months. The same considerations apply to families in the area who are not in a shelter (eg, those at home).

Relactation

For some mothers and babies, *relactation,* which is a resumption of lactation once breastfeeding has stopped, is possible (see Chapter 13, Breastfeeding in Special Circumstances). Steps to induce relactation include encouraging the mother to start skin-to-skin contact and frequent suckling by the newborn or infant, as often as continuously to every 2 hours. Nutritional supplements should be preferentially given to the baby with an at-breast lactation aid device as the baby suckles at the breast, if the means to clean the equipment in a sanitary manner exist. The mother's milk supply often increases gradually over days to weeks, and supplementation should decrease accordingly. Signs of milk production include an increase in breast size or fullness, less consumption of the nutritional supplement, achieving satisfaction of the baby after feeding at the breast, and stool changes to a softer, more yellow consistency.

Careful assessment of the newborn's or infant's nutritional and hydration status by the mother and health care professionals is critical during this process. Relactation is more successful if the infant was recently weaned, if the mother is still occasionally nursing, or if the infant is younger than 6 months. It is, however, also possible to achieve relactation in older infants and to induce lactation in mothers who previously never nursed. The necessary conditions for these outcomes are a highly motivated mother, stimulation of the breasts, and ongoing support (see Chapter 13, Breastfeeding in Special Circumstances). One-hundred fifty women successfully relactated under the guidance of the Puerto Rico chapter of La Leche League International after the Hurricane Maria disaster when most of the island lost electricity and experienced difficulty accessing tap water and other basic needs for months. The success of these women with relactation illustrates the effectiveness of providing support for mothers and their courage and motivation to achieve it.

COVID-19 Pandemic

In late 2019 a new respiratory illness, COVID-19, appeared in Wuhan, China. COVID-19 is caused by SARS-CoV-2, a coronavirus similar to severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome, both of which originated in bats. By May 2020, there were more than 500 million cases and 81 million deaths worldwide, with more than 80 million cases and almost 1 million deaths in the United States. The virus was most associated with severe respiratory disease in adults, particularly older adults and those with underlying health conditions. Children, who make up 22% of the US population, account for 19% of COVID-19 cases but only 3% of hospitalizations and 0.1% of deaths. Children can also develop multisystem inflammatory syndrome with fever, laboratory evidence of inflammation, and multisystem organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatological, or neurological) and evidence of current or recent SARS-CoV-2 infection or exposure to a person who is suspected or confirmed to have COVID-19 within 4 weeks prior to the onset of symptoms. See Chapter 16, Medications and Breastfeeding, for a description of treatments and their effect on lactation.

Promoting and supporting breastfeeding and human milk feeding and assisting mothers with the establishment of a milk supply are essential goals to improve newborn and infant health during a pandemic. Human milk provides antibodies and other anti-infective and anti-inflammatory factors, with little to no direct evidence of transmitting SARS-CoV-2 to newborns or infants, so breastfeeding is encouraged. The AAP recommends skin-to-skin care, rooming-in of mothers and newborns, and breastfeeding. Mothers of newborns in the neonatal intensive care unit (NICU) are encouraged to pump human milk for their newborns if their infection status prohibits their presence in the NICU. Mothers who have suspected or confirmed SARS-CoV-2 infection should perform hand hygiene and wear a mask during breastfeeding or caring for their newborns. These precautions should be continued after discharge until the mother is no longer infectious.

Lactation support via telemedicine and in person is recommended for mothers. The AAP has provided guidance to support maintenance of breastfeeding after hospital discharge among mothers with suspected or confirmed SARS-CoV-2 infection at https://www.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/clinical-guidance/breastfeeding-guidance-post-hospital-discharge.

Radiation

When a leak or explosion occurs at a nuclear reactor site, ionizing radiation and radioactive materials may be released. Once out of the closest zone, where radiation burns and immediate life-threatening effects occur (ie, external radiation exposure), the concern becomes the ingestion of contaminated food, milk, and water; exposure to external contamination of clothes and skin; and internal contamination by inhalation of contaminated air with volatile radionuclides or contaminated dust or particles. People may also become internally contaminated through open wounds. In previous nuclear emergencies, such as Chernobyl in 1986 and Fukushima in 2011, a variety of radionuclides were released in nuclear reactor accidents, causing air and ground contamination. Among the released radionuclides were radioactive iodine (RAI) and radioactive cesium (RAC). Radioactive iodine has a half-life of 8.09 days and RACs of 30.17 years. The effect radiation may have on the health of exposed persons will depend on the amount of radiation absorbed by the body (the dose), the type of radiation, and how and for how long the person was exposed. Populations exposed to high doses of radiation could have a greater risk of developing cancer later in life, depending on the level of radiation exposure. Children are at a higher risk of developing health effects from radiation exposure because they have accelerated organ and tissue growth and a longer life span to develop cancer. Epidemiological studies of the effect of the Chernobyl accident state that 60% of thyroid cancer cases in children who were 0 to 4 years old when exposed were attributed to radiation. The epidemiological studies have shown that the thyroid gland is highly susceptible to the carcinogenic effect of RAI, with a higher incidence when comparing exposed populations to nonexposed populations. Children are particularly vulnerable because the "heavy" particles rapidly fall to the ground, settling in the area where babies and small children live. Because children also have higher minute ventilation rates than adults, they are at greater risk for breathing in more of the aerosolized particles. Breastfeeding mothers who are near the affected area may be exposed to radiation and internal contamination, and radioactive material can be passed to babies through human milk. The Centers for Disease Control and Prevention (CDC) recommends that breastfeeding mothers consider temporarily stopping breastfeeding and switching either to human milk that was pumped and stored before the exposure or formula, until the mother can be evaluated and treated. Formula and feeding supplies should be cleaned with a damp cloth or clean towel. If no other source of food is available for the baby, the mother should continue to breastfeed and be instructed to wash her nipples and breasts thoroughly with soap and warm water and gently wipe around and away from the baby's mouth

before breastfeeding. If a breastfeeding mother temporarily discontinues breastfeeding, she can still pump her breast milk and discard it to maintain her milk production and avoid mastitis until it is safe to restart breastfeeding.

Medical treatments are available for limiting or removing internal contamination, depending on the type of radioactive material to which mothers and babies are exposed. Treatments include potassium iodide (KI), Prussian blue, and diethylenetriamine pentaacetic acid. When indicated, a treatment should be applied as soon as possible to increase its effectiveness in removing the internal contamination and diminish the effects of the radioisotope.

Radioactive iodine is actively transferred into mammalian milk, both human and bovine, making these sources of nutrition potential risks for this vulnerable population. If contaminated water is used to mix formula for babies, it serves as another source that can cause or lead to internal radiation exposure. Radioactive iodine is rapidly taken up into the thyroid gland and can ultimately cause thyroid cancer.

Potassium iodine accumulates in the thyroid and blocks RAI absorption for the next 24 hours. It does not block RAI from entering the body and cannot reverse the effects caused by RAI once the thyroid is affected. It does not protect other parts of the body from RAI; nor does it protect the body from other radioactive elements.

Because newborns and infants have the highest risk of thyroid cancer after being exposed to RAI, the CDC recommends that they receive a single dose of KI; this includes breasted newborns and infants. Breastfeeding women should also take only one dose of KI if they have been internally contaminated with (or are likely to be internally contaminated with) RAI. They should be prioritized to receive other protective action measures. The US Food and Drug Administration recommends the following doses for internal contamination with (or likely internal contamination with) RAI: 16-mg single dose for breastfeeding and non-breastfeeding newborns up to 1 month of age, and 32-mg single dose for all infants and children between 1 month and 3 years of age. Breastfeeding women should take the adult dose of 130 mg. More recommendations by public health or emergency management officials may emerge dependent on continued risk of exposure. Administering more than 1 dose of KI to newborns increases their risk of developing hypothyroidism. Because the window to effectively administer KI is within 4 hours, the AAP 2018 policy statement recommends that local governments have readily available stockpiles that can be distributed in case they are required. Potassium iodide is only helpful when there is exposure to RAI, for it is not protective against other

radioactive materials. Prussian blue reduces the time that RAC and thallium stay in the body, by trapping them in the intestines and passing them out in the feces, thereby limiting the amount of time the body is exposed to radiation. Diethylenetriamine pentaacetic acid binds to radioactive plutonium, americium, and curium, decreasing the amount of time it takes to get these radioactive isotopes out of the body. These medications cannot prevent radioactive isotopes from entering the body; they function by decreasing absorption and accumulation in internal organs. The time of effectiveness of these medications varies, but the sooner they are administered, the more effective they are. They may be administered to all newborns, infants, and children younger than 12 years, and breastfeeding women may follow the recommended doses if exposed to the specific radionuclides for which the medication is indicated. Each medication is targeted to a specific radionuclide and has minimal or no effect on others.

The thyroid function of the newborn or infant should be monitored and thyroid hormone therapy prescribed if hypothyroidism develops. Because newborns and infants are particularly vulnerable to radiation, they should receive priority, along with their mothers, for evacuation and control of the food supply. If KI is not available and safe ready-to-feed formula is available, formula supplementation should be provided as a temporary solution until KI becomes available or until public health authorities declare breastfeeding safe again. If this decision is made, mothers must be supported in expressing their milk to maintain their milk supply until the baby can resume breastfeeding. If no other source of food is available for the baby, the mother should continue to breastfeed after washing her nipples and breasts thoroughly with soap and warm water and gently wiping around and away from the baby's mouth.

INFANT FEEDING IN DISASTERS AND EMERGENCIES

Breastfeeding and Other Options



In a Natural Disaster or Public Health Emergency

- There may be no clean drinking water or sterile environment.
- It may be impossible to ensure cleaning and sterilization of feeding utensils.

The cleanest, safest food for an infant, in disasters or emergencies, is human milk.

- It is nutritionally perfect.
- It is readily available without dependence on feeding supplies.
- It is protective against diseases, especially diarrhea and respiratory infections.
- It enhances the infant's immune response.
- It is the right temperature and helps to prevent hypothermia.
- Hormone release during breastfeeding helps relieve maternal stress and anxiety.

Disadvantages of Formula Use During Disasters or Emergencies

- Supplies of formula may not be available.
- Formula may become contaminated if prepared with unclean water or stored in non-sterilized containers, or if refrigeration is not available for storage.
- Errors in formula preparation may occur.

Pediatricians can take action to support breastfeeding during a disaster or an emergency.

1. Keep families together.
2. Create safe havens for pregnant and breastfeeding mothers. These havens should provide security, counseling, water, and food. Pediatricians can contribute using offices, hospitals, or other shelters.
3. Assure mothers that human milk can contribute significant nutrition in the absence of safe complementary foods for the first year after birth and beyond.
4. Assist new mothers to initiate breastfeeding within 1 hour of birth, promote exclusive breastfeeding for about 6 months, and encourage breastfeeding for at least 1 year and beyond.
5. Encourage thoughtful discussions with families before weaning during times of emergency.
6. Provide support for breastfeeding through assessment of the infant's and mother's hydration and nutritional status. If abnormal, increase breastfeeding frequency for the infant and nutritional support of the mother. Extra food should be provided for all pregnant and lactating women.
7. In situations where the mother's own milk is not available, the best option is pasteurized donor human milk. While pasteurized donor milk from a regulated milk bank is preferred, it is often not available during a disaster. If formula is given, recommend ready-to-feed standard formula. Use concentrated or powdered formula only if a safe water supply is ensured.
8. Advocate for optimal feeding options for orphaned infants, including donor human milk.
9. Lactating women may be immunized as recommended for adults and adolescents.
10. In the event of a pandemic, the most current Centers for Disease Control and Prevention (CDC) or American Academy of Pediatrics (AAP) guidance on breastfeeding should be consulted.
11. If radiation exposure is a concern
    a. When the risk of exposure to radioactive iodine is temporary, mothers can continue to breastfeed if potassium iodide (KI) is given to her and the infant within 4 hours of contamination.
    b. Mother and infant should be prioritized to receive protective measures like evacuation.
    c. Mothers should consider temporarily stopping breastfeeding and switching to either expressed milk from before the exposure or ready-to-feed infant formula until the mother and infant can be treated with KI. Powdered or concentrated formula should only be used if the water is free from radiation.
    d. If no other source of food is available for the infant, the mother should continue to breastfeed after washing the nipple and breast thoroughly with soap and warm water and gently wiping around and away from the infant's mouth.
    e. Breastfeeding can resume when advised by local health officials or when the mother and infant have been evacuated to an environment free from radiation exposure.
12. Refer to www.cdc.gov for more information about precautions for lactating women involving specific diseases, immunizations, and treatments and to LactMed (https://www.ncbi.nlm.nih.gov/books/NBK501922) for information on medications and lactation. It is important to reassure mothers that most medications are compatible with breastfeeding, including antibiotics.
13. Advocate for breastfeeding promotion, protection, and support with relief agencies and workers. Infant feeding practices and resources should continually be assessed, coordinated, and monitored.

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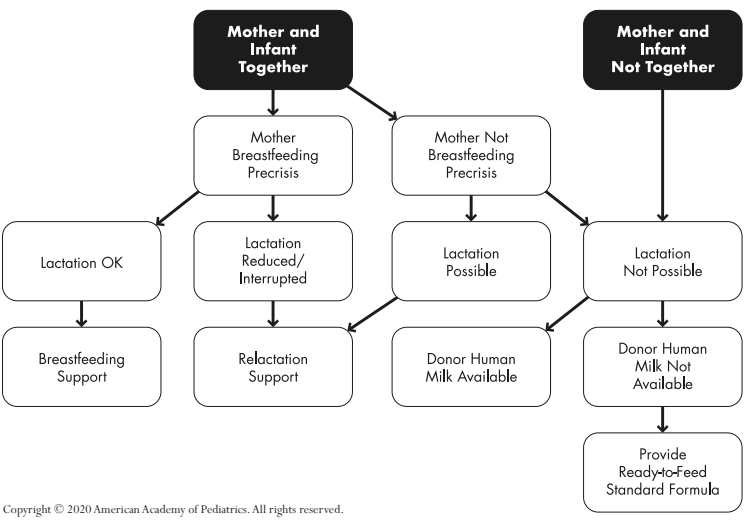
KEY STRATEGY: INCREASING THE CURRENT RATE OF BREASTFEEDING IN THE UNITED STATES IS FUNDAMENTAL TO OPTIMIZE INFANT NUTRITION WHEN DISASTER STRIKES.

Breastfeeding Facts

1. Mothers continue to lactate in times of physical and emotional stress but will need support.
2. Malnourished women and women with medical illnesses can breastfeed.
3. Optimal human milk supply is maintained by infant demand.
4. For some mothers and babies, once breastfeeding has stopped, it may be resumed successfully.
   a. Encourage skin-to-skin contact and frequent suckling (every 2 hours).
   b. Supply increases gradually over days to weeks and supplementation should decrease accordingly.
   c. Careful assessment of the infant's nutritional and hydration status is critical.
   d. A full milk supply is established more rapidly with the younger infant.
   e. Mothers need encouragement during this process.

For more information on infant feeding during a disaster and relactation technique, please visit the Emergency Nutrition Network (ENN) at www.ennonline.net.

INFANT FEEDING IN DISASTERS AND EMERGENCIES



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The recommendations in this publication do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

For more information, please call or email American Academy of Pediatrics Breastfeeding Initiatives at 800/433-9016 or lactation@aap.org.

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Appendix A

POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Breastfeeding and the Use of Human Milk

Joan Younger Meek, MD, MS, RD, FAAP, FABM, IBCLC,[a] Lawrence Noble, MD, FAAP, FABM, IBCLC,[b,c] and the Section on Breastfeeding

Breastfeeding and human milk are the normative standards for infant feeding and nutrition. The short- and long-term medical and neurodevelopmental advantages of breastfeeding make breastfeeding, or the provision of human milk, a public health imperative. The American Academy of Pediatrics (AAP) recommends exclusive breastfeeding for approximately 6 months after birth. Furthermore, the AAP supports continued breastfeeding, along with appropriate complementary foods introduced at about 6 months, as long as mutually desired by mother and child for 2 years or beyond. These recommendations are consistent with those of the World Health Organization (WHO). Medical contraindications to breastfeeding are rare. The AAP recommends that birth hospitals or centers implement maternity care practices shown to improve breastfeeding initiation, duration, and exclusivity. The Centers for Disease Control and Prevention (CDC) and The Joint Commission monitor breastfeeding practices in US hospitals. Pediatricians play a critical role in hospitals, their practices, and communities as advocates of breastfeeding and, thus, need to be trained about the benefits of breastfeeding for mothers and children and in managing breastfeeding.

Since the publication of the previous policy statement of the American Academy of Pediatrics on breastfeeding and the use of human milk, research and systematic reviews have continued to reinforce the conclusion that breastfeeding and human milk are the normative standards for infant feeding and nutrition.[1] More than 80% of women initiate breastfeeding in the United States, and both federal and state laws protect a woman's right to breastfeed as well as the right to breastfeed in public and to continue breastfeeding or to express milk in the workplace.[2] With most women choosing to breastfeed, breastfeeding has been established as the cultural norm in the United States. Furthermore, breastfeeding, or the provision of human milk,

abstract

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should be considered the reference standard to which all forms of infant feeding are compared from a biological, medical, and scientific standpoint. This policy statement updates the recommendations regarding breastfeeding and serves as a reference for other AAP policy and publications that address breastfeeding and infant nutrition. An accompanying technical report[3] provides the evidence and basis for the recommendations.

The statement addresses infant feeding from a public health perspective. Feeding decisions go well beyond the provision of nutrition. Breastfeeding itself is about far more than the nutrition provided to the growing child but the relationship between parent and child. The goal of this policy is to support optimal health and nutrition for the child and mother and support parents in meeting their breastfeeding goals. Individual decisions about family feeding should be made by the family with their pediatrician's guidance.

EPIDEMIOLOGY

The average national breastfeeding initiation rate for the total US population, based on data from the birth cohort in the 2018 National Immunization Survey of the CDC, is 83.9%.[2] This figure represents any breastfeeding, not exclusive breastfeeding. Healthy People 2020 indicators have been met or exceeded for initiation of any breastfeeding (actual 83.9%), exclusive breastfeeding through 3 months (46.3%), exclusive breastfeeding through 6 months (25.8%), and any breastfeeding at 12 months of life (35.0%), but not for 6-month rates of any breastfeeding (56.7%) (most recent data indicated in parentheses; see Table 1). Furthermore, 19.4% of breastfed infants receive supplements of commercial infant formula in the first 48 hours after birth. The Healthy People 2030 goals for breastfeeding are to increase the proportion of infants exclusively breastfed for 6 months to 42.4%[4] and to increase the proportion of infants who continue to breastfeed for 12 months to 54.1%.[5]

EQUITY

Overall rates of breastfeeding obscure significant sociodemographic and cultural differences. For example, the breastfeeding initiation rate for the non-Hispanic White and Hispanic populations are much higher than for the non-Hispanic Black or African American population, with the non-Hispanic Asian initiation rates being the highest[2] (Figs 1 and 2).None of the Healthy People 2020 objectives for breastfeeding were met for non-Hispanic Black mothers and infants among the 2018 birth cohort.[2] Similar disparities are also seen among mothers with low income (participants in the Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]), younger women (<20 years), and those with a high school education or less.[2] These disparities represent a significant inequity issue that has disproportionate impact on the non-Hispanic Black population. Implicit bias, structural bias, and structural racism should be addressed to eliminate disparities in breastfeeding and improve the health and well-being of all children and families.[6]

It has been estimated that suboptimal breastfeeding in a non-Hispanic Black population is associated with a 1.7 times excess number of cases of acute otitis media, a 3.3 times excess number of cases of necrotizing enterocolitis, and a 2.2 times excess number of child deaths, compared to a non-Hispanic White population.[7] A nationally representative sample found that breastfeeding was associated with a 21% reduced risk of postneonatal death for all infants and a 31% reduced risk for Black infants.[8] A recent analysis linking birth and death certificates for all US births in 2017 found that any breastfeeding of non-Hispanic Black infants is associated with a 17%

TABLE 1 Healthy People 2020 Objectives and Outcomes for Breastfeeding

Maternal Child Health Indicators[a]	Healthy People 2020 Objectives	Target, %	Current Rates, %[b]
MICH-21.1	Increase the proportion of infants who are breastfed: Ever	81.9	83.9
MICH-21.2	Increase the proportion of infants who are breastfed: At 6 mo	60.6	56.7
MICH-21.3	Increase the proportion of infants who are breastfed: At 1 y	34.1	35.0
MICH-21.4	Increase the proportion of infants who are breastfed: Exclusively through 3 mo	46.2	46.3
MICH-21.5	Increase the proportion of infants who are breastfed: Exclusively through 6 mo	25.5	25.8
MICH-23	Reduce the proportion of breastfed newborns who received formula supplementation with the first 2 d of life	14.2	19.4

[a] Source: Healthy People 2020 (https://www.healthypeople.gov/2020/data-search/Search-the-Data#topic-area=3492).
[b] Source: National Immunization Survey, representing infants born in 2018 (https://www.cdc.gov/breastfeeding/data/nis_data/results.html).

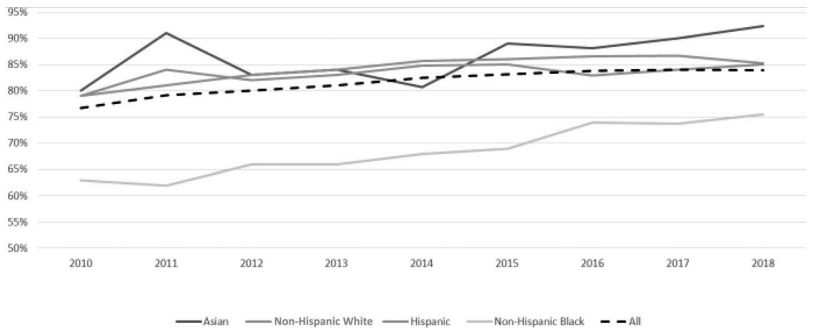


FIGURE 1
Any breastfeeding US by race and ethnicity. Centers for Disease Control and Prevention, Department of Health and Human Services, National Immunization Survey (2021). Available at: https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-socio-dem-2018.html. Accessed June 7, 2022

reduction in infant mortality (7–364 days), 29% reduction in neonatal mortality (7–27 days), and 13% reduction in postneonatal mortality (28–364 days).[9] Targeted interventions have shown improvement in breastfeeding initiation and duration rates among those groups with lower breastfeeding rates. For example, implementation of the Ten Steps to Successful Breastfeeding from the World Health Organization and United Nations Children's Fund[10] has decreased the disparity in breastfeeding initiation between Black and White infants by 9.6%.[11] In addition, a systematic review by the Agency for Healthcare Research and Quality concluded that, for women enrolled in WIC, peer support interventions offered by WIC agencies improve rates of breastfeeding initiation and duration.[12]

EXCLUSIVE BREASTFEEDING

The AAP recommends exclusive breastfeeding for ~6 months. This recommendation is consistent with guidelines set forth by the World Health Organization, American College of Obstetricians and Gynecologists, American Academy of Family Physicians, and Canadian Pediatric Society.[13–16] Human milk has a unique composition, with antimicrobial, antiinflammatory, immunoregulatory agents, and living leukocytes, all of which contribute to the developing immune system of the child.[17] Studies and meta-analyses have confirmed the association of 6 months of exclusive breastfeeding with decreased rates of

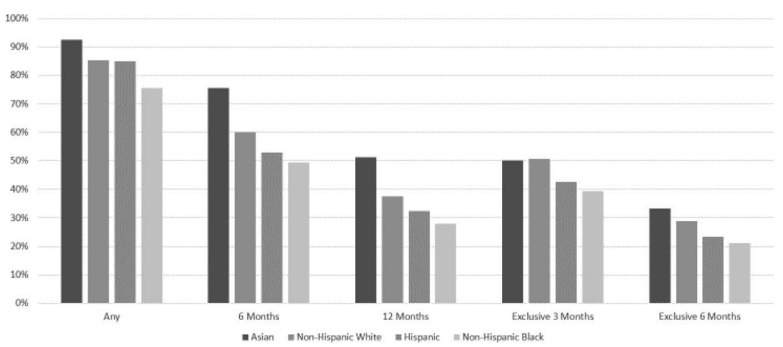


FIGURE 2
Breastfeeding rates by race and ethnicity 2018. Centers for Disease Control and Prevention, Department of Health and Human Services, National Immunization Survey (2021). Available at: https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-socio-dem-2018.html. Accessed June 7, 2022

lower respiratory tract infections, severe diarrhea, otitis media, and obesity (Table 2).

The Pregnancy and Birth to 24 Months Project of the US Department of Agriculture concluded that complementary foods initiated earlier than 6 months offer no benefit to the breastfeeding infant in growth or iron status but may be associated with an increased risk of overweight or obesity, especially if introduced before 4 months.[18] The European Food Safety Authority Panel on Nutrition, Novel Foods, and Food Allergens concluded that most infants do not need complementary feeds for nutritional reasons until around 6 months of age.[19]

DURATION OF BREASTFEEDING

The AAP supports continued breastfeeding, along with appropriate complementary foods introduced at about 6 months, as long as mutually desired for 2 years or beyond. Studies and meta-analyses have also confirmed the impact of breastfeeding longer than 12 months on maternal health in decreasing maternal type 2 diabetes mellitus, hypertension, breast cancer, and ovarian cancer rates (Table 2). Mothers who decide to breastfeed beyond the first year need support. They often report feeling ridiculed or alienated in their choice and conceal their breastfeeding behavior to minimize unsolicited judgment and comments.[20,21] There is evidence that only one-half of mothers who breastfeed past 1 year discuss their decision with their pediatric primary care provider and that 38% of women who reported that their provider was unsupportive of breastfeeding past the first year elected to change their pediatric primary care provider.[22]

Breastfeeding exclusively for about 6 months is an evidence-based recommendation. In an individual counseling situation, pediatricians and families can discuss the desires of the family and cultural variations. Pediatricians can review the importance of exclusive breastfeeding and ensure mothers and families are fully informed about their decisions, while at the same time engaging in nonjudgmental conversations about the family's personal goals for breastfeeding. Exclusive or any breastfeeding is not always possible, despite the best of intentions, and these mothers and families need special support to overcome the disappointment that may accompany breastfeeding difficulties.

OUTCOMES

Extensive data confirm that many acute and chronic pediatric disorders, such as otitis media, acute diarrheal disease, lower respiratory illnesses, sudden infant death syndrome (SIDS), inflammatory bowel disease, childhood leukemia, diabetes mellitus, obesity, asthma, and atopic dermatitis, occur less frequently among children who were breastfed as infants.[18] Some of these outcomes may be secondary to the unique biologic composition of human milk. Mothers who breastfeed experience lower risk of type 2 diabetes mellitus; breast, ovarian, and endometrial cancer; and hypertension[12] (Tables 2 and 3).

CONTRAINDICATIONS TO BREASTFEEDING

Classic galactosemia in the infant is an absolute contraindication to breastfeeding.[23,24] Mothers in the United States should not breastfeed or feed expressed milk to their infants if they have HIV infection, human T-cell lymphotropic virus type I or type II infection, untreated brucellosis, or suspected or confirmed Ebola virus disease.[25]

Substances such as illicit opioids, cocaine, and phencyclidine are considered contraindications to breastfeeding because of their potential effect on the infant's long-term neurobehavioral development. In most cases, it is preferable if mothers with prenatal opioid use initiate breastfeeding and practice exclusive breastfeeding to mitigate the impact of potential withdrawal on the newborn infant. Some newborn infants also may require pharmacologic treatment, but maternal rooming-in and continued breastfeeding is desirable.[26] Both mothers and infants should be monitored closely throughout the hospitalization and in the outpatient setting for signs and symptoms of withdrawal and for appropriate infant weight gain.[27]

SPECIAL CONSIDERATIONS

Infectious Diseases

Most maternal infections are compatible with breastfeeding. Current evidence regarding emerging pathogens, such as severe acute respiratory syndrome-2 and breastfeeding, is available from the AAP. In most cases, breast milk provides antibodies and protection, with little to no direct evidence of the virus causing infections to infants.[28–31] Contact between the mother, other infected family members, and the infant potentially exposes the infant to respiratory secretions, so hand hygiene and covering the nose and mouth with a mask is recommended when the infected mother is breastfeeding directly. Updated guidance from the AAP and the CDC should be consulted.

Mothers who are infected with untreated brucellosis temporarily should not breastfeed and should not feed expressed milk to their

TABLE 2 Breastfeeding and Infant Outcomes[a]

Outcome and Reference	% Lower Risk	Breastfeeding[a]	Compared With:	Comments[b]	OR, RR, or HR	95% CI
SIDS[87]	40	2–4 mo	None	Breastfeed at least 2 mo to reduce SIDS	OR 0.60	0.44–0.82
	60	4–6 mo	None		OR 0.40	0.26–0.63
	64	>6 mo	None		OR 0.36	0.22–0.61
Infant mortality, United States[88]	19	Ever	Never	US cohort	OR 0.81	0.68–0.97
Neonatal mortality (8–27 d)[88]	51	Ever	Never	US cohort	OR 0.49	0.34–0.72
Postneonatal mortality[8]	21	Ever	Never	US nationally representative sample	OR 0.79	0.67–0.93
	38	>3 mo	Never		OR 0.62	0.46–0.82
Infant mortality (7–365 d)[9]	26	Ever	Never	US national cohort	OR 0.74	0.70-0.79
Neonatal mortality (7–27 d)[9]	40	Ever	Never	US national cohort	0.60	0.54-0.67
Postneonatal mortality (28–364 d)[9]	19	Ever	Never	US national cohort	0.81	0.76-0.87
Infant mortality, developing countries[89]	33	Exclusive	Predominant		RR 0.67	0.52–0.88
	79	Exclusive	Partial		RR 0.21	0.20–0.22
	93	Exclusive	None		RR 0.07	0.03–0.16
Infant mortality, developing countries[90]	25	Initiated in first hour	>1st hour		RR 0.75	0.64–0.88
Lower respiratory tract infection[91]	19	Exclusive 6 mo	Exclusive <4 mo	Cohort	RR 0.81	0.69–0.95
Severe or persistent diarrhea[91]	30	Exclusive 6 mo	Exclusive <4 mo	Cohort	RR 0.70	0.52–0.94
Otitis media[92]	33	Ever	Never		OR 0.67	0.56–0.80
	33	More	Less		OR 0.67	0.59–0.76
	43	Exclusive 6 mo	None		OR 0.57	0.44–0.80
Asthma 5–18 y[93]	10	More	Less		OR 0.90	0.84–0.97
	12	Ever	Never		OR 0.88	0.82–0.95
Asthma ever, all ages[94]	22	Longer	Shorter	Most protective for wheezing in first 2 y	OR 0.78	0.74–0.84
Eczema first, 2 y[93]	26	Exclusive 3–4 mo	Shorter		OR 0.74	0.57–0.0.97
Crohn's disease[95]	29	Ever	Never		OR 0.71	0.59–0.85
	80	12 mo	3–6 mo		OR 0.20	0.08–0.50
Ulcerative colitis[95]	22	Ever	Never		OR 0.78	0.67–0.91
	79	12 mo	3–6 mo		OR 0.21	0.10–0.43
Childhood obesity[96]	22	Ever	Never		OR 0.78	0.74–0.81
	10	<3 mo	Never		OR 0.90	0.84–0.95
	12	3–5 mo	Never		OR 0.88	0.79–0.97
	17	5–7 mo	Never		OR 0.83	0.76–0.90
	21	>7 mo	Never		OR 0.79	0.70–0.88
Childhood and adult obesity[97]	23	Ever	Never		OR 0.77	0.69–0.86
	26	Greater	Less		OR 0.74	0.68–0.80
	31	Exclusive	Nonexclusive		OR 0.69	0.61–0.79

TABLE 2 Continued

Outcome and Reference	% Lower Risk	Breastfeeding[a]	Compared With:	Comments[b]	OR, RR, or HR	95% CI
Childhood obesity[98]	18	>6 mo	Never	European pooled analysis	OR 0.82	0.78–0.86
	11	>6 mo	<6 mo		OR 0.89	0.86–0.93
	20	Exclusive 6 mo	Nonexclusive		OR 0.8	0.74–0.85
Type 1 diabetes[99]	57	Fully breastfeeding 6 mo	Never	Cohort	HR 0.43	0.21–0.90
	56	12 mo	Never	Cohort	HR 0.44	0.22–0.88
Type 2 diabetes[100]	33	Ever	Never		OR 0.67	0.56–0.80
Leukemia[101]	11	Ever	Never		OR 0.89	0.84–0.94
	19	6 mo	None or Shorter		OR 0.81	0.73–0.89

CI, confidence interval; HR, hazard ratio; OR, odds ratio; RR, relative risk.
[a] Not necessarily exclusive breastfeeding unless specifically written.
[b] Data are from meta-analyses, unless another type of study is written.

infants.[25] Women with active herpetic lesions on the breast should refrain from breastfeeding or using expressed milk from the affected breast until the lesions have resolved but may breastfeed from the unaffected breast when lesions on the affected breast are covered completely.[25]

Women infected with West Nile virus may breastfeed.[32]

Infants born to women known to be hepatitis B surface antigen positive should receive the initial dose of hepatitis B vaccine and hepatitis B immune globulin within 12 hours of birth.[25,33] There is no need to delay initiation of breastfeeding until after the infant is immunized. Although hepatitis C virus can be detected in maternal milk, transmission of hepatitis C virus via breast milk has not been documented, so neither the AAP nor the CDC consider maternal hepatitis C virus infection a contraindication to breastfeeding.[25,34] Mothers with hepatitis C who have cracked or bleeding nipples should refrain from breastfeeding from the affected breast or feeding expressed milk from that breast until the nipple has healed.

Mastitis occurs in one-third of postpartum women. Mothers with mastitis are encouraged to continue to breastfeed. Regular feeding or expression of milk is an adjunct to other treatment. Antibiotics may be indicated. Approximately 10% of mastitis cases progress to breast abscesses, which require drainage. Breastfeeding can continue on the affected side as long as the infant's mouth does not contact purulent

TABLE 3 Breastfeeding and Maternal Outcomes (From Meta-Analyses)

Condition and Reference	% Lower Risk	Breastfeeding[a]	Compared With	OR or RR	95% CI
Type 2 diabetes mellitus[102]	32	Longer	Shorter	RR 0.68	0.57–0.82
Diabetes mellitus[103]	30	>12 mo	Less	RR 0.70	0.62–0.78
Gestational diabetes mellitus and type 2 diabetes mellitus[104]	78	Longer	Shorter	OR 0.22	0.13–0.36
	58	Exclusive	None	OR 0.42	0.22–0.81
Hypertension[105]	8	<6 mo	None	OR 0.92	0.88–0.96
	11	6–12 mo	None	OR 0.89	0.86–0.92
	12	>12 mo	None	OR 0.88	0.84–0.93
Hypertension[103]	13	>12 mo	Less	RR 0.87	0.78–0.97
Premenopausal breast cancer[106]	14	Any	None	RR 0.86	0.80–0.93
Postmenopausal breast cancer[106]	11	Any	None	RR 0.89	0.83–0.95
Breast cancer[106]	28	Exclusive	None	RR 0.72	0.58–0.90
Breast cancer[107]	22	Any	None	OR 0.78	0.74–0.82
	7	<6 mo	None	OR 0.93	0.88–0.99
	9	6–12 mo	None	OR 0.91	0.87–0.96
	26	>12 mo	None	OR 0.74	0.69–0.79
Ovarian cancer[107]	30	Ever	Never	OR 0.70	0.64–0.77
	17	<6 mo	None	OR 0.83	0.78–0.89
	28	6–12 mo	None	OR 0.72	0.66–0.78
	37	>12 mo	None	OR 0.63	0.56–0.71
Endometrial cancer[108]	11	Ever	Never	OR 0.89	0.81–0.98
Thyroid cancer[109]	9	Ever	Never	RR 0.91	0.83–0.99

[a] Not necessarily exclusive breastfeeding unless specifically written.

drainage from the breast. Coordination with the mother's provider is recommended.[25]

Influenza vaccination is recommended in breastfeeding mothers if they did not receive the influenza vaccine during pregnancy or are breastfeeding into the next influenza season.[35]

A pediatric infectious disease specialist or the AAP *Red Book: Report of the Committee on Infectious Diseases* should be consulted for current recommendations on breastfeeding and infectious diseases.[25]

Marijuana Use

Current data are insufficient to assess the effects of exposure of infants to maternal marijuana use during breastfeeding. As a result, maternal marijuana use while breastfeeding is discouraged. Because the potential risks of infant exposure to marijuana metabolites are unknown, women should be informed of the potential risk of exposure during lactation and encouraged to abstain from using any marijuana products and avoid second-hand marijuana smoke exposure.[36]

Alcohol Use

Breast milk alcohol concentrations closely parallel blood alcohol concentrations, with highest levels in milk occurring 30 to 60 minutes after consuming alcohol. Moderate alcohol consumption by a breastfeeding mother (up to 1 standard drink per day) is not known to be harmful to the infant, especially if the mother waits at least 2 hours after a single drink before nursing or expressing milk to be fed to the infant. Moderate alcohol intake does not appear to affect breastfeeding duration.[37] Consuming more than 2 standard alcoholic drinks daily is discouraged.

Tobacco Use

Breastfeeding mothers should be encouraged strongly to stop smoking and to minimize secondhand exposure. Cigarette smoking, or the use of nicotine products, is associated with reduced production of milk and shorter lactation.[38] In addition, exposure to secondhand smoke from either parent is associated with an increase in SIDS, asthma, and other respiratory illnesses.[39] If, after counseling, a breastfeeding mother chooses to smoke or vape, she should be advised to minimize her smoking, never smoke while breastfeeding, and never smoke inside the home or car. To minimize the transmission of nicotine and other by-products to the infant, it is preferable that the mother smoke or vape immediately after breastfeeding. Nicotine cessation products may be used while breastfeeding.[40]

MATERNAL MEDICATIONS

Most medications that women who are breastfeeding might take are compatible with breastfeeding. There are a limited number of agents that are contraindicated, and an appropriate substitute usually can be found. The most comprehensive source of information regarding the safety of maternal medications when the mother is breastfeeding is the Drugs and Lactation Database (LactMed), published by the National Library of Medicine and National Institutes of Health, and is available online (see other medication references in Table 4).[41]

RADIOLOGIC PROCEDURES

According to the American College of Radiology, the routine administration of gadolinium or iodinated contrast medium is not a contraindication to breastfeeding.[42] Very small amounts of contrast enter breast milk, and $<1\%$ of that ingested by the infant is absorbed from its gastrointestinal tract, for a net absorption of $<0.0004\%$ of the intravenous dose of gadolinium and $<0.01\%$ of the intravenous dose of iodinated contrast being absorbed systemically.[42] Mothers receiving these contrast agents do not need to stop breastfeeding and/or to express and discard their milk.

HOSPITAL SUPPORT

The AAP acknowledges the findings of the Agency for Healthcare Research and Quality that the Baby-Friendly Hospital Initiative[43] increases breastfeeding initiation and duration.[12] Although education of health care staff may be important, it is insufficient as a single measure to increase breastfeeding initiation. Practices shown to improve breastfeeding rates include skin-to-skin care of mother and infant immediately

TABLE 4 Medications and Breastfeeding References

Reference	Website
Drugs and Lactation Database (LactMed), National Library of Medicine/National Institutes of Health, available via the internet or through mobile applications	https://www.ncbi.nlm.nih.gov/books/NBK501922/?report=classic
Dr Thomas Hale's Medications and Mother's Milk; Infant Risk Center at Texas Tech University	https://www.infantrisk.com/
MotherToBaby medication fact sheets	https://mothertobaby.org/fact-sheets-parent/
Sachs HC; American Academy of Pediatrics, Committee on Drugs. Clinical report: The transfer of drugs and therapeutics into human breast milk: an update on selected topics. Pediatrics. 2013;132(3):e796-e809. Reaffirmed May 2018	https://pediatrics.aappublications.org/content/132/3/e796

after birth for newborn infants delivered both vaginally and by cesarean delivery. Early skin-to-skin contact decreases the risk of hypoglycemia.[44] Implementation of breastfeeding-supportive hospital practices, including breastfeeding in the first hour after birth, exclusive breastfeeding, rooming-in, breastfeeding on demand, avoidance of pacifiers, and information on breastfeeding support after discharge, enabled women to be more successful at meeting their prenatal desire for exclusive breastfeeding.[45] Data compiled by the CDC Maternal Practices in Infant Nutrition and Care survey of infant feeding data and maternity practices at more than 1300 US hospitals revealed that higher scores on implementation of breastfeeding-supportive maternity care practices were associated with higher rates of exclusive breastfeeding at the time of hospital discharge and with any and exclusive breastfeeding at 8 weeks postpartum.[46,47] In addition, the Agency for Healthcare Research and Quality systematic review of 40 studies concluded that breastfeeding supportive practices were associated with improved rates of breastfeeding initiation and duration.[12]

Frequent feeding on demand, at least 8 to 10 times in 24 hours, decreases newborn weight loss, the need for supplements, and the risk of clinically significant hyperbilirubinemia.[48] Continuous rooming-in with frequent, exclusive breastfeeding is recommended. Practitioners can avoid recommending breast milk supplements unless breastfeeding technique and frequency has been optimized first or when supplementation is medically necessary. Maternity care practices shown to increase initiation, duration, and exclusivity of breastfeeding, such as those delineated in the WHO Ten Steps to Successful Breastfeeding, are monitored by the CDC in the Maternity Practices in Infant Nutrition and Care survey.[49] Statewide and hospital results on the Maternity Practices in Infant Nutrition and Care surveys can be used to develop practices and policies that strengthen support for maternity patients.

Delayed bathing of the newborn until 12 hours after birth allows more uninterrupted skin-to-skin contact and has been shown to improve exclusive in-hospital breastfeeding rates.[50,51] The AAP does not provide a recommendation on infant bathing, except in cases of maternal HIV infection, hepatitis B or C virus infection, herpes simplex, or other infections transmitted via blood or other bodily fluids. This guidance is based on expert opinion.

Formal hospital staff training should focus on updating knowledge and techniques for breastfeeding support. Emphasis should be placed on the numerous benefits of exclusive breastfeeding and emphasize the role of staff in decreasing disparities and providing culturally competent care.

SAFE SLEEP

The AAP has issued recommendations for SIDS or sudden unexplained infant death prevention, as well as safe sleep and skin-to-skin care.[52] These recommendations provide detailed guidance to support breastfeeding mothers while preventing the tragic deaths of infants because of unsafe sleep practices.[52–54] The AAP recommends breastfeeding as one strategy to decrease the risk of SIDS or sudden unexplained infant death.[52]

ESTABLISHMENT OF BREASTFEEDING

Most mothers experience lactogenesis II, or more copious milk production, by the third to fourth day after delivery. Early skin-to-skin care and frequent feeding facilitate this transition from drops of colostrum to ounces of milk. Risk factors for delayed lactogenesis II include maternal obesity, polycystic ovarian syndrome, maternal diabetes mellitus, hypertensive disorders in pregnancy, preterm labor, cesarean delivery, and intrapartum complications, such as excessive blood loss.[55,56] In cases of maternal diabetes mellitus complicated by maternal obesity, rates of cesarean deliveries are higher, which may also interfere with the initiation of breastfeeding. Signs of physiologic transition to lactogenesis II, such as breast fullness or tenderness, visible leaking of milk, and more frequent infant swallowing, should be tracked along with the infant elimination patterns and weight trajectory.

At least once every 8 to 12 hours during the hospitalization of the mother and infant, including once within 8 hours before hospital discharge, it is recommended that a health professional trained in formal assessment of breastfeeding perform and document an assessment of breastfeeding effectiveness.[57]

BREASTFEEDING AND HUMAN MILK FOR THE VERY LOW BIRTH WEIGHT INFANT

The AAP has provided clinical guidance to support breastfeeding and the use of human milk among very low birth weight infants (VLBW).[58] Mother's expressed milk for very low birth weight infants (≤1500 g) in the NICU provides short- and long-term health benefits, including reduction of necrotizing enterocolitis, late-onset sepsis, chronic lung disease, retinopathy of prematurity, and improved

neurodevelopment.[58] Mother's expressed milk should be considered medical therapy, with higher doses associated with maximal health benefits. Pediatricians can emphasize the importance of early and frequent milk expression for mothers of VLBW infants. The AAP recommends pasteurized donor human milk when a mother's milk is not available or is contraindicated.[59] Fortification of mother's milk or donor milk with bovine or human milk-derived human milk fortifiers should be considered to optimize growth in the VLBW infant.[60]

LATE PRETERM AND EARLY TERM INFANTS

Late preterm infants, born between 34 and 36 weeks' gestational age, and early term infants, born at 37 to 38 weeks' gestation, have decreased breastfeeding rates compared to term newborn infants.[61,62] There are multiple factors that may lead to breastfeeding difficulties, including maternal delayed onset of lactation, infant immaturity, decreased effective milk emptying, and separation of infants from their mothers. Inadequate human milk intake in the first days after delivery can contribute to longer hospital stays and higher rates of hospital readmissions.[63] Infant supplementation, when necessary, should preferably be with expressed maternal milk or pasteurized donor human milk, when available, because formula supplementation has been associated with increased exclusive formula feeding at discharge.[64,65] Informal milk sharing may be associated with infectious risks as well as contaminants.[66]

HYPERBILIRUBINEMIA

Infants who are breastfeeding tend to have higher mean concentrations of bilirubin. This is believed to be physiologic, and there is some evidence that bilirubin in neonates is beneficial, because bilirubin is a potent antioxidant.[67] Poor intake by the exclusively breastfed infant in the first days of life, however, can be associated with pathologic hyperbilirubinemia. A study has documented that decreased frequency of breastfeeding, especially ≤7 times a day, is associated with higher bilirubin concentrations, whereas breastfeeding 9 to 10 times a day is associated with lower bilirubin concentrations.[68] Infant supplementation, when necessary, should preferably be with expressed maternal milk. Colostrum feedings increase stooling in the newborn, which increases bilirubin excretion in the stools. The need for phototherapy in an otherwise healthy infant without signs of dehydration and/or insufficient intake is not an indication for supplementation with formula, unless bilirubin concentrations are approaching exchange transfusion levels. Infants requiring phototherapy benefit from remaining in close proximity to the mother to facilitate cue-based feeding and additional breastfeeding support.

Some breastfed infants experience breast milk jaundice, a benign condition that may persist up to 3 months of age.[69] The bilirubin is unconjugated and occurs in a healthy, thriving infant who is gaining weight appropriately and stooling frequently. No specific treatment is necessary.

ADOPTION OR SURROGACY

Breastfeeding is possible in cases of adoption or surrogacy, but if this is to occur, it optimally requires advance preparation through hormonal stimulation as well as signaling of the breasts through pumping in advance of delivery.[70] Mothers may produce at least a partial milk supply. Expressed milk or pasteurized donor human milk, if readily available and affordable, as well as infant formula, may be provided at the breast through use of supplemental nursing systems. Referral to a breastfeeding medicine specialist should be encouraged.

INFANTS BORN TO GENDER-DIVERSE FAMILIES

Children of gender-diverse parents may have less access to human milk because of both social and biological constraints. Breastfeeding is used throughout this document; however, the word "breastfeeding" itself may be both triggering, and less accurate, for gender-diverse parents, who may prefer the term "chestfeeding," which is more inclusive of lactation in the context of varying physiologic anatomies.[71]

VITAMIN AND MINERAL SUPPLEMENTS

Intramuscular vitamin K1 (phytonadione), at a dose of 0.5 to 1.0 mg, should be routinely administered to all infants on the first day of life to reduce the risk of vitamin K deficiency bleeding.[72,73] The dose may be delayed until after the first feeding at the breast. Oral vitamin K is not recommended, because the oral dose is variably absorbed and may not provide adequate concentrations or stores.[72]

Vitamin D deficiency or insufficiency and rickets has increased in all infants as a result of decreased sunlight exposure secondary to changes in lifestyle, dress habits, and use of topical sunscreen preparations.[74] To maintain an adequate serum vitamin D concentration, all infants consuming less than 28 ounces of commercial infant formula per day routinely should receive an oral supplement of vitamin D 400 IU per day, beginning at hospital discharge and throughout breastfeeding.[74] This recommendation applies to both exclusively and partially breastfed

infants. An alternative strategy to vitamin D supplementation of the infant is to supplement the mother who is breastfeeding with 6400 IU of vitamin D.[75]

The AAP has published recommendations for supplementing iron in infants.[76] More studies are needed, however, because delayed cord clamping has been shown to increase iron stores in healthy term newborn infants.[77] Preterm infants should receive both a multivitamin preparation and an oral iron supplement until they are ingesting a completely mixed diet and their growth and hematologic status are normalized.[78]

COMPLEMENTARY FEEDINGS

The AAP recommends exclusive breastfeeding for about 6 months. Complementary solids should be introduced at about 6 months for most infants. Foods rich in protein, iron, and zinc, such as finely ground meats, chicken, or fish, are good choices to complement the infant's diet of breast milk.[79,80] Breast milk remains the major component of the infant's diet, as foods from the family's diet are gradually introduced with appropriate modification of texture and avoidance of added sugar and fat.[79,80] An expert panel has advised peanut introduction as early as 4 to 6 months of age for infants at high risk of peanut allergy because of the presence of severe eczema and/or egg allergy, but not until 6 months for infants at moderate or low risk.[81]

ROLE OF THE PEDIATRICIAN

The AAP is cognizant that for women to be successful in achieving the recommended breastfeeding goals, significant societal changes are required. Pediatricians can play an important role in leading and advocating for the societal changes that permit continued exclusive and direct breastfeeding, such as guaranteed paid maternity leave, flexible work schedules, including working from home, and on-site child care.[82] Additionally, public health interventions such as WIC incentives and environmental policies may provide opportunities to overcome structural barriers to breastfeeding.[83,84]

The critical role that pediatricians play is highlighted by the recommended health supervision visit within 48 to 72 hours after discharge from the hospital or at 3 to 5 days of age.[85] Pediatricians should discourage the use of nonmedically indicated supplementation with commercial infant formula. Many breastfeeding problems may arise between 4 and 7 days after birth. The pediatrician needs to be able to assess the effectiveness of breastfeeding, manage common problems, provide guidance for preservation of the milk supply if supplementation is needed, and provide appropriate referrals.[48]

Pediatricians are ideally positioned to serve as breastfeeding educators and not solely delegate this role to staff or nonmedical or lay volunteers. Pediatricians' direct communication with families that breastfeeding is a medical and health priority can increase initiation, duration, and exclusivity. Collaboration with the maternal health provider can improve the overall care for the infant and mother. Health care providers play a role in providing the most up-to-date information and recommendations so that parents have the information about breastfeeding that they need to make an informed feeding decision.

The AAP has outlined how a pediatrician's own office-based practice can serve as a model for how to support breastfeeding in the workplace (Table 5).[86] The pediatrician should consider taking the lead in encouraging his or her affiliated hospitals to provide appropriate support and facilities for their breastfeeding employees. In addition, the pediatrician can work collaboratively with all members of the health care team to have maximal impact. Pediatricians can partner with lactation specialists or

TABLE 5 Summary of Breastfeeding-Supportive Office Practices

1. Have a written breastfeeding-friendly office policy
2. Train staff in breastfeeding support skills
3. Discuss breastfeeding during prenatal visits and at each well-child visit
4. Encourage exclusive breastfeeding for ~6 mo
5. Provide appropriate anticipatory guidance that supports the continuation of breastfeeding as long as desired
6. Incorporate breastfeeding observation into routine care
7. Educate mothers on breast milk expression and return to work
8. Provide noncommercial breastfeeding educational resources for parents
9. Encourage breastfeeding in the waiting room, but provide private space on request
10. Eliminate the distribution of free formula
11. Train staff to follow telephone triage protocols to address breastfeeding concerns
12. Collaborate with the local hospital or birthing center and obstetric community regarding breastfeeding-friendly care
13. Link with breastfeeding community resources
14. Monitor breastfeeding rates in your practice

Meek JY, Hatcher AJ; American Academy of Pediatrics, Section on Breastfeeding. Clinical report: The breastfeeding-friendly pediatric office practice. *Pediatrics*. 2017;139(5):e20170647.

train office staff to provide effective breastfeeding counseling.

KEY RECOMMENDATIONS

1. The AAP recommends exclusive breastfeeding for about 6 months, with complementary food introduction at about 6 months, and as mutually desired by mother and child, supports continued breastfeeding until 2 years or beyond.
2. The AAP recommends that birth hospitals or centers implement maternity care practices that improve breastfeeding initiation, duration, and exclusivity, such as those in the WHO Ten Steps to Successful Breastfeeding, as monitored by the CDC.
3. Pediatricians need to provide information so that parents can make an informed feeding decision. The parental feeding decision should be fully supported, without pressure or guilt by any member of the health care team.
4. Parents giving birth should be supported to breastfeed through early initiation of skin-to-skin contact and frequent breastfeeding, with skilled lactation support readily available in maternity care facilities.
5. Pediatricians are encouraged to use current resources, such as LactMed, to provide guidance and avoid disrupting breastfeeding unnecessarily, even temporarily, because most maternal conditions, medications, and vaccinations are compatible with breastfeeding.
6. Pediatricians need to be knowledgeable about the health benefits of breastfeeding and breastfeeding management and skillful in providing culturally congruent breastfeeding care. Pediatricians can implement breastfeeding supportive policies and practices in their offices and be ready to partner with community resources to improve breastfeeding support. Pediatricians and pediatric practices may consider partnering with lactation specialists to support breastfeeding parents and children.
7. Pediatricians play a role in advocating for socially and culturally sensitive policies that support breastfeeding families and can work to address inequities in the delivery of care in the office, the hospital, and the community to eliminate disparities in breastfeeding.
8. Pediatricians can assist parents who have given birth to preterm and other vulnerable infants to establish a full supply of milk by working with hospital staff to facilitate early, frequent milk expression. Pasteurized donor human milk is recommended for very low birth weight infants when the mother's milk is not available or as a supplement to the mother's milk.
9. Policies that protect breastfeeding, including universal paid maternity leave, the right of a woman to breastfeed in public, insurance coverage for lactation support and breast pumps, on-site child care; universal workplace break time with a clean, private location for expressing milk, the right to feed expressed milk, and the right to breastfeed in child care centers and lactation rooms in schools are all essential to supporting families in sustaining breastfeeding.
10. National breastfeeding rates through the age of 2 years should be tracked and data should be stratified by known breastfeeding disparities by national public health infrastructure. These data should be stratified by race, ethnicity, and socioeconomic demographics for known breastfeeding disparities by states, local health departments, hospitals, and pediatric practices, because these data will inform areas that need improvement.

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ABBREVIATIONS

AAP: American Academy of Pediatrics
CDC: Centers for Disease Control and Prevention
SIDS: sudden infant death syndrome
WHO: World Health Organization
WIC: woman, infants, and children
VLBW: very low birth weight

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Appendix B

POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Donor Human Milk for the High-Risk Infant: Preparation, Safety, and Usage Options in the United States

COMMITTEE ON NUTRITION, SECTION ON BREASTFEEDING, COMMITTEE ON FETUS AND NEWBORN

The use of donor human milk is increasing for high-risk infants, primarily for infants born weighing <1500 g or those who have severe intestinal disorders. Pasteurized donor milk may be considered in situations in which the supply of maternal milk is insufficient. The use of pasteurized donor milk is safe when appropriate measures are used to screen donors and collect, store, and pasteurize the milk and then distribute it through established human milk banks. The use of nonpasteurized donor milk and other forms of direct, Internet-based, or informal human milk sharing does not involve this level of safety and is not recommended. It is important that health care providers counsel families considering milk sharing about the risks of bacterial or viral contamination of nonpasteurized human milk and about the possibilities of exposure to medications, drugs, or herbs in human milk. Currently, the use of pasteurized donor milk is limited by its availability and affordability. The development of public policy to improve and expand access to pasteurized donor milk, including policies that support improved governmental and private financial support for donor milk banks and the use of donor milk, is important.

INTRODUCTION

Human milk provides health benefits for all newborn infants but is of particular importance for high-risk infants, especially those born with very low birth weight (<1500 g). Donor human milk also can be beneficial to supplement the mother's own milk when necessary. The evidence to support the use of donor human milk has been reviewed,[1–6] and recent studies[7–9] support health benefits for its use in infants with a birth weight <1500 g, especially in decreasing rates of necrotizing enterocolitis.

Donor milk banks represent a safe and effective approach to obtaining, pasteurizing, and dispensing human milk for use in NICUs and other settings. However, accessibility to donor milk in the United States

abstract

FREE

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continues to be substantially limited in terms of supply, cost, and distribution. Because of these limitations, some parents have chosen to exchange human milk that is not pasteurized or handled by an established milk bank with each other (milk sharing). This report reviews the preparation, safety, and usage options for donor human milk in the United States.

PREPARATION OF DONOR HUMAN MILK, PASTEURIZATION, AND DISTRIBUTION

The number of human milk banks in the United States is increasing. Currently, there are 20 donor milk banks in the United States and 4 in Canada that pasteurize milk as part of a professional organization for supporters of nonprofit human milk banking, the Human Milk Banking Association of North America (HMBANA); 7 others are in various stages of planning and development (www.hmbana.org). In addition, several commercial (for-profit) human milk banks collect, pasteurize, and distribute donor human milk but are not part of HMBANA.

Donor Human Milk Collection

HMBANA has established policies for donor human milk collection, as do commercial human milk banks.[10] These have been described in the literature[1,2] and in the policies usually found on the Web sites of the individual milk banks. Guidelines for donors include completion of a health screen, blood serologic testing, and detailed instructions on collecting, storing, and shipping milk.[10] In contrast, direct milk sharing or other forms of milk collection and distribution are extremely variable in the screening of donors and the methods of milk storage and transportation.

Pasteurization

Several methods may be used to pasteurize donor human milk, and these have been reviewed extensively.[1,3,11] The Holder pasteurization method uses heating at 62.5°C for 30 minutes and is the primary method used by HMBANA milk banks. One commercial milk bank, Medolac Laboratories (Lake Oswego, OR), uses a different thermal pasteurization system.

Distribution

In the United States and Canada, most donor milk is distributed by established milk banks to NICUs. Each milk bank and/or processing center has policies, including cost-related guidelines, for this distribution. The distribution of donor milk may be subject to federal or state guidelines in some situations, but at the time of this publication, there are no restrictions on the use of pasteurized donor human milk in any state in the United States.

Frozen donor human milk is distributed by using shipping guidelines established by the milk banks. Receiving hospitals are provided guidance related to temperature and other storage conditions for the milk, and these may be subject to state and local regulations. Hospitals that use frozen donor human milk must have properly regulated freezers and other methods for handling and tracking donor milk.

SAFETY

Human milk is a biological product; therefore, whether from an infant's own mother or a donor mother, there will always be concerns about contamination. Possible contaminants are infectious agents, including both bacteria and viruses, and contamination with other substances, most notably toxic components in the environment (eg, pesticides, mercury, medications, drugs, or herbs).

Although a detailed description of each of these is beyond the scope of this statement, the processes used in pasteurization of donor human milk are highly effective in removing viral infectious contaminants.[10–14] Human milk banks vary in their approach to bacterial screening of incoming milk, but postpasteurization bacteriologic cultures are performed routinely. Published data[10,11] have revealed a very low or unmeasurable level of infectious contaminants. Families and caregivers may be reassured that, at the time of this publication, there are no reported cases of pasteurized donor human milk causing an infection with hepatitis viruses or HIV and that the likelihood of this type of infection occurring in a neonate given donor human milk is extremely small.

With regard to noninfectious contaminants, although these can be difficult to completely eliminate, the pooling process with donor milk makes it very unlikely that these will represent a significant exposure risk. An exception to this is cow milk protein, which is present in the milk of mothers who include dairy in their diet. The contamination of human milk purchased via the Internet with cow milk (up to a 10% dilution of the human milk) has recently been reported.[15]

In contrast, informal direct milk sharing without pasteurization exposes infants to a range of possible risks, including bacterial contamination[16] and viral transmission, including cytomegalovirus, hepatitis viruses, and HIV.[17] Individual screening is performed by some Internet-based groups that organize direct milk sharing, but these are neither consistently applied nor documented. Furthermore, even with serologic blood testing, infectious complications remain a significant risk in unpasteurized milk.

Because direct milk sharing is often arranged by using milk from a single donor mother, other contaminants, such as medications or drugs, may be

a higher risk than with pooled milk products. It is unknown what effects paying women for milk might have on these risks.

Growth Issues

Early studies in the use of donor human milk for small preterm infants showed relatively slow growth. More recent studies[18–20] showed improved growth outcomes, which may be attributable both to a greater availability of donor milk with higher nutrient content and to widely used strategies for fortifying donor milk. However, these are retrospective cohort studies, and further studies are needed. Strategies for fortifying donor human milk include both commercial human milk–based and cow milk protein–based fortifiers. Both types of fortifiers have been shown to lead to appropriate growth, and the use of donor human milk does not need to be limited on the basis of growth concerns in most high-risk infants. Growth monitoring is always paramount for infants, and human milk fortification is needed for all infants with very low birth weight.

Loss of Nutrients and Antiinflammatory Properties

The process of pasteurization destroys cells, such neutrophils and stem cells, and affects macronutrients and antiinflammatory factors. In addition, pasteurization can eliminate bacterial strains with probiotic properties. Substantial evidence describing these losses is available.[21–25] Bioactive components of human milk, including lactoferrin and immunoglobulins, are substantially decreased by pasteurization, but there is much less effect on macro- or micronutrients, including vitamins.[22,23] Overall, the benefits of improved feeding tolerance and clinical outcomes support the concept that some nutrient losses of bioactive components should not limit the use of donor human milk or preclude its pasteurization before use. Donor human milk may have a lower protein and energy content than the milk of mothers of preterm infants, in addition to lost bile salt–dependent lipase activity, which may affect fortification strategies and growth. Alternative sterilization methods to preserve innate bioactive properties and to decrease the cost of preparing donor milk need investigation.

The principal goal for infants with very low birth weight is the provision of the mother's own milk, with donor human milk as a bridge or support while the mother's milk is made available or increasing in volume. It is important to encourage and assist mothers to pump or express and provide their own milk whenever possible and at the maximum volume possible. Although the use of donor human milk has not been shown to decrease the frequency or volume of mother's own milk to NICU patients,[9,23,26,27] vigilance and education are needed regarding the superiority of mother's own milk relative to donor human milk.

USAGE

Infants <1500 g Birth Weight

The supply of donor human milk currently available in the United States and Canada is less than optimal. Although a goal of providing donor milk to supplement the mother's milk for all preterm infants has been described,[5] this goal may not be achievable for a period of time; thus, prioritization may be needed for infants weighing <1500 g. Relatively few data are available on whether this would include small for gestational age infants, such as those who are >32 to 33 weeks' postmenstrual age at birth who also weigh <1500 g; but, in general, the primary guide for use is birth weight, not gestational age, in prioritizing donor milk use.

There are no clear guidelines for discontinuing the use of donor human milk in an infant <1500 g birth weight when the volume of mother's milk is not adequate. A range of postmenstrual ages from 32 to 36 weeks is commonly used in the United States, because this range covers the highest risk period for necrotizing enterocolitis. Further research is needed to clarify the optimal timing of discontinuing donor human milk. Breastfeeding should be encouraged during hospitalization for these infants to enhance the likelihood of successful breastfeeding after hospital discharge.[28]

Other Intestinal Diseases

Fewer data are available regarding the use of donor human milk in other high-risk infants, including infants with abdominal wall defects, such as gastroschisis or omphalocele, and other conditions, such as congenital heart disease. Nonetheless, some infants with these conditions or other neonatal disorders may benefit from donor human milk either because of a direct effect on intestinal growth or improved feeding tolerance.[29] In these cases, payers may expect documentation of intolerance to specialized infant formulas and the medical necessity for donor human milk before providing payment for human milk at home or in the hospital.

Outpatient (Home) Versus Hospital Distribution

The vast majority of donor human milk distributed from HMBANA milk banks is distributed to hospitals for internal use in NICU patients. However, in some cases, donor human milk may be provided for home use from HMBANA milk banks.[1] In cases of limited supply, health care providers, such as community pediatricians and neonatologists, can work together to establish priority for such use relative to local NICU needs. A pediatrician/

neonatal clinician generally will need to be involved in ordering and supervising the use of donor milk in any outpatient setting. Clear documentation as to the reason for the use of donor human milk at home is recommended.

OTHER POLICY ISSUES

Cost Reimbursement

A major limitation in the use of donor human milk is the cost of providing this milk to hospitals or to families. Reimbursement for donor milk is inconsistent between states and often between sources of payment. Health care providers can advocate for the development of public and local hospital policies to enhance the availability and affordability of donor human milk on the basis of evidence. Resources from the American Academy of Pediatrics and other groups can also assist those involved in the care of neonates in this discussion.

The use of donor human milk in appropriate high-risk infants is consistent with good health care for these infants.[30,31] Policies are needed to provide high-risk infants access to donor human milk on the basis of documented medical necessity, not financial status.

Federal and State Regulation of Milk Banks and Donor Milk Sharing

Legal issues exist regarding the regulation of donor human milk banks on both a state and national level. Federal or state guidelines are needed regarding the preparation, handling, and transfer of human milk as well as the operation of donor human milk banks and would be best accomplished via formal regulation by the US Food and Drug Administration with oversight by the Centers for Disease Control and Prevention.

Families of high-risk infants should be fully informed about the current state of research regarding the benefits of using human milk to decrease the risks of complications such as necrotizing enterocolitis. This discussion may include appropriate warnings about risks related to infectious complications when human milk is shared or distributed outside of established milk banks. Neonatologists and other health care providers should advocate for policies of full disclosure of the risks and benefits related to direct or informal milk sharing without pasteurization. Hospitals should develop standards such that all human milk given to infants meets appropriate standards for preparation and distribution and that pasteurization of all donor human milk occurs.

SUMMARY OF KEY POINTS

1. Although a mother's own milk is always preferred, donor human milk may be used for high-risk infants when the mother's milk is not available or the mother cannot provide milk. Priority should be given to providing donor human milk to infants <1500 g birth weight.
2. Human milk donors should be identified and screened by using methods such as those currently used by HMBANA milk banks or other established commercial milk banks.
3. Donor milk should be pasteurized according to accepted standards. Postpasteurization testing should be performed according to internal quality-control guidelines.
4. Health care providers should discourage families from direct human milk sharing or purchasing human milk from the Internet because of the increased risks of bacterial or viral contamination of nonpasteurized milk and the possibility of exposure to medications, drugs, or other substances, including cow milk protein.
5. The use of donor human milk in appropriate high-risk infants should not be limited by an individual's ability to pay. Policies are needed to provide high-risk infants access to donor human milk on the basis of documented medical necessity, not financial status.

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ABBREVIATION

HMBANA: Human Milk Banking Association of North America

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Appendix C

ACOG
The American College of Obstetricians and Gynecologists

ACOG COMMITTEE OPINION

Number 821

(Replaces Committee Opinion 570, August 2013)

Committee on Health Care for Underserved Women
Breastfeeding Expert Work Group

This Committee Opinion was developed by the American College of Obstetricians and Gynecologists' Committee on Health Care for Underserved Women and the Breastfeeding Expert Work Group in collaboration with committee member Caroline E. Rouse, MD, and work group member Lauren E. Hanley, MD, IBCLC.

Barriers to Breastfeeding: Supporting Initiation and Continuation of Breastfeeding

ABSTRACT: Breastfeeding has maternal, infant, and societal benefits. However, many parents experience obstacles to achieving their breastfeeding goals, leading to reduced rates of breastfeeding initiation and continuation. Despite efforts to increase rates of breastfeeding initiation and continuation, inequities still persist. The factors that influence an individual's desire and ability to breastfeed are varied and include individual parent considerations; practitioner influences; hospital barriers; societal factors, such as workplace and parental leave policies; access to lactation support; and social support of their breastfeeding goals. A multidisciplinary approach that involves community, family, parents, and health care professionals will strengthen the support for parents and help them achieve their breastfeeding goals.

Recommendations

The American College of Obstetricians and Gynecologists (ACOG) makes the following recommendations to support initiation and continuation of breastfeeding:

- The American College of Obstetricians and Gynecologists supports individuals' informed decision making about breastfeeding, free from commercial influence, coercion, and bias. Parents have the right to make their own informed choice about whether or not to breastfeed.
- For those parents who desire to breastfeed, the obstetrician–gynecologist should use a multidisciplinary approach that involves practitioners, community lactation support, family members, employers, and childcare providers to help parents overcome obstacles and obtain the benefits of breastfeeding for themselves and their infants.
- The American College of Obstetricians and Gynecologists recommends that practitioners educate parents about the benefits and mechanics of breastfeeding and encourages clinicians, nursing staff, and government assistance agencies to advocate for policy changes that facilitate breastfeeding, including lactation programs, both within hospitals and in the community.
- To benefit the parent–child dyad, including promoting the opportunity to breastfeed, ACOG recommends paid parental leave, with maintenance of full benefits and 100% pay, for a minimum of 6 weeks. Obstetrician–gynecologists and other health care professionals should strongly advocate for policies that enable breastfeeding, including paid parental leave and break time for persons to express milk in the workplace.
- Practitioners should be open and willing to discuss the intersecting barriers to breastfeeding that parents may face to help them achieve their breastfeeding goals.
- The benefits of breastfeeding, as well as patient education, counseling, and support strategies, should be emphasized during medical school and training of residents in obstetrics and gynecology, family medicine, and pediatrics. Ongoing education also should be promoted for all clinicians and hospital staff involved in childbirth.

Statement of Purpose

Maternal and infant benefits of breastfeeding are well documented. However, many parents experience obstacles to achieving their breastfeeding goals, leading to reduced rates of breastfeeding initiation and continuation. The factors that influence an individual's desire and ability to breastfeed are varied and include individual parent considerations; practitioner influences hospital barriers; societal factors, such as workplace and parental leave policies; access to lactation support; and social support of their breastfeeding goals. Obstetrician–gynecologists and other health care professionals should inform parents of the benefits of breastfeeding and support breastfeeding for parents who desire to pursue it. For those parents who desire to breastfeed, the obstetrician–gynecologist should use a multidisciplinary approach that involves practitioners, community lactation support, family members, employers, and childcare providers to help parents overcome obstacles and obtain the benefits of breastfeeding for themselves and their infants. The American College of Obstetricians and Gynecologists urges obstetrician–gynecologists and others who support individuals in their breastfeeding decisions to advocate for policies that increase breastfeeding support.

The American College of Obstetricians and Gynecologists' Breastfeeding Expert Work Group and Committee on Obstetric Practice have developed documents that address many aspects of breastfeeding (See the ACOG Breastfeeding Toolkit and other ACOG breastfeeding resources at www.acog.org/en/Topics/Breastfeeding). Therefore, this document will focus on the barriers to breastfeeding that parents face and strategies to help them achieve their breastfeeding goals.

Box 1. Benefits of Breastfeeding

- Decreased rate of common childhood infections, such as diarrhea and ear infections, which results in decreased parental absenteeism from work
- Decreased rates of childhood obesity in children who were breastfed as infants
- Decreased rate of necrotizing enterocolitis
- Decreased risk of sudden infant death syndrome
- Increased bonding between mother and infant
- Decreased rates of hypertension, hyperlipidemia, type 2 diabetes mellitus, and cardiovascular disease among women
- Decreased rates of ovarian and breast cancer in women
- Improved return to prepregnancy weight
- Improved birth spacing

Data from Lawrence RA, Lawrence RM. Breastfeeding: a guide for the medical profession. 7th ed. Maryland Heights, MO: Elsevier Mosby; 2011; Chua S, Arulkumaran S, Lim I, Selamat N, Ratnam SS. Influence of breastfeeding and nipple stimulation on postpartum uterine activity. Br J Obstet Gynaecol 1994;101:804–5; Rosenblatt KA, Thomas DB. Lactation and the risk of epithelial ovarian cancer. The WHO Collaborative Study of Neoplasia and Steroid Contraceptives. Int J Epidemiol 1993;22:192–7; Newcomb PA, Storer BE, Longnecker MP, Mittendorf R, Greenberg ER, Clapp RW, et al. Lactation and a reduced risk of premenopausal breast cancer. N Engl J Med 1994;330:81–7; *and* Breast cancer and breastfeeding: collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50302 women with breast cancer and 96973 women without the disease. Collaborative Group on Hormonal Factors in Breast Cancer. Lancet 2002;360:187–95.

Background

The value of breastfeeding to both the parents and infant is unequivocal (Box 1). Overall, the national rate of breastfeeding initiation is 84.1% (1), which meets the Healthy People 2020 target of 81.9% (2). However, significant disparities exist within breastfeeding initiation across many variables, including race (Table 1), income (76.6% for women living at less than 100% of the federal poverty level), participation in federal aid programs (77% for women in the Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]), mother's educational status (75.6% for women with a high school diploma or GED), and age (74% for women younger than 20 years) (3). Furthermore, although initiation rates are increasing, continuation rates are not, indicating that more support is needed to help parents achieve their breastfeeding goals (1). Barriers to breastfeeding exist at all levels, from societal and structural obstacles, such as inadequate parental leave policies, to practitioner-specific discomfort with or lack of knowledge about how to support all lactating parents. Policies that protect the right of a woman and her child to breastfeed in public and that accommodate milk expression, such as insurance coverage for breast pumps, paid maternity leave, on-site childcare, break time for expressing milk, and a clean, private location for expressing milk, are essential to sustaining breastfeeding (4).

Obstetrician–gynecologists and other health care professionals are in a unique position to review the medical and nonmedical benefits of breastfeeding with parents and families throughout prenatal care. The American College of Obstetricians and Gynecologists supports each individual's informed decision making about breastfeeding, free from commercial influence, coercion, and bias. Parents have the right to make their own informed choice about whether or not to breastfeed. Recognizing and addressing the specific barriers to breastfeeding initiation and or continuation can be instrumental in helping parents achieve their breastfeeding goals.

Addressing Hospital Barriers to Breastfeeding

Hospitals, through the implementation of lactation support programs, can have a positive influence on

Table 1. Rates of Any and Exclusive Breastfeeding by Race and Ethnicity Among Children Born in 2017

	Ever Breastfed (%)	Exclusive at 3 months (%)	Exclusive at 6 months (%)	Any at 12 months (%)
All women	84.1	46.9	25.6	35.3
Hispanic	84.1	41.5	21.5	33.9
Non-Hispanic White	86.7	52.4	28.7	38.2
Non-Hispanic Black	73.7	38.7	21.2	26.1
Non-Hispanic Asian	90.0	47.7	26.8	50.0
2 or more races	83.7	43.9	26.6	31.0

Modified from Centers for Disease Control and Prevention. Rates of any and exclusive breastfeeding by sociodemographics among children born in 2017 (percentage +/− half 95% confidence interval). Available at: https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-socio-dem-2017.html. Retrieved October 16, 2020.

breastfeeding for parents who desire to breastfeed. In 1991, the World Health Organization and the United Nations Children's Fund (UNICEF) launched the Baby-Friendly Hospital Initiative to motivate facilities providing maternity care to implement the Ten Steps to Successful Breastfeeding (https://www.who.int/activities/promoting-baby-friendly-hospitals/ten-steps-to-successful-breastfeeding). The more "steps" parents are exposed to during Ten Steps care, the more likely parents are to initiate and continue breastfeeding (5). Furthermore, implementation of Ten Steps care has been associated with narrowing the gap with respect to racial inequities and breastfeeding initiation and exclusivity (6). Hospitals should support the Ten Steps and joint decision making to assist parents with their breastfeeding goals, without coercion.

The first step of Ten Steps care addresses advertising of breastmilk substitutes (formula) in health care settings. The marketing efforts of companies that produce infant formula promote the belief that formula feeding is or should be the norm. The strong inverse relationship between breastfeeding and marketing of formula through promotional items led to the World Health Organization Code of Marketing of Breast Milk Substitutes, which, among other requirements, stipulates that "facilities of health care systems should not be used for the display of products within the scope of this Code, for placards or posters concerning such products, or for the distribution of material provided by a manufacturer or distributor" (7). Obstetrician–gynecologists and other health care professionals should be aware that the in-office or in-hospital advertising and distribution of gift packs with formula to breastfeeding parents commonly is a deterrent to continuation of breastfeeding (8). Therefore, health care professionals should seek noncommercial educational alternatives or gift packs without health-related items (9).

Ten Steps care not only addresses the marketing of breastmilk substitutes, but also highlights the importance of in-hospital breastfeeding support as well as continued assistance after discharge from the hospital (10). Lactation consultants should be accessible to parents in the hospital and after the parent goes home. Although the Patient Protection and Affordable Care Act (ACA) covers breastfeeding support without cost sharing, this practice has yet to be fully implemented in most communities because of state licensure or insurance issues, or both. Therefore, the out-of-pocket costs of lactation services have become cost prohibitive for many parents. Additionally, the inclusion of lactation visits in the global prenatal fee has limited the ability of obstetric care professionals to provide services after delivery in the absence of a breast infection or other specific diagnosis. To address lower breastfeeding rates among marginalized groups who participate in WIC, programs and campaigns to increase the rate of breastfeeding among its participants have been introduced, including a robust peer counseling program to help parent–infant dyads. As a result, from 2010 to 2018, there was a 5.7% increase in the number of infants in the WIC program reported as being breastfed (11, 12). This was associated with a decrease in the rate of subscription to the WIC food packages that included formula and an increase in the subscription to exclusive breastfeeding packages (13).

Sometimes breastfeeding is desired but not possible. Practitioners should be familiar with donor human milk banks, which offer a source of pasteurized human milk. The donors have been screened, and collection, storage, and distribution guidelines are in place (4). Donor human milk has been shown to be especially important for high-risk infants, including those who are preterm and with very low birth weight (less than 1500 g) (14–17). The Human Milk Banking Association of North America is a professional, nonprofit organization composed of 27 donor milk banks in the United States and Canada that facilitates the donation and receipt of human milk, which practitioners and parents can access (www.hmbana.org). However, supply, cost, and distribution remain significant barriers to providing donor milk to high-risk infants. These barriers might cause some families to seek out human milk not handled by an established milk bank (informal milk sharing), a practice

that is not supported by the American Academy of Pediatrics because of increased risks of bacterial or viral contamination, as well as the possibility of exposure to medications, drugs, and other substances when milk and donors are not appropriately screened (14). Some states have passed legislation that allows Medicaid coverage of donor milk for high-risk neonates. Policies that advocate for the use of donor human milk based on an infant's medical need, regardless of insurance status, should be advanced by obstetrician–gynecologists and other health care professionals.

Societal Barriers to Breastfeeding

Social and structural determinants of health can have a significant effect on a parent's general health, including their desire or ability to breastfeed (18).

An individual's racialized experience in the world can greatly affect their ability to meet their breastfeeding goals. Historical factors, such as predatory marketing of infant formulas in the 1950s, might play into breastfeeding decisions made by Black American parents today (19). People of color are more likely to live in under-resourced areas where access to breastfeeding support is less available than in well-resourced areas (20). Research has also shown an association between the experience of racism and discrimination in the job setting and lower odds of breastfeeding at 3–5 months (21). Structural racial inequities result in parents of color being disproportionately affected by barriers common to most individuals who desire to breastfeed, such as inadequate parental leave policies (20, 22). Resources are available to support families of color and identify solutions to overcome disparities in breastfeeding (Box 2).

American Indians and Alaska Natives also have breastfeeding rates lower than the national average, but literature on feeding behavior is limited compared with other racial and ethnic groups. Studies have shown that social networks can have a positive effect on breastfeeding rates among indigenous persons (23). Native Nation governments also have a role in educating individuals about the importance of breastfeeding. Multiple active coalitions exist, such as the Native American Breastfeeding Coalition of Washington and the Navajo Breastfeeding Coalition (24). All thirteen Indian Health Service hospitals that provide maternity care have implemented the Ten Steps, reinforcing the health services' commitment to encouraging breastfeeding (25).

Lack of or inadequate parental leave policies may have a detrimental effect on breastfeeding in parents who return to work. Many individuals with fewer resources have low rates of breastfeeding because they are more likely to return to work soon after giving birth and are employed in positions that make breastfeeding at work more difficult than those with higher incomes (26). A 2018 report from the University of California Hastings College of the Law found lactation discrimination to be widespread, with particularly harsh effects for low-wage workers, who are more likely to be people of color (27).

Policy changes can have a beneficial effect on breastfeeding in the workplace. For example, statewide paid family leave policies in California and New Jersey are associated with increased exclusive breastfeeding rates (28, 29). The ACA supports breastfeeding in several ways. First, it mandates access to breastfeeding support and counseling and provides breastfeeding supplies, such as a breast pump, with no cost sharing. Furthermore, through an amendment to the Fair Labor Standards Act known as "Break Time for Nursing Mothers," the ACA requires employers to provide reasonable break time and a private place, other than a bathroom, for breastfeeding individuals to express breast milk during the workday for 1 year after the infant's birth (30, 31). Despite this requirement, the 2018 report from the University of California Hastings College of the Law finds that over 25 million workers of childbearing age in the United States are left without adequate protections for breastfeeding while working (27).

Unfortunately, not all individuals benefit from the Fair Labor Standards Act amendment. Employers with fewer than 50 employees may apply for exemption if they are able to show that compliance would cause them undue hardship (31). In addition, many salaried employees are exempt from this law and must do their own negotiation and advocacy if they plan to express milk in the workplace (27). Knowledge of their rights related to breastfeeding may be beneficial as parents return to work. A Better Balance (www.abetterbalance.org) and the University of California Hastings College of the Law Center for Work-Life Law (worklifelaw.org) are examples of organizations dedicated to combating workplace discrimination based on pregnancy and family status. State-specific resources that inform breastfeeding mothers about state and local breastfeeding laws are available on individual websites.

Box 2. Breastfeeding Resources for Families of Color

- Black Mothers' Breastfeeding Association (https://blackmothersbreastfeeding.org)
- It's Only Natural (https://www.womenshealth.gov/its-only-natural)
- National Medical Association–Breastfeeding (https://www.nmanet.org/page/Breastfeeding)
- ROBE: Reaching Our Brothers Everywhere (https://breastfeedingrobe.org)
- ROSE: Reaching Our Sisters Everywhere (http://www.breastfeedingrose.org)

Paid parental leave has been demonstrated to increase initiation and maintenance of breastfeeding (29). Strong support of paid parental leave is unanimous across national organizations, including the Society for Maternal-Fetal Medicine (12 weeks recommended) and the American Academy of Pediatrics (12 weeks recommended) (32, 33). To benefit the parent–child dyad, including promoting the opportunity to breastfeed, ACOG recommends paid parental leave, with maintenance of full benefits and 100% pay, for a minimum of 6 weeks. Obstetrician–gynecologists and other health care professionals should strongly advocate for policies that enable breastfeeding, including paid parental leave and break time for all persons to express milk in the workplace (34).

Other Barriers to Breastfeeding

Practitioners should be open and willing to discuss the intersecting barriers to breastfeeding that parents may face to help them achieve their breastfeeding goals. Acknowledging challenges involved in breastfeeding, the difficulties many parents experience while breastfeeding, and recognizing that these experiences are risk factors for postpartum depression, is critical (35). Additionally, it is important that breastfeeding support not be coercive, and that the parent's informed decision about whether or not to breastfeed be respected (4).

Practitioner Barriers

Practitioner knowledge of resources is important to encourage breastfeeding. The American College of Obstetricians and Gynecologists lists physician resources in "The Physician's Role in Human Milk Feeding" at www.acog.org/education-and-events/publications/the-physicians-role-in-human-milk-feeding. Clinicians should be aware of community resources, including prenatal lactation classes, lactation consultants, home-visiting practitioners, and local and national support groups. Telehealth interventions, including text messages and web-based interactive support, have shown promise to extend breastfeeding continuation (36–39). It is helpful for parents to learn about these resources during prenatal care. All practitioners, family members, and childcare providers involved with the care of pregnant and postpartum patients and their infants can support breastfeeding initiation and continuation. The benefits of breastfeeding, as well as patient education, counseling, and support strategies, should be emphasized during medical school and training of residents in obstetrics and gynecology, family medicine, and pediatrics. Ongoing education also should be promoted for all clinicians and hospital staff involved in childbirth.

Parents With a History of or Current Trauma

Obstetrician–gynecologists and other health care professionals should be aware of the effect that a history of trauma can have on an individual's health and interaction with the health care system, including their desire to breastfeed (40). The principles of trauma-informed care should be used when counseling about breastfeeding. Physical abuse during pregnancy has been linked with early cessation of exclusive breastfeeding (41). Similarly, psychological intimate partner violence increases the avoidance of breastfeeding (42). Patients with a history of sexual trauma may choose not to breastfeed, but those who do often report positive bodily connections while breastfeeding and feelings of empowerment by their choice to do so (43).

Barriers for Patients With Complex Medical Issues

Patients with complex medical issues breastfeed at lower rates and for a shorter duration than patients without medical conditions (44–46). Prenatally, practitioners should identify patients with medical comorbidities, assess the patient's intention to breastfeed, and ensure there is no contraindication to breastfeeding (4). Although the decision to breastfeed is influenced by many factors, programs that assist patients with medically complex pregnancies and deliveries may improve rates of breastfeeding in this population (47). Most medications are compatible with breastfeeding; however, patients who require medications during pregnancy or postpartum, or both, might be hesitant to breastfeed or take prescribed medications because of concerns related to infant drug exposure through lactation (48). Practitioners should be familiar with the Drugs and Lactation Database, called LactMed (www.ncbi.nlm.nih.gov/books/NBK501922), which provides comprehensive information on excretion of medications into breastmilk, including suggestions for alternative medications in cases in which a specific medication is contraindicated.

Barriers for Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ+) Parents

The LGBTQ+ community is ethnically, socioeconomically, and geographically diverse, and there is a paucity of information related to lactation support for LGBTQ+ parents. Research generally has focused on white lesbian and gay individuals and may not reflect the experiences of all LGBTQ+ people. LGBTQ+ patients may face unique challenges with breastfeeding, such as co-nursing and induced lactation (49). Transgender men who choose to breastfeed, also referred to as "chestfeed," may have difficulty with milk supply if they have had chest reduction surgery (50). Transgender women who desire to breastfeed may induce lactation with a combination of medications and breast pumping (51). For transgender men, the decision not to lactate may be driven by body dysmorphia, and the decision to resume testosterone treatment soon after pregnancy, which will suppress lactation. Clinicians should be aware of resources, such as La Leche League International, the Academy of Breastfeeding Medicine, and the United States Breastfeeding Committee, that offer information and support for LGBTQ+ individuals who choose to pursue lactation (50, 52, 53).

Substance Use Disorder and Breastfeeding

Substance use disorder should not be considered a categorical contraindication to breastfeeding. For example, patients with opioid use disorder who are stable on medication-assisted therapy, and without other contraindications, should be encouraged to breastfeed. On the other hand, patients actively using illicit substances, such as methamphetamine or cocaine, should not breastfeed (48, 54, 55). Many parents with substance use disorder have coinciding hepatitis C infection, which is not a contraindication to breastfeeding, unless nipples are cracked and bleeding (56). While nipples are healing, the parent should pump and discard the milk until the nipple skin is healed and breastfeeding can resume safely.

Parents who are entering recovery should be counseled that if they would like to maintain lactation by pumping until their milk is safer, they should be encouraged to do so. Obstetrician–gynecologists should be prepared to discuss these safety issues with their patients and advise as appropriate (54, 55, 57).

Although marijuana use is becoming more common, data related to its effects on infants is limited, and marijuana use during breastfeeding is strongly discouraged. However, the choice to breastfeed an infant in this setting is not absolutely contraindicated (48, 57–59). Practitioners should use harm-reduction strategies without imposing arbitrary restrictions.

Incarcerated Parents and Breastfeeding

Incarcerated parents face unique barriers to providing breast milk for their infants. Many prisons and jails do not have policies or equipment that allow parents to express milk or directly breastfeed infants at contact visits. This lack of access decreases breastfeeding initiation rates for parents who give birth while in custody and disrupts milk supply for those who enter as lactating parents. Some institutions of incarceration do have supportive policies and pumping equipment, which demonstrate that it is feasible to support breastfeeding for incarcerated parents. The American College of Obstetricians and Gynecologists and the National Commission on Correctional Health Care support such programs (60). Even when systems are in place, challenges remain in the transfer of breastmilk to an infant's caregiver, in the low availability of lactation consultations for parents in custody, the lack of adequate privacy, and the psychological difficulties of being separated from one's child. Obstetrician–gynecologists and other health care professionals can facilitate lactation support services for incarcerated parents, especially while the parent is in the hospital, by educating prison and jail staff about the maternal and child benefits of breastfeeding and advocating that legislation support such programs (61).

Social Support and Breastfeeding

Lack of family and social support also can be a barrier to achieving breastfeeding goals (62). Partner demographics such as race, education, and exposure to breastfeeding are associated with attitudes about breastfeeding that can affect the decision to breastfeed (63). Education directed at the partner has been demonstrated to improve breastfeeding rates (64). An example of a community organization focused specifically on African American fathers is Reaching Our Brothers Everywhere (ROBE; breastfeedingrobe.org). Their goal is to educate, equip and empower men about breastfeeding, which increases rates of breastfeeding and decreases infant mortality rates in the African American community. Peer support programs also have been shown to increase the initiation, duration, and exclusivity of breastfeeding (65–68).

Adolescent Parents and Breastfeeding

Adolescent parents are less likely to breastfeed their children (74%) compared with those older than 20 years (82.4–85.2%) (3). Among adolescents, factors such as the effect of breastfeeding on social and intimate relationships and the availability of social support have a significant influence on the decision to breastfeed (69). Adolescents also face other barriers to breastfeeding, including inadequate education on the importance of breastfeeding, lack of support to initiate and continue breastfeeding, and lack of school-based or work-based facilities in which to breastfeed or pump (70). The obstetric and pediatric community should encourage adolescent and young parents who desire to breastfeed and offer augmented support systems, such as formal parenting programs and support groups (71). Ten Steps care also has been shown to increase the initiation and continuation of breastfeeding in this group (72).

Summary

Breast milk is well established as the best source of nutrition for infants. Breastfeeding has maternal, infant, and societal benefits. Despite efforts to increase rates of breastfeeding initiation and continuation, inequities still persist. The American College of Obstetricians and Gynecologists recommends that practitioners educate parents about the benefits and mechanics of breastfeeding and encourages clinicians, nursing staff, and government assistance agencies to advocate for policy changes that facilitate breastfeeding, including lactation programs, both within hospitals and in the community. Joint decision making between parents and health care professionals is vital to minimize the risk of coercion. A multidisciplinary approach that involves community, family, parents, and health care professionals will strengthen the support for parents and help them achieve their breastfeeding goals.

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Barriers to breastfeeding: supporting initiation and continuation of breastfeeding. ACOG Committee Opinion No. 821. American College of Obstetricians and Gynecologists. Obstet Gynecol 2021;137:e54–62.

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Appendix D

The American College of Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

ACOG COMMITTEE OPINION

Number 756

(Replaces Committee Opinion No 658, February 2016)

Breastfeeding Expert Work Group
Committee on Obstetric Practice

This Committee Opinion was developed by the American College of Obstetricians and Gynecologists' Breastfeeding Expert Work Group and the Committee on Obstetric Practice in collaboration with work group members Susan D. Crowe, MD and Lauren E. Hanley, MD, IBCLC.

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Optimizing Support for Breastfeeding as Part of Obstetric Practice

ABSTRACT: As reproductive health experts and advocates for women's health who work in conjunction with other obstetric and pediatric health care providers, obstetrician–gynecologists are uniquely positioned to enable women to achieve their infant feeding goals. Maternity care policies and practices that support breastfeeding are improving nationally; however, more work is needed to ensure all women receive optimal breastfeeding support during prenatal care, during their maternity stay, and after the birth occurs. Enabling women to breastfeed is a public health priority because, on a population level, interruption of lactation is associated with adverse health outcomes for the woman and her child, including higher maternal risks of breast cancer, ovarian cancer, diabetes, hypertension, and heart disease, and greater infant risks of infectious disease, sudden infant death syndrome, and metabolic disease. Contraindications to breastfeeding are few. Most medications and vaccinations are safe for use during breastfeeding, with few exceptions. Breastfeeding confers medical, economic, societal, and environmental advantages; however, each woman is uniquely qualified to make an informed decision surrounding infant feeding. Obstetrician–gynecologists and other obstetric care providers should discuss the medical and nonmedical benefits of breastfeeding with women and families. Because lactation is an integral part of reproductive physiology, all obstetrician–gynecologists and other obstetric care providers should develop and maintain skills in anticipatory guidance, support for normal breastfeeding physiology, and management of common complications of lactation. Obstetrician–gynecologists and other obstetric care providers should support women and encourage policies that enable women to integrate breastfeeding into their daily lives and in the workplace. This Committee Opinion has been revised to include additional guidance for obstetrician–gynecologists and other obstetric care providers to better enable women in unique circumstances to achieve their breastfeeding goals.

Recommendations

The American College of Obstetricians and Gynecologists makes the following recommendations:

Education

- Clinical management of lactation is a core component of reproductive health care.
- Because lactation is an integral part of reproductive physiology, all obstetrician–gynecologists and other obstetric care providers should develop and maintain skills in anticipatory guidance, support for normal breastfeeding physiology, and management of common complications of lactation.

Support for Breastfeeding Women

- Women are strongly encouraged to breastfeed and the American College of Obstetricians and Gynecologists supports each woman's right to breastfeed. Exclusive breastfeeding is recommended for the first 6 months of life, with continued breastfeeding as complementary foods are introduced during the infant's first year of life, or longer, as mutually desired by the woman and her infant.

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- The advice and encouragement of the obstetrician–gynecologist and other obstetric care providers are critical in assisting women to make an informed infant feeding decision and should be free from coercion, pressure, or undue influence.
- Obstetrician–gynecologists and other obstetric care providers should support each woman's informed decision about whether to initiate or continue breastfeeding, recognizing that she is uniquely qualified to decide whether exclusive breastfeeding, mixed feeding, or formula feeding is optimal for her and her infant.
- When taking an obstetric history, obstetrician–gynecologists and other obstetric care providers should specifically ask about any breast surgeries, prior breastfeeding duration, and any previous breastfeeding difficulties.
- Breastfeeding is an option for women who have undergone double mastectomy and reconstruction by feeding with a supplemental feeding tube device at the breast.
- Women who experience breastfeeding difficulties are at higher risk of postpartum depression and should be screened, treated, and referred appropriately.
- Most medications and vaccinations are safe for use during breastfeeding.
- Obstetrician–gynecologists and other health care providers should consult lactation pharmacology resources for up-to-date information on individual medications because inappropriate advice often can lead women to discontinue breastfeeding unnecessarily.
- Obstetrician–gynecologists and other obstetric care providers should support women who have given birth to preterm and other vulnerable infants to establish a full supply of milk by providing anticipatory guidance and working with hospital staff to facilitate early, frequent milk expression starting within 1 hour of delivery, if possible.

Policy

- Obstetrician–gynecologists and other obstetric care providers should support women and encourage policies that enable women to integrate breastfeeding into their daily lives and in the workplace.
- The World Health Organization's "Ten Steps to Successful Breastfeeding" should be integrated into maternity care to increase the likelihood that a woman will initiate and sustain breastfeeding and achieve her personal breastfeeding goals.
- Policies that protect the right of a woman and her child to breastfeed in public and that accommodate milk expression, such as insurance coverage for breast pumps, paid maternity leave, on-site child-care, break time for expressing milk, and a clean, private location for expressing milk, are essential to sustaining breastfeeding.

Introduction

Although most women in the United States initiate breastfeeding, more than one half wean earlier than they desire (1). In addition, substantial disparities persist in initiation and duration of breastfeeding that affect population health (2). For example, in a sample of infants born between 2010 and 2013, there was a 17.2% difference in the rate of initiation among black and white women in the United States. Furthermore, there was a 7.8 percentage point difference in 6-month exclusive breastfeeding rates and a 13.7 percentage point difference in any breastfeeding at 12 months (3). Maternity care policies and practices that support breastfeeding are improving nationally; however, more work is needed to ensure all women receive optimal breastfeeding support during prenatal care, during their maternity stay, and after the birth occurs (4). As reproductive health experts and advocates for women's health who work in conjunction with other obstetric and pediatric health care providers, obstetrician–gynecologists are uniquely positioned to enable women to achieve their infant feeding goals. This Committee Opinion has been revised to include additional guidance for obstetrician–gynecologists and other obstetric care providers to enable women in unique circumstances achieve their breastfeeding goals.

Benefits of Breastfeeding

Clinical management of lactation is a core component of reproductive health care. However, education surrounding lactation is often lacking in graduate and postgraduate medical education (5). Enabling women to breastfeed is a public health priority because, on a population level, interruption of lactation is associated with adverse health outcomes for the woman and her child, including higher maternal risks of breast cancer, ovarian cancer, diabetes, hypertension, and heart disease, and greater infant risks of infectious disease, sudden infant death syndrome, and metabolic disease (2, 6, 7).

Although lactation is the physiologic norm, cultural norms for infant feeding have changed dramatically in the past century. In 1971, only 24.7% of women left the hospital breastfeeding. Since then, breastfeeding initiation rates have progressively increased. In 2014, 82.5% of women in the United States initiated breastfeeding, 55.3% were breastfeeding at 6 months, and 33.7% were breastfeeding at 1 year after giving birth (8) (Table 1).

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Breastfeeding confers medical, economic, societal, and environmental advantages; however, each woman is uniquely qualified to make an informed decision surrounding infant feeding. Obstetrician–gynecologists and other obstetric care providers should discuss the medical and nonmedical benefits of breastfeeding with women and families, (9) because engaging and educating fathers and significant others have been shown to improve breastfeeding success (10). Contraindications to breastfeeding are few and include those women who have an infant with galactosemia, are infected with human immunodeficiency virus (HIV) or human T-cell lymphotropic virus type I or type II, and have active untreated tuberculosis or varicella or active herpes simplex virus lesions on the nipple. Most medications and vaccinations are safe for use during breastfeeding, with few exceptions.

Use of medically indicated drugs or treatment for substance use disorders may not be a contraindication to breastfeeding. For example, women on stable doses of methadone or buprenorphine, who are not using illicit drugs, and who have no other contraindications, should be encouraged to breastfeed (11–13). There are insufficient data to evaluate the effects of marijuana use on infants during lactation. In the absence of data, marijuana use is discouraged (14). As the number of states legalizing and decriminalizing marijuana use increases, screening and counseling women about medicinal and recreational marijuana use during pregnancy and lactation is important and should not be overlooked. More details on marijuana use and lactation can be found in Committee Opinion No. 722, *Marijuana Use During Pregnancy and Lactation* (14).

The Role of Obstetrician–Gynecologists and Other Obstetric Care Providers in Supporting Breastfeeding

The American College of Obstetricians and Gynecologists strongly encourages women to breastfeed and supports each woman's right to breastfeed. The American College of Obstetricians and Gynecologists recommends exclusive breastfeeding for the first 6 months of life, with continued breastfeeding as complementary foods are introduced during the infant's first year of life, or longer, as mutually desired by the woman and her infant. This recommendation is consistent with those of other medical and nursing organizations, such as the American Academy of Pediatrics (7) and the Association of Women's Health, Obstetric and Neonatal Nurses (15). The American College of Obstetricians and Gynecologists additionally supports public health and policy efforts to enable more women to breastfeed, including Healthy People 2020 targets for increasing worksite lactation programs, reducing formula supplementation of breastfed infants in the first 2 days of life, and increasing the proportion of births that occur in facilities that

Table 1. Healthy People 2020 Goals for Breastfeeding

	Healthy People Goals (%)	Current Data U.S. National	Non-Hispanic Black
Increase the proportion of infants who are breastfed at the following stages:			
Ever breastfed	81.9	82.5±1.1*	68.0±3.5
Breastfed at 6 months	60.6	55.3±1.4*	41.5±3.7
Breastfed at 1 year	34.1	33.7±1.3*	21.5±3.1
Breastfed exclusively through 3 months	46.2	46.6±1.4*	32.7±3.5
Breastfed exclusively through 6 months	25.5	24.9±1.3*	15.0±2.7
Increase the proportion of employers who have worksite lactation support programs	38	49†‡	N/A
Reduce the proportion of breastfed newborns who receive formula supplementation within the first 2 days of life	14.2	15.5±1.0*	N/A
Increase the proportion of live births that occur in facilities that provide recommended care for lactating women and their newborns	81	7.79§	N/A

*2014 Births (Centers for Disease Control and Prevention. Breastfeeding among U.S. children born 2002–2014, CDC National Immunization Survey. Atlanta (GA): CDC; 2017. Available at: https://www.cdc.gov/breastfeeding/data/nis_data/results.html. Retrieved June 26, 2018).

†Society for Human Resource Management. 2018 employee benefits: the evolution of benefits. Alexandria (VA): SHRM; 2018. Available at: https://www.shrm.org/hr-today/trends-and-forecasting/research-and-surveys/Documents/2018%20Employee%20Benefits%20Report.pdf. Retrieved June 26, 2018.

‡Offer onsite lactation/mother's room, defined as a separate room that goes above and beyond The Patient Protection and Affordable Care Act law, which requires that employees be "shielded from view" and "free from intrusion" during their break. Six percent offer lactation support services.

§Centers for Disease Control and Prevention. Breastfeeding report card: United States/2016. Atlanta (GA): CDC; 2016. Available at: https://www.cdc.gov/breastfeeding/pdf/2016breastfeedingreportcard.pdf. Retrieved June 26, 2018.

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provide recommended care for lactating women and their infants (Table 1).

Because lactation is an integral part of reproductive physiology, all obstetrician–gynecologists and other obstetric care providers should develop and maintain skills in anticipatory guidance, support for normal breastfeeding physiology, and management of common complications of lactation. Obstetrician–gynecologists and other obstetric care providers should be in the forefront of policy efforts to enable women to breastfeed, whether through individual patient education, change in hospital practices, community efforts, or supportive legislation.

Obstetrician–gynecologists can play an active role in breastfeeding support by helping to ensure that their office practice setting aligns with these goals. The following practices are evidence-based options that obstetricians can implement to optimize the office setting: a written breastfeeding policy to facilitate support for breastfeeding patients and employees, providing information to patients about infant feeding that is free of artificial infant formula advertising, displaying posters and pamphlets with images of women breastfeeding that reflect the diversity of the population, and partnering with regional breastfeeding support services where patients can be referred for additional breastfeeding support after delivery (16–18).

Prenatal Care

The advice and encouragement of the obstetrician–gynecologist and other obstetric care providers are critical in assisting women to make an informed infant feeding decision and should be free from coercion, pressure, or undue influence (19). Women and families should receive noncommercial, accurate, and unbiased information so that they can make informed decisions about their health care (20). Obstetric care providers should be aware that personal experiences with infant feeding may affect their counseling. In addition, pervasive direct-to-consumer marketing of infant formula adversely affects patient and health care provider perception of the risks and benefits of breastfeeding.

Beginning conversations about lactation early in prenatal care by asking the patient and her family, "What have you heard about breastfeeding?" sets the stage for a patient-centered discussion. When taking an obstetric history, obstetrician–gynecologists and other obstetric care providers should specifically ask about any breast surgeries, prior breastfeeding duration, and any previous breastfeeding difficulties. Prior problems leading to earlier-than-desired weaning should be discussed, anticipatory guidance should be provided, and appropriate lactation support resources should be identified. The breast examination can identify surgical scars indicating prior surgery, as well as widely spaced, tubular breasts that may indicate insufficient glandular tissue (6). A breast assessment and breastfeeding history should be obtained as part of prenatal care, and identified concerns and risk factors for breastfeeding difficulties should be discussed with the woman and communicated to the infant's health care provider, either directly or as part of shared records. A woman with a history of breast surgery usually can successfully breastfeed with the supervision of a health care provider to watch for any milk supply challenges or other anatomic issues related to the procedure. Of particular concern is a history of breast reduction, extensive wide local excision or multiple biopsies because these procedures can affect the ability to produce a full milk supply or permit normal anatomic drainage through the ducts, or both. Obstetrician–gynecologists and other obstetric care providers should engage the patient's partner and other family members in discussions about infant feeding and address any questions and concerns. This patient-centered approach allows the health care provider, the patient, and her family to anticipate challenges, develop strategies to address them, and collaborate to develop a feeding plan that is compatible with the woman's and family's goals. Obstetrician–gynecologists and other obstetric care providers should support each woman's informed decision about whether to initiate or continue breastfeeding, recognizing that she is uniquely qualified to decide whether exclusive breastfeeding, mixed feeding, or formula feeding is optimal for her and her infant.

Breast cancer is the most common cancer in women worldwide (21). The range of treatment options for breast cancer is wide and many of these women will go on to have children. Women who undergo lumpectomy and radiation may opt to breastfeed. The volume of milk produced after breast radiation is decreased. In addition, breast milk from an irradiated breast can have a higher sodium concentration and lower fat concentration. Infants will sometimes reject the milk from an irradiated breast or show strong preference for the nonirradiated breast, or both (22). A full milk supply may develop in the nonirradiated breast, however, counseling about nipple soreness and complications is prudent. Breastfeeding is an option for women who have undergone double mastectomy and reconstruction by feeding with a supplemental feeding tube device at the breast (23). This device has a container, often a syringe, that has a small tube attached that can be held or taped to the woman's breast. When the infant latches, the milk from the container is drawn into the infant's mouth through this tube. These women can still participate in skin-to-skin contact and should be offered alternative approaches to feeding their infants if desired. Some women in this population may choose to use donor milk if it is available. It is important to support these women and provide resources for them, including referral to lactation specialists who have experience in breastfeeding after a breast cancer diagnosis. There are specific support groups addressing these concerns (24).

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As breastfeeding rates continue to increase in the United States, more than 33% of infants are breastfeeding at 12 months and beyond (8). Thus, the topics of lactation during pregnancy and tandem nursing (when an older child and newborn are both nursing) are becoming even more relevant to the obstetrician–gynecologist than in the past. Many nursing women may notice nipple soreness or a decrease in milk supply when they become pregnant, or both. Therefore, these symptoms should trigger pregnancy testing. A review of the limited literature available suggests that there is no increase in spontaneous abortion and preterm birth among low risk women who are breastfeeding during pregnancy, and most infants will wean from breastfeeding during the first or second trimester of the woman's subsequent pregnancy. There is an increased risk of anemia in women who breastfeed while pregnant, and they can expect their milk supply to diminish. They also can expect to transition to colostrum during later parts of pregnancy. Tandem nursing has not been consistently associated with diminished infant growth, with some studies showing less and others showing more growth. More data are needed to fully understand the effect of breastfeeding during pregnancy in developed countries (25).

Intrapartum Care

Maternity care practices affect breastfeeding outcomes. The World Health Organization's "Ten Steps to Successful Breastfeeding" (Ten Steps) is an evidence-based set of health care practices that support breastfeeding physiology, including early skin-to-skin care, enabling rooming-in, and feeding on demand (see Box 1) (2). In a systematic review of randomized controlled trials, skin-to-skin care in the first hour of life increased breastfeeding duration by a mean of 64 days (95% CI, −37.96 to 89.50) (26). Rooming-in enables women to learn and respond to infant cues and facilitates early breastfeeding. It is important to communicate the rationale for rooming-in to families during prenatal care and during the maternity care stay. A woman's clinical situation, fatigue, or a specific request for alternative arrangements may necessitate different rooming options. The Ten Steps should be integrated into maternity care to increase the likelihood that a woman will initiate and sustain breastfeeding and achieve her personal breastfeeding goals (27). Cesarean birth is associated with lower breastfeeding rates, and women who undergo cesarean delivery may need extra support to establish and sustain breastfeeding. Skin-to-skin contact is feasible in the operating room and is associated with reduced need for formula supplementation (28).

As hospitals are making progress towards providing skin-to-skin care and rooming-in, which facilitate breastfeeding initiation, it is important that infants are adequately supervised to ensure safety, prevent falls, and prevent sudden unexpected postnatal collapse.

Box 1. Ten Hospital Practices to Encourage and Support Breastfeeding*

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in the skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help women initiate breastfeeding within 1 hour of birth.
5. Show women how to breastfeed and how to maintain lactation, even if they are separated from their newborns.
6. Give newborns no food or drink other than breast milk, unless medically indicated.
7. Practice rooming-in—allow mothers and newborns to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no pacifiers or artificial nipples to breastfeeding infants.†
10. Foster the establishment of breastfeeding support groups and refer to them on discharge from the hospital or birth center.

*The 1994 report of the Healthy Mothers, Health Babies National Coalition Expert Work Group recommended that the UNICEF-WHO Baby Friendly Hospital Initiative be adapted for use in the United States as the United States Breastfeeding Health Initiative, using the adapted 10 steps above.

†The American Academy of Pediatrics endorsed the UNICEF–WHO Ten Steps to Successful Breastfeeding but does not support a categorical ban on pacifiers because of their role in reducing the risk of sudden infant death syndrome and their analgesic benefit during painful procedures when breastfeeding cannot provide the analgesia.

Data from Baby-Friendly USA. Guidelines and evaluation criteria for facilities seeking baby-friendly designation. Sandwich (MA): Baby Friendly USA; 2010. Available at: https://www.babyfriendlyusa.org/get-started/the-guidelines-evaluation-criteria. Retrieved October 29, 2015.

Particular attention is required for breastfeeding dyads when the woman is using opioid analgesia. Practicing a standardized approach to infant monitoring, which includes optimal infant positioning and observation, is vitally important in order to avoid adverse events (see Box 2) (29). The American College of Obstetricians and Gynecologists' Committee Opinion No. 742 and Committee Opinion No. 711 include further discussion about opioid use and breastfeeding (11, 30).

Healthy People 2020 and the Joint Commission have targeted unnecessary formula supplementation as a barrier to establishing breastfeeding, and maternity care providers can provide anticipatory guidance for families regarding the rationale for avoiding early introduction of formula. Distribution of formula marketing packs reduces breastfeeding initiation and duration (31) and implies that formula is a recommended feeding method.

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Box 2. Components of Safe Positioning for the Newborn While Skin-to-Skin

1. Infant's face can be seen
2. Infant's head is in "sniffing" position
3. Infant's nose and mouth are not covered
4. Infant's head is turned to one side
5. Infant's neck is straight, not bent
6. Infant's shoulders and chest face mother
7. Infant's legs are flexed
8. Infant's back is covered with blankets
9. Mother–infant dyad is monitored continuously by staff in the delivery environment and regularly on the postpartum unit
10. When mother wants to sleep, infant is placed in bassinet or with another support person who is awake and alert

Reprinted from Ludington–Hoe SM, Morgan K. Infant assessment and reduction of sudden unexpected postnatal collapse risk during skin-to-skin contact. Newborn Infant Nurs Rev 2014;14:28–33.

Moreover, provision of samples implies the health care provider's endorsement of a specific brand, which encourages families to purchase more expensive brand-name products, rather than generic equivalents (32). Such marketing should not occur in inpatient or outpatient health care settings.

The adolescent birth rate continues to decrease in the United States, but it remains the highest in the developed world. Most adolescent mothers would like to breastfeed, but they face unique challenges particular to their age. This cohort breastfeeds less exclusively and for shorter duration than their older counterparts when dividing women by age 20 years or younger (33). When adolescents are exposed to more components of the Ten Steps, they also tend to breastfeed longer and more exclusively. Thus, Ten Steps care is a practice that supports females of all ages and should not be denied to adolescents. Adolescent mothers are a vulnerable population in whom the health effects of breastfeeding could be particularly beneficial (34).

Overall, the preterm birth rate in the United States is currently 9.8% and black women have a prematurity rate of 13.3%, which is 49% higher than the preterm birth rate among all other women (35). The American Academy of Pediatrics states that all preterm infants should receive human milk. If a woman's own milk is not available, pasteurized donor human milk is the next best alternative (36). When fed human milk, this fragile group of infants has a lower risk of necrotizing enterocolitis, retinopathy of prematurity, late onset sepsis, and lower readmission rates in the first year of life (37, 38). Sharing this information with women who have given birth to preterm infants and who intend to formula feed can increase breastfeeding initiation without increasing maternal anxiety (39). Obstetrician–gynecologists and other obstetric care providers should collaborate with the pediatric care provider to share this information as soon as a preterm birth is anticipated because initiation of milk expression within 6 hours of birth is associated with improved milk production (40). Obstetrician–gynecologists and other obstetric care providers should support women who have given birth to preterm and other vulnerable infants to establish a full supply of milk by providing anticipatory guidance and working with hospital staff to facilitate early, frequent milk expression starting within 1 hour of delivery, if possible (41, 42). It is important to recognize and support this vulnerable group of mother–infant dyads because these women have particular challenges to initiate and maintain milk supply.

Clinical Management of the Breastfeeding Dyad

The offices of obstetrician–gynecologists and other obstetric care providers should be a resource for breastfeeding assistance throughout the entire breastfeeding relationship. Breastfeeding is a two-person activity, and evaluation of breastfeeding problems requires assessment of the woman and her infant, as well as the active engagement and support of her partner, extended family, or other identified support. Management of issues such as pain, perceived or actual low milk supply, breast infections, and maternal medication safety should, therefore, be coordinated with the infant's health care provider as appropriate. Office staff should be prepared to triage common breastfeeding concerns and to refer women, as needed, to a certified lactation professional in the community, such as an International Board Certified Lactation Consultant or other lactation provider. Embedding lactation professionals within the offices of an obstetrician–gynecologist or other obstetric care provider may be feasible with coverage of lactation services included as preventive care under the Affordable Care Act (43). The American College of Obstetricians and Gynecologists encourages each health care provider to learn his or her own community resources to best support patients. In addition, screening patients for Women, Infants, and Children eligibility during prenatal care is an important way to help provide breastfeeding and nutrition support to many women and families. This type of collaborative care model helps enable women to achieve their feeding goals (44).

Most medications are safe for use during breastfeeding. Obstetrician–gynecologists and other health care providers should consult lactation pharmacology resources for up-to-date information on individual medications (12) because inappropriate advice often can lead women to discontinue breastfeeding unnecessarily. LactMed is a free resource updated monthly from the National Institutes of Health National Library of Medicine and available online or as an app compatible with

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most smartphones. Information about drug safety in pregnancy should not be extrapolated to breastfeeding because the physiology of the placenta and breast are not the same. For example, warfarin crosses the placenta and can cause embryopathy, but minimal amounts enter breast milk, so it is considered to be safe during lactation (45). Counseling regarding medication use during lactation should address the risks of drug exposure through breast milk and the risks of interrupting lactation. After anesthesia for surgical procedures, women who have given birth to healthy infants generally may breastfeed as soon as they are stable, awake, and alert enough to hold the infant (46). Breastfeeding can be continued without interruption after the use of iodinated contrast during a computed tomography scan or gadolinium contrast with magnetic resonance imaging (12, 47).

Low milk supply is a common concern and may reflect misinterpretation of normal infant feeding behaviors, low production, or inadequate milk transfer (48). The most common cause of low milk supply is inadequate breast stimulation. Careful evaluation by a certified lactation professional to ensure frequent breast stimulation and milk removal is the most effective strategy to increase milk production. There is limited evidence for medications and herbal galactagogues to increase milk supply (49).

Pain is a common cause of premature weaning. In one study of more than 1,300 women who stopped breastfeeding in the first month, approximately two out of three cited pain or sore, cracked, or bleeding nipples as an important reason (50). The differential diagnosis of nipple or breast pain is broad and complex. The support of the breastfeeding woman with pain requires time and knowledge. If the symptoms, history, and physical examination do not confer a diagnosis, additional evaluation with a certified lactation professional should be strongly considered (51).

Disrupted lactation is common, with one in eight women reporting early, undesired cessation of breastfeeding because of multiple problems with pain, low milk supply, or the infant being unable to latch on to the breast (48). Obstetric care providers should collaborate with certified lactation professionals and the infant's health care provider to evaluate and manage breastfeeding problems. Even with comprehensive support, some mother–infant dyads are unable to establish sustained, exclusive breastfeeding. Women who are not able to achieve their breastfeeding intentions report considerable distress, and obstetrician–gynecologists and other health care providers should validate each woman's efforts and experience. Women who experience breastfeeding difficulties are at higher risk of postpartum depression and should be screened, treated, and referred appropriately (6).

Contraception is an important topic for all women, and comprehensive discussion of methods should not be delayed for breastfeeding women. Although breastfeeding without introducing any complementary solids or formula will in most cases prevent ovulation and, thus, pregnancy for up to 6 months after giving birth, it will do so only when women are fully or nearly fully breastfeeding and there is continued amenorrhea. Contraceptive options should be explained in detail and include nonhormonal methods (copper intrauterine devices, condoms, diaphragms, lactational amenorrhea method), and hormonal methods (levonorgestrel intrauterine device, etonogestrel implant, medroxyprogesterone acetate injection, progestin-only pills, and combined hormonal contraceptive pills) (52). The American College of Obstetricians and Gynecologists endorses the Centers for Disease Control and Prevention's evidence-based medical eligibility criteria for contraceptive use, which states that, for breastfeeding and nonbreastfeeding women, the advantages of progestin-only pills, injectable contraception, contraceptive implant, and intrauterine devices outweigh the risks for use any time in the postpartum period, including immediately after birth. Because of an increased risk of venous thromboembolism, the advantages of combined hormonal contraceptives, however, do not outweigh the risks for women until 1 month after giving birth (53). The Centers for Disease Control and Prevention and the World Health Organization diverge on recommendations for combined hormonal contraceptives beyond the early postpartum period; according to the World Health Organization, primarily breastfeeding women generally should not use combined hormonal contraceptives from 6 weeks through 6 months after giving birth (54).

Theoretical concerns exist that exogenous progesterone could prevent the onset of milk production because progesterone withdrawal after delivery of the placenta is thought to trigger onset of lactogenesis (48). Women considering immediate postpartum progestin-only contraception should be counseled about the theoretical risk of reduced duration of breastfeeding and about the preponderance of evidence that has not shown a negative effect on actual breastfeeding outcomes (55–57). Obstetric care providers should discuss any concerns within the context of each woman's desire to breastfeed and her risk of unplanned pregnancy, so that she can make an autonomous and informed decision.

Breastfeeding in the Community

Obstetrician–gynecologists and other obstetric care providers should support women and encourage policies that enable women to integrate breastfeeding into their daily lives and in the workplace. Before discharge from the maternity center, women should be provided with contact information for community-based lactation support. Maintaining milk supply depends largely on frequency of milk removal through breastfeeding and through expressing milk (breast pumping or manual expression) when the woman and her infant are separated. Policies that protect the right of a woman and her child to breastfeed in public and that accommodate milk

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expression, such as insurance coverage for breast pumps, paid maternity leave (58), on-site childcare, break time for expressing milk, and a clean, private location for expressing milk (59), are essential to sustaining breastfeeding. Obstetric care provider offices and hospitals can set an example through supportive policies for lactating staff, accommodations for nursing patients, awareness and educational materials, and staff training (15, 16). Laws vary by state, and health care providers should be aware of their state and local laws to inform and empower patients to feel comfortable breastfeeding in public and supported in achieving their breastfeeding goals (see the For More Information section for more information on state and local laws) (2).

For More Information

The American College of Obstetricians and Gynecologists has identified additional resources on topics related to this document that may be helpful for ob-gyns, other health care providers, and patients. You may view these resources at www.acog.org/More-Info/ObBreastfeedingSupport.

These resources are for information only and are not meant to be comprehensive. Referral to these resources does not imply the American College of Obstetricians and Gynecologists' endorsement of the organization, the organization's website, or the content of the resource. The resources may change without notice.

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Optimizing support for breastfeeding as part of obstetric practice. ACOG Committee Opinion No. 756. American College of Obstetricians and Gynecologists. Obstet Gynecol 2018;132:e187–96.

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Appendix E

CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

The Breastfeeding-Friendly Pediatric Office Practice

Joan Younger Meek, MD, MS, RD, FAAP, IBCLC, Amy J. Hatcher, MD, FAAP, SECTION ON BREASTFEEDING

The landscape of breastfeeding has changed over the past several decades as more women initiate breastfeeding in the postpartum period and more hospitals are designated as Baby-Friendly Hospitals by following the evidence-based Ten Steps to Successful Breastfeeding. The number of births in such facilities has increased more than sixfold over the past decade. With more women breastfeeding and stays in the maternity facilities lasting only a few days, the vast majority of continued breastfeeding support occurs in the community. Pediatric care providers evaluate breastfeeding infants and their mothers in the office setting frequently during the first year of life. The office setting should be conducive to providing ongoing breastfeeding support. Likewise, the office practice should avoid creating barriers for breastfeeding mothers and families or unduly promoting infant formula. This clinical report aims to review practices shown to support breastfeeding that can be implemented in the outpatient setting, with the ultimate goal of increasing the duration of exclusive breastfeeding and the continuation of any breastfeeding.

BACKGROUND/CURRENT RECOMMENDATIONS

Breastfeeding has long been documented as the ideal method for feeding and promoting the optimal development of infants and children, with rare exceptions (see Recommendation 3 below). The American Academy of Pediatrics (AAP) describes breastfeeding as the normative method of infant feeding. There are countless medical, emotional, and economic benefits of breastfeeding as described in the 2012 AAP statement "Breastfeeding and the Use of Human Milk."[1] Benefits of breastfeeding include decreased risk of lower respiratory infections, gastroenteritis, otitis media, and necrotizing enterocolitis, the latter being especially important in preterm infants. Because breastfeeding is the norm for infant feeding, comparatively there are risks associated with the lack of breastfeeding, which include an increase in sudden infant death syndrome, obesity, asthma, certain childhood cancers, diabetes, and postneonatal death.[1–3] Breastfeeding promotes attachment and optimal

abstract

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cognitive development. In women, lack of breastfeeding is associated with an increase in the risk of breast and ovarian cancer, type 2 diabetes, heart disease, and postpartum depression.[4–7]

The AAP recommends exclusive breastfeeding for approximately 6 months, followed by continued breastfeeding for 1 year or longer, as mutually desired by mother and child.[1] The *Surgeon General's Call to Action To Support Breastfeeding*[8] in 2011 emphasized the importance of breastfeeding as a public health imperative. Breastfeeding is strongly promoted, supported, and encouraged by the AAP, the Academy of Breastfeeding Medicine,[9] the American College of Obstetricians and Gynecologists,[10,11] and the American Academy of Family Physicians.[12] Each of these organizations calls on its members to be actively engaged in promoting and supporting breastfeeding among their patients.

TABLE 1 The Ten Steps to Successful Breastfeeding

1. Have a written breastfeeding-friendly policy that is routinely communicated to all health care staff.
2. Train all health care staff in the skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within 1 hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants.
6. Give infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming in: allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no pacifiers or artificial nipples to breastfeeding infants.[a]
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or birth center.

[a] The AAP does not support a categorical ban on pacifiers because of their role in SIDS risk reduction and their analgesic benefit during painful procedures when breastfeeding cannot provide the analgesia. Pacifier use in the hospital in the neonatal period should be limited to specific medical indications, such as pain reduction, calming in a drug-exposed infant, etc. For breastfed infants, pacifier introduction should be delayed until breastfeeding is firmly established. Infants who are not being directly breastfed can begin pacifier use as soon as desired.

EPIDEMIOLOGY

The rate of initiation of any breastfeeding in the US population is 81.1% according to data from the National Immunization Survey (2016, birth cohort from 2013).[13] Although the rate of breastfeeding initiation approaches the Healthy People 2020 target[14] of 81.9%, only 22.3% of US infants are breastfed exclusively at age 6 months. There are significant disparities in terms of breastfeeding rates in the country; among black infants, only 66.3% are breastfed at all, and only 14.6% are exclusively breastfed through the first 6 months of life. Among Native American and Alaska Native infants, breastfeeding initiation is 68.3% and exclusive breastfeeding rates at 6 months are 17.9%. Mothers are more likely to breastfeed if they are married, have a college education, live in metropolitan areas, do not experience poverty, and do not receive benefits from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC provides targeted breastfeeding support and peer-counseling services for mothers who qualify for their services. Infants most likely to experience toxic stress are least likely to be breastfed. According to the 2005–2007 Infant Feeding Practices Study II, 85% of US mothers intended to breastfeed exclusively for ≥3 months; however, only 32.4% achieved their intended exclusive breastfeeding duration.[15]

CURRENT INITIATIVES TO INCREASE BREASTFEEDING RATES

There have been numerous initiatives to increase breastfeeding exclusivity and duration both in hospitals and in the outpatient setting. US hospitals accredited by The Joint Commission with maternity units that have at least 1100 births per year are required to report data on the Perinatal Care Core Measure Set, which includes a measure on Exclusive Breast Milk Feeding.[16] There have been major initiatives to increase the number of maternity facilities designated as Baby-Friendly. The first of these was Best Fed Beginnings,[17] a collaboration of the National Initiative for Children's Healthcare Quality, the Centers for Disease Control and Prevention (CDC), and Baby-Friendly USA, in a national effort to improve maternity care practices and achieve designation as Baby-Friendly. Through Best Fed Beginnings, hospitals implemented the evidence-based and AAP-endorsed Ten Steps to Successful Breastfeeding (Table 1), as established in the Baby-Friendly Hospital Initiative, developed by the World Health Organization (WHO)/United Nations Children's Fund.[18–20] Additional maternity care facilities are pursuing the Baby-Friendly designation by participating in EMPower Breastfeeding: Enhancing Maternity Practices,[21] in cooperation with the CDC's Division of Nutrition, Physical Activity, and Obesity, and in partnership with the Carolina Global Breastfeeding Institute and Population Health Improvement Partners. EMPower similarly provides support to hospitals in quality-improvement methodology and breastfeeding support to improve maternity care practices and achieve Baby-Friendly USA designation. The number of births in designated facilities increased from 2.9% in 2007 to 20.01% in January 2017,[22] surpassing the Healthy People 2020 goal of 8.1%.[14]

For the national breastfeeding targets to be met, outpatient support from pediatricians and other pediatric care providers is imperative. As more infants are

being discharged from hospitals designated as Baby-Friendly and having successfully initiated breastfeeding, it is essential that the pediatricians with whom they will follow up are knowledgeable about breastfeeding and that their office practices are prepared to support these breastfeeding dyads. The *Surgeon General's Call to Action To Support Breastfeeding* lists specific action steps that apply directly to the pediatric outpatient practice (Table 2).

TABLE 2 Relevant Steps in the US Surgeon General's Call to Action to Support Breastfeeding

1. Give mothers the support they need to breastfeed their infants.
6. Ensure that the marketing of infant formula is conducted in a way that minimizes its negative impacts on exclusive breastfeeding.
8. Develop systems to guarantee continuity of skilled support for lactation between hospitals and health care settings in the community.
9. Provide education and training in breastfeeding for all health professionals who care for women and children.
10. Include basic support for breastfeeding as a standard of care for midwives, obstetricians, family physicians, nurse practitioners, and pediatricians.
11. Ensure access to services provided by IBCLCs.

Shown are action steps that apply directly to the pediatric outpatient practice, numbered according to the original steps in the Call to Action.[8]

Many pediatricians have little experience in clinical breastfeeding management. Analysis of an AAP Periodic Survey of Fellows regarding breastfeeding in 2004, compared with a similar survey in 1995, showed that pediatricians were less likely to believe that the benefits of breastfeeding outweighed the difficulties or inconvenience, and fewer believed that almost all mothers were able to succeed.[23] Unfortunately, more pediatricians in 2004 reported reasons to recommend against breastfeeding compared with the cohort who responded in 1995. A 2014 AAP Periodic Survey confirmed that some of these attitudes persist (unpublished data from American Academy of Pediatrics Periodic Survey of Fellows No. 89).

Szucs et al[24] found that there were gaps in providers' breastfeeding knowledge, counseling skills, and professional education and training. The authors showed that providers' cultures and attitudes affected breastfeeding promotion and support and that the providers used their own breastfeeding experiences to replace evidence-based knowledge and AAP policy statement recommendations. Both the Academy of Breastfeeding Medicine (ABM)[25] and the US Breastfeeding Committee[26] have published recommendations regarding the education and training of health care professionals, including pediatric care providers, in breastfeeding support and management.

The ABM's clinical protocol "The Breastfeeding-Friendly Physician's Office: Optimizing Care for Infant and Children"[27] details specific steps that a practice can take to become more breastfeeding friendly. These guidelines can inform the guidance for pediatric offices. Corriveau et al[28] sought to determine whether implementing a program based on this clinical protocol affected breastfeeding rates within the pediatric primary care setting. Even with a diverse patient population, rates of both initiation of and exclusive breastfeeding increased after the implementation of the ABM breastfeeding-friendly protocol. Feldman-Winter[29] outlined methods to increase breastfeeding initiation and duration in "Evidence-Based Interventions To Support Breastfeeding." In a comprehensive evidence review for the US Preventive Services Task Force, Chung et al[30] provided evidence that breastfeeding interventions, including both pre- and postnatal interventions, were more influential than either alone and that interventions including a component of lay support, such as peer counselors, are more effective than usual care in increasing short- and long-term breastfeeding rates. The US Preventive Services Task Force recommends interventions during pregnancy and after birth to support breastfeeding and concludes that coordinated interventions can increase breastfeeding initiation, duration, and exclusivity (Evidence Grade B).[31]

THE BREASTFEEDING-FRIENDLY PEDIATRIC OFFICE PRACTICE

Because of the importance of breastfeeding to maternal and infant health outcomes, all pediatric care providers should aim to improve breastfeeding rates in their practices, with the goal of achieving the AAP breastfeeding recommendations for exclusive breastfeeding until approximately 6 months, followed by continued breastfeeding for 1 year or longer, as mutually desired by the mother and infant.[1] Pediatric care providers should help mothers identify and reach their own breastfeeding goals.

The following evidence-based recommendations for the pediatric outpatient practice should be considered as part of the practice-improvement process to increase breastfeeding rates to meet or exceed the AAP recommendations and the Healthy People 2020 goals. These recommendations provide guidance for clinical care and are not intended to imply a standard of care, nor does this report provide a strict weighing of the evidence:

1. Establish a written breastfeeding-friendly office policy that includes the provisions as outlined in this document and in Table 3.[27,32,33] Provide a lactation room with

supplies for employees who breastfeed or express breast milk at work. This room could also be used by breastfeeding mothers (refer to recommendation 12). Collaborate with the entire team, including colleagues and office staff. All employees should be aware of the policy, and copies of the policy should be provided to all staff, including anyone who answers the telephone or retrieves messages, such as front office staff.

2. Train staff in the skills necessary to support breastfeeding, especially nurses and medical assistants.[33] Identify ≥1 breastfeeding resource personnel on staff. If possible, consider employing an International Board Certified Lactation Consultant (IBCLC), or a nurse or other staff member trained in lactation support. Trained staff members may be able to perform much of the routinely provided breastfeeding support under the guidance of the pediatrician or other health care provider. The staff should be aware of community resources, including IBCLCs and other lactation support personnel, especially if one is not available in the practice (see recommendation 15).

3. Become knowledgeable regarding the rare but true contraindications to breastfeeding, which include infants with the classic form of galactosemia, maternal HIV or antiretroviral therapy, untreated active tuberculosis, human T-cell lymphotropic virus type I or II, use of illicit drugs, or mothers undergoing chemotherapy or radiation treatment.[34] Most maternal medications are compatible with breastfeeding. Specific drug information can be verified through the National Institutes of Health Toxicology Data Network, LactMed, which is accessible online or through a mobile device application.[35]

4. Introduce the subject of breastfeeding as early as possible, ideally with prenatal visits and early postpartum visits.[27] Use open-ended questions to inquire about feeding plans for the child, such as "What are your thoughts about feeding your baby?" or "Tell me about your previous infant feeding experiences." Encourage attendance by both parents and/or partners at all visits, and consider discussions with grandparents or other important decision-makers in the family.[36]

5. Encourage breastfeeding mothers to feed newborn infants only human milk and to avoid offering supplements, including formula, glucose water, or other liquids, unless medically indicated.[1] This education ideally should begin prenatally, in anticipation of the newborn infant's stay in the maternity hospital, and should continue through the early postnatal visits.

6. Work with committees within the local hospital or birthing center to implement breastfeeding-friendly care.[1,17,18] Provide the hospital or birthing center with your office policies regarding breastfeeding. If the facility is not aware of the WHO/United Nations Children's Fund Ten Steps to Successful Breastfeeding, the pediatrician can provide education and help to develop breastfeeding-friendly order sets for the hospital. Encourage the facility to pursue the Baby-Friendly USA designation so that mothers and infants are exposed to maternal and newborn care that supports and encourages breastfeeding, beginning with skin-to-skin care in the immediate postpartum period and early initiation of breastfeeding.[20] Show support for breastfeeding during hospital rounds by reinforcing the benefits of breastfeeding, encouraging exclusive breastfeeding, educating about the importance of frequent breastfeeding, and assessing the adequacy of breastfeeding. During rounds, either evaluate a feeding directly or review the chart for documentation of adequacy of feeding. Encourage mothers to attend breastfeeding classes. Advocate for lactation consultation for mothers who are experiencing any breastfeeding problems or who have concerns.

TABLE 3 Summary of Breastfeeding Supportive Office Practices

1. Have a written breastfeeding-friendly office policy
2. Train staff in breastfeeding support skills
3. Discuss breastfeeding during prenatal visits and at each well-child visit
4. Encourage exclusive breastfeeding for ~6 months
5. Provide appropriate anticipatory guidance that supports the continuation of breastfeeding as long as desired
6. Incorporate breastfeeding observation into routine care
7. Educate mothers on breast-milk expression and return to work
8. Provide noncommercial breastfeeding educational resources for parents
9. Encourage breastfeeding in the waiting room, but provide private space on request
10. Eliminate the distribution of free formula
11. Train staff to follow telephone triage protocols to address breastfeeding concerns
12. Collaborate with the local hospital or birthing center and obstetric community regarding breastfeeding-friendly care
13. Link with breastfeeding community resources
14. Monitor breastfeeding rates in your practice

7. Schedule the first newborn visit by the third to fifth day of life, or approximately 24 to 48 hours from the time the newborn infant is discharged depending on the length of the hospital stay. At office visits, incorporate anticipatory guidance that supports exclusive breastfeeding until infants are approximately 6 months old, followed by continued breastfeeding for 1 year or longer, as mutually desired by the infant and mother.[1] Anticipatory guidance should include appropriate guidance about weight-gain expectations with the use of appropriate growth charts, such as the WHO growth standards for ages 0 to 2 years recommended by the CDC.[37]
8. Educate mothers regarding the provisions of the Patient Protection and Affordable Care Act (Pub L No. 111-148 [2010]), which cover access to breastfeeding support services, breaks to breastfeed or pump at work, as applicable,[38] and the ability to obtain breast pumps through insurance.[39]
9. Provide mothers with anticipatory guidance about returning to work. Workplace support in the pediatric practice and in other work environments can be optimized through the implementation of guidance from the Health Resources and Services Administration Maternal and Child Health Bureau's Business Case for Breastfeeding.[32] Provide information and education to mothers about both the expression and the storage of human milk, which may include providing parents with handouts detailing the recommendations regarding expression and storage.[40]
10. Have the front office staff advise the family, when the first follow-up appointment is scheduled, that the pediatrician or other trained office staff may wish to observe a feeding during the first visit, so that the family will be aware. Encourage the family to let the staff know when the infant is ready to feed while waiting for the appointment. For the first and subsequent appointments, feedings should be observed when the mother identifies any breastfeeding problem, or if weight gain is not appropriate.
11. Provide appropriate educational resources for parents.[41,42] These resources could cover, at a minimum, the benefits of breastfeeding for mother and child, AAP recommendations for duration of breastfeeding, education regarding feeding cues, how to tell whether the infant is getting enough milk, latch and holding techniques, and a list of peer support groups and local breastfeeding resources. The literature should be culturally sensitive and appropriate for the literacy of the patient population. Consider linking to appropriate resources on the practice Web site. Avoid distributing literature provided by manufacturers of infant formula.
12. Allow and encourage breastfeeding in the waiting room.[33] Display noncommercial posters and pamphlets that encourage mothers to breastfeed in waiting areas and examination rooms. Include graphics that show diversity and include fathers, who are valuable partners in the success of the breastfeeding dyad. Do not interrupt or discourage breastfeeding, either in the waiting room or in the examination room. Provide a comfortable, private area for mothers to breastfeed if they prefer privacy. This room may include a rocking chair, pillows, music, water fountain, or whatever helps to create a warm and relaxing environment. An examination room may suffice as a private room for breastfeeding.
13. Eliminate the practice of distribution of free formula and other infant items from formula companies to parents.[43,44] In accordance with the WHO International Code of Marketing of Breast-milk Substitutes,[45] the storage of formula supplies, which may be purchased by the practice as applicable for formula-fed infants, should be out of the view of patients. The breastfeeding-friendly pediatric office practice should not accept gifts (formula and other feeding supplies, pens, writing pads, calendars, mugs, etc) from companies manufacturing infant formula, feeding bottles, or pacifiers. Consumer publications that advertise infant formula or have tear-off cards or inserts to receive free or discounted formula should be discouraged.
14. Train staff to follow telephone triage protocols to address breastfeeding concerns and problems. Train staff on providing appropriate breastfeeding telephone advice, including when to refer to an IBCLC or to a physician with special expertise in breastfeeding management.[46] Telehealth consults may be an option in some locations.
15. Acquire or maintain a list of community resources and be knowledgeable about referral procedures. Refer expectant and new parents to peer, community support, and resource groups.[33] Get to know peer and community support groups in your area. WIC breastfeeding support services, La Leche League International, and peer counselors are

some options. Not all groups may provide evidence-based information, so it is useful if the pediatric care provider or members of the clinic staff have attended and maintain good communication with the leaders of these support groups. Consider inviting successfully breastfeeding mothers to join any advisory groups associated with the practice.

16. Frenulum clipping of the tongue/upper lip has become a popular practice, which may improve infant latch and the effectiveness of breastfeeding and milk transfer. Work closely with local lactation consultants or breastfeeding specialists to determine if frenotomy is appropriate. If so, refer to otolaryngologists and/or dentists with experience in clipping the frenulum in a timely fashion, if the physicians in the practice do not perform the procedure.

17. Collaborate with the obstetric community to develop optimal breastfeeding support programs, because it is clearly documented that a mother's decision to breastfeed starts in the prenatal period and, in many cases, before pregnancy.[10,36]

18. Provide support and education to local child care centers on the importance of breastfeeding and the handling, storage, and feeding of expressed human milk.[47]

19. Monitor breastfeeding initiation and duration rates in the pediatric practice. Be able to access state and national trends as tracked by the CDC through the National Immunization Survey[11] and hospital practices through the Maternity Practices in Infant Nutrition and Care biannual survey data.[48]

BARRIERS TO IMPLEMENTING BREASTFEEDING-FRIENDLY OFFICE PRACTICES

There are challenges to implementing the steps as outlined above for the breastfeeding-friendly pediatric office practice. Breastfeeding care delivered by physicians in the outpatient practice may be limited by lack of knowledge, skills, time, and cultural sensitivity.[23] Breastfeeding management and counseling can be both time consuming and labor intensive. In many health care systems, especially in the United States, practice revenue currently is dependent on volume of visits and patients seen instead of the outcomes of those patients. The AAP Section on Breastfeeding has developed a guide on coding and billing[49] as a tool to optimize reimbursement for time spent in breastfeeding support in the office. Coding guidance also is available through the American College of Obstetricians and Gynecologists for maternal conditions.[50] If additional office visits are required beyond those covered for well-child visits, then diagnosis codes should be used for conditions such as jaundice, newborn feeding problem, infection associated with lactation, etc. Extended visits that require repeated evaluation of breastfeeding and extensive counseling should be billed according to time-based codes.

Even if payment were not an issue, time constraints may be. Complicated breastfeeding problems may require immediate attention and can monopolize staff time and space. Some of these more complex issues may exceed the knowledge level or skill set of the general pediatric care provider. Identifying health care providers and lactation support personnel in the community as sources for referral is important for timely intervention. Lactation support personnel may be limited in certain geographic distributions, especially rural areas, as well as in certain communities. There are different skill levels among lactation support personnel. These may include, among others, volunteer or paid peer counselors, lactation educators, certified lactation counselors, IBCLCs, and breastfeeding medicine specialists. The extent of training required by the lactation specialist may vary depending on the needs of the mother and/or infant and the particular clinical or community setting. There exists a need for greater availability of culturally appropriate and ethnically diverse lactation support personnel in a variety of community and health care settings. Home visitation, where available, is a family-friendly way to provide lactation support. Pediatric care providers need to be knowledgeable about common complications that can affect both mother and infant and either treat these conditions in the mother or become aware of obstetrician/gynecologists, family physicians, or breastfeeding medicine specialists in the community who are comfortable and knowledgeable in treating the maternal conditions.

Clearly, there will be obstacles to implementing the steps outlined in this report; however, these obstacles are not insurmountable. With ongoing advocacy for the support of breastfeeding, there should be fewer barriers over time.

FURTHER RESEARCH

It would be valuable to study the cost-effectiveness and impact of the routine presence of trained lactation support personnel, such as IBCLCs, versus no specific lactation support in the outpatient pediatric practice on breastfeeding exclusivity and duration. In addition, further research is needed on the effectiveness and intensity of other interventions to support breastfeeding, such as in-person

consultation, group sessions, online resources, or use of telehealth, as well as community support interventions. Another area for research is the best method for improving pediatric care provider education in breastfeeding management and support during undergraduate and graduate medical education, as well as continuing medical education for practicing physicians. Education of other members of the health care team who may interact with breastfeeding mothers or children is also important. Finally, similar to the research published in *Pediatrics* entitled "Evaluation of an Office Protocol To Increase Exclusivity of Breastfeeding,"[28] in which the authors evaluated the ABM's clinical protocol for the Breastfeeding-Friendly Physician's Office,[27] an evaluation of the impact of implementation in pediatric office practices of the steps outlined in this clinical report on rates of exclusive breastfeeding and duration of breastfeeding would be beneficial.

CONCLUSIONS

The benefits of breastfeeding and the potential risks of not breastfeeding are numerous, and increasing breastfeeding initiation, duration, and exclusivity has been the focus of multiple recent initiatives in the health care setting, workplace, and community, as recommended by the *Surgeon General's Call to Action To Support Breastfeeding*. With national goals as outlined in Healthy People 2020, an increase in overall breastfeeding initiation, and more Baby-Friendly–designated hospitals, the need for increased support from all members of the health care team is clear. The pediatric care provider is well suited to play a primary role in this effort. The steps outlined in this document provide clear and concise ways for the pediatric office practice to support breastfeeding mothers, infants, and families; increase breastfeeding exclusivity and duration in their patients; and improve health outcomes for the population.

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ABBREVIATIONS

AAP: American Academy of Pediatrics
ABM: Academy of Breastfeeding Medicine
CDC: Centers for Disease Control and Prevention
IBCLC: International Board Certified Lactation Consultant
WHO: World Health Organization
WIC: Special Supplemental Nutrition Program for Women, Infants, and Children

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Appendix F

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The Physician's Role in Human Milk Feeding

1 All physicians will encounter women who are breastfeeding or children who are breastfed, thus education about lactation is important regardless of the physician's chosen field. More specifically, obstetrician–gynecologists, pediatricians, and family physicians are medical professionals whose disciplines are dedicated to the medical and surgical care of women or children, or both. These disciplines require extensive study of the physiologic, social, cultural, and genetic factors that influence health and disease, including breastfeeding medicine. Physicians who care for women and children should have the knowledge, skills, and attitudes necessary to provide evidence-based patient care that protects, promotes, and supports breastfeeding, when possible, as the ideal method for infant feeding, and should support each woman's informed decision about infant feeding.

2 At a minimum, physicians should understand the importance of lactation and human milk and the role of breastfeeding as the biologically indicated feeding method for infants and young children. Physicians should appreciate breastfeeding's association with reduced short-term and long-term morbidities for women, infants, and children. Physicians should attain and maintain knowledge and skills in anticipatory guidance, physical assessment, support for normal breastfeeding physiology, medical management of common issues, and management of common complications in lactation. Obstetrician–gynecologists, pediatricians, and family physicians should collaborate with physicians in other specialties and with other health care personnel to deliver integrated care for the breastfeeding dyad antepartum, in the hospital, and after hospital discharge. Furthermore, physicians should be at the forefront of policy efforts to enable and encourage families to breastfeed, whether through individual patient education, changes in hospital practices (such as implementation of the *Ten Steps to Successful Breastfeeding*), community efforts, or legislation to ensure uniform and comprehensive breastfeeding support. Physicians who have advanced training and experience in breastfeeding management and lactation disorders also may be available to serve mother and child dyads whose complex issues may require a physician with additional breastfeeding training and expertise.

3

The physician often coordinates the multidisciplinary care provided to the breastfeeding dyad. However, all physicians must recognize the limitations of their own lactation knowledge and breastfeeding expertise. When appropriate, they should seek assistance from other members of the care team—understanding the training, credentials, and scope of practice of various lactation support professional—and make referrals accordingly. Lactation support professionals have gained expertise in breastfeeding support that comes from a variety of backgrounds, including personal experience, academic education, and various professions. Some of the categories of lactation support personnel include:

Lactation Consultants – Lactation consultants provide the full range of breastfeeding care, particularly involving challenging breastfeeding situations. Referral may be appropriate for complex problems, such as establishing supply and transitioning to feeding preterm infants, inadequate infant weight gain, and anatomic or medical issues in the mother or infant that may affect breastfeeding. These professionals include International Board Certified Lactation Consultants, Advanced Lactation Consultants, and Advanced Nurse Lactation Consultants.

Breastfeeding Counselors – Breastfeeding counselors have the skills to provide breastfeeding counseling; to address normal breastfeeding in healthy, term infants; and to conduct maternal and infant assessments of anatomy, latch, and positioning while providing support to families in the hospital and community settings. They include Certified Lactation Counselors, Certified Breastfeeding Specialists, and Certified Lactation Educators.

Breastfeeding Peer Counselors – Breastfeeding peer counselors have personal breastfeeding experience and additional training to meet the needs of families, focusing primarily on individual and community support. Groups include Breastfeeding USA, HealthConnect One, the La Leche League, Reaching Our Sisters Everywhere, and the Special Supplemental Nutrition Program for Women, Infants, and Children Program.

Lactation Educators – Lactation educators are qualified to support and educate the public on breastfeeding and related issues but do not perform clinical care. They are members of the Childbirth and Postpartum Professional Association.

Breastfeeding Medicine Specialists – Breastfeeding medicine specialists are physicians with advanced training or experience in breastfeeding management and lactation disorders. Most of these physicians have achieved certification with one or more of the credentials listed above.

To view the full contents of the *Lactation Support Provider Descriptor Table*, visit http://www.usbreastfeeding.org/d/do/3216.

Finally, physicians should be aware of how to find and use breastfeeding information and resources to further their own knowledge about breastfeeding medicine. The Academy of Breastfeeding Medicine, the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Obstetricians and Gynecologists, LactMed, the *Eunice Kennedy Shriver* National Institute of Child Health and Development, and the United States Breastfeeding Committee, among others, offer resources and guidance specifically for physicians.

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Academy of Breastfeeding Medicine

American Academy of Family Physicians

American Academy of Pediatrics

American College of Osteopathic Pediatricians

Association of Women's Health, Obstetric and Neonatal Nurses

Centers for Disease Control and Prevention

National Hispanic Medical Association

National Medical Association

Reaching Our Sisters Everywhere

United States Breastfeeding Committee

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American Academy of Pediatrics
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CLINICAL REPORT

The Transfer of Drugs and Therapeutics Into Human Breast Milk: An Update on Selected Topics

abstract

FREE

Many mothers are inappropriately advised to discontinue breastfeeding or avoid taking essential medications because of fears of adverse effects on their infants. This cautious approach may be unnecessary in many cases, because only a small proportion of medications are contraindicated in breastfeeding mothers or associated with adverse effects on their infants. Information to inform physicians about the extent of excretion for a particular drug into human milk is needed but may not be available. Previous statements on this topic from the American Academy of Pediatrics provided physicians with data concerning the known excretion of specific medications into breast milk. More current and comprehensive information is now available on the Internet, as well as an application for mobile devices, at LactMed (http://toxnet.nlm.nih.gov). Therefore, with the exception of radioactive compounds requiring temporary cessation of breastfeeding, the reader will be referred to LactMed to obtain the most current data on an individual medication. This report discusses several topics of interest surrounding lactation, such as the use of psychotropic therapies, drugs to treat substance abuse, narcotics, galactagogues, and herbal products, as well as immunization of breastfeeding women. A discussion regarding the global implications of maternal medications and lactation in the developing world is beyond the scope of this report. The World Health Organization offers several programs and resources that address the importance of breastfeeding (see http://www.who.int/topics/breastfeeding/en/). *Pediatrics* 2013;132:e796–e809

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KEY WORD
human milk

ABBREVIATIONS
AAP—American Academy of Pediatrics
FDA—Food and Drug Administration
HBV—hepatitis B vaccine
HPV—human papillomavirus vaccine
NSAID—nonsteroidal antiinflammatory drug

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The guidance in this report does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

*The recommendations in this review are those of the authors and do not represent the views of the US Food and Drug Administration.

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INTRODUCTION

Lactating women can be exposed to medications or other therapeutics, either on a limited or long-term basis, depending on the need to treat acute or chronic conditions. Many women are advised to discontinue nursing or avoid taking necessary medications because of concerns about possible adverse effects in their infants.[1] Such advice is often not based on evidence, because information about the extent of drug excretion into human milk may be unavailable, and for many drugs, information is limited to data from animal studies, which may not correlate with human experience. In addition, not all drugs are excreted in clinically significant amounts into human milk, and the presence of a drug in human milk may not pose a risk for the infant. To weigh the risks and benefits of breastfeeding, physicians need to consider multiple factors. These factors include the need for the drug by the mother, the potential effects of

the drug on milk production, the amount of the drug excreted into human milk, the extent of oral absorption by the breastfeeding infant, and potential adverse effects on the breastfeeding infant. The age of the infant is also an important factor in the decision-making process, because adverse events associated with drug exposure via lactation occur most often in neonates younger than 2 months and rarely in infants older than 6 months.[2] In the near future, pharmacogenetics may also provide important guidance for individualized decisions.

In large part because of efforts by Cheston Berlin, Jr, MD, a statement by the American Academy of Pediatrics (AAP) on the transfer of drugs and chemicals into human milk was first published in 1983[3] and underwent several subsequent revisions,[4,5] the most recent of which was published in 2001.[6] Previous editions were intended to list drugs potentially used during lactation and to describe possible effects on the infant and/or on lactation. Revisions for the statement can no longer keep pace with the rapidly changing information available via the Internet, published studies, and new drug approvals. A more comprehensive and current database is available at LactMed (http://toxnet.nlm.nih.gov). LactMed includes up-to-date information on drug levels in human milk and infant serum, possible adverse effects on breastfeeding infants, potential effects on lactation, and recommendations for possible alternative drugs to consider. Common herbal products are also included. For this reason, with the exception of radioactive compounds that require temporary or permanent cessation of breastfeeding, the reader will be referred to LactMed to obtain the most current data on an individual medication.

This statement reviews proposed changes in US Food and Drug Administration (FDA) labeling that are designed to provide useful information to the physician and to outline general

LactMed is part of the National Library of Medicine's Toxicology Data Network (TOXNET)

Each record includes the following information:

- Generic name: refers to US-adopted name of active portion of the drug
- Scientific name: genus and species of botanical products (when applicable)
- Summary of use during lactation (includes discussion of conflicting recommendations and citations)
- Drug levels
  - Maternal levels: based on studies that measure concentration in breast milk; includes relative infant dose (weight-adjusted percentage of maternal dose) when possible
  - Infant levels: serum or urine concentrations from the literature
- Effects in breastfed infants: adverse events with Naranjo* assessment of causality (definite, probably, possibly, unlikely)
- Possible effects on lactation: if known, including effects on infants that may interfere with nursing (eg, sedation)
- Alternative drugs to consider: may not be comprehensive
- References
- Chemical Abstracts Service Registry Number
- Drug class
- LactMed record number
- Last revision date

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* The Naranjo probability scale is a method used to estimate the probability that an adverse event is caused by a drug.[7]

considerations for individual risk/benefit counseling. An update regarding the use of antidepressants, anxiolytics, and antipsychotics in the lactating woman is also provided, because the use of psychotropic agents during lactation is still debated. Since publication of the last statement, numerous questions have been raised regarding the use of methadone in the lactating woman. For this reason, therapies for substance abuse and smoking cessation are discussed. Given the finding that codeine use may be associated with toxicity in patients, including neonates with ultrarapid metabolism, a brief review of alternative agents to treat pain in the lactating woman is provided. The use of galactagogues is also reviewed because more women now endeavor to breastfeed adopted infants or preterm neonates. The increasing use of herbal products has invited a discussion of the merits of these alternative therapies in the nursing woman. Finally, immunization of breastfeeding women and their infants will be reviewed to assist pediatricians in encouraging immunization when needed in lactating women and addressing parental reluctance to immunize breastfed infants.

GENERAL CONSIDERATIONS

Several factors should be considered when advising a woman regarding a decision to breastfeed her infant while she is on drug therapy. The benefits of breastfeeding for both the infant and mother need to be weighed against the risks of drug exposure to the infant (or to the mother, in the case of agents intended to induce lactation). Many factors affect the individual risk/benefit decision, including specific information about chemical and pharmacologic properties of the drug, which may be available from resources such as LactMed and in product labeling. In general, chemical properties of a drug, such as lack of ionization, small molecular weight, low volume of distribution, low maternal serum protein binding, and high lipid solubility, facilitate drug excretion into human milk. Drugs with long half-lives are more likely to accumulate in human milk, and drugs with high oral bioavailability are more easily absorbed by the infant.[8] The adverse event profile of the drug is another property that affects the individual risk/benefit ratio. Use of a drug with a significant adverse effect in a lactating woman (such as an arrhythmia) may be acceptable to treat a serious illness in the mother; however, use of the same drug to increase milk production would not be acceptable. For drugs with an adverse event profile that correlates with increasing dosage, higher maternal doses may be associated with greater neonatal toxicity. In addition, the timing of exposure and the duration of therapy are other important considerations. A decision to breastfeed when continuing treatment with an agent for which in utero exposure also has occurred differs from a decision to initiate a novel therapy in the early postpartum period. Similarly, the risks of a single-dose therapy or short-term treatment may differ from those of a chronic therapy.

In addition to pharmacokinetic or chemical properties of the drug, the infant's expected drug exposure is influenced by infant and maternal factors beyond basic known pharmacokinetic and chemical properties of the drug itself. For example, the risk of adverse reactions in a preterm infant or an infant with underlying chronic medical conditions may be higher than that for a more mature or healthier infant. Certain drugs may accumulate in the breastfed infant because of reduced clearance or immaturity of metabolic pathways. However, for other drugs (eg, acetaminophen), the immaturity of these same pathways may protect an infant from toxic drug metabolites. Similarly, patients with specific genotypes may experience drug toxicity, as evidenced by fatalities observed in individuals who demonstrate ultrarapid metabolism of codeine.[9] Finally, certain infant conditions, such as metabolic diseases, and maternal health conditions may preclude nursing (eg, HIV) or require multiple therapies that are particularly toxic (eg, cancer treatment).

CHANGES IN DRUG LABELING

In the past, the lactation section in FDA-approved labeling was often limited to statements that advise caution or contain an admonition to discontinue breastfeeding or discontinue therapy, depending on the importance to the mother. In 2008, the FDA published a proposed revision to the regulations, which affects the pregnancy and lactation sections of labeling. The agency is currently working on the final rule, which is intended to provide a clinically oriented framework for placement of pregnancy and lactation information into drug labeling and to permit the patient and physician to explore the risk/benefit on the basis of the best available data. Under the proposed rule, the current Nursing Mothers section is replaced by a section called Lactation. The Lactation section of labeling will contain 3 subsections: Risk Summary, Clinical Considerations, and Data. The Risk Summary section will include a summary of what is known about the excretion of the drug into human milk and potential effects on the breastfed infant, as well as maternal milk production. The Clinical Considerations section will include methods to minimize exposure of the breastfed infant to the drug when applicable, as well as information about monitoring for

expected adverse drug effects on the infant. The Data component will provide a detailed overview of the existing data that forms the evidence base for the other 2 sections.

In addition to the proposed rule, the FDA published "Guidance for Industry: Clinical Lactation Studies: Study Design, Data Analysis, and Recommendations for Labeling."[10]

Along with outlining recommendations regarding lactation study design as well as the timing and indications for these studies, this draft guidance includes advice on parameters (several of which are used in LactMed) that can be used to inform physicians about the extent of drug exposure. Using these parameters, drug exposure to the infant may be measured directly in infant serum or estimated on the basis of pharmacokinetic parameters. These estimates of infant exposure (for example, relative infant dose) can be expressed as a percent of weight-adjusted maternal or, when known, weight-adjusted pediatric dose.

ESTIMATES OF DRUG EXPOSURE

Daily Infant Dosage (mg/day)=

$\sum$(drug concentration in each milk collection × expreesed volume in each milk collection)

OR

C_{milk}[average drug concentration in milk(mg/mL)] × V_{milk}(volume in mL of milk ingested in 24 hours)

Note: V_{milk} is typically estimated to be 150 mL/kg/day

Relative Infant Dose

% Maternal Dose= [Daily Infant Dosage (mg/kg/day) ÷ Maternal Dose (mg/kg/day)] × 100

% Infant or Pediatric Dose= [Daily Infant Dosage (mg/kg/day) ÷ Infant or Pediatric dose(mg/kg/day)] × 100

ANTIDEPRESSANTS, ANXIOLYTICS, AND ANTIPSYCHOTICS

Previous statements from the AAP categorized the effect of psychoactive drugs on the nursing infant as "unknown but may be of concern." Although new data have been published since 2001, information on the long-term effects of these compounds is still limited. Most publications regarding psychoactive drugs describe the pharmacokinetics in small numbers of lactating women with short-term observational studies of their infants. In addition, interpretation of the effects on the infant from the small number of longer-term studies is confounded by prenatal treatment or exposure to multiple therapies. For these reasons, the long-term effect on the developing infant is still largely unknown.[11,12]

Many antianxiety drugs, antidepressants, and mood stabilizers appear in low concentrations in human milk, with estimated relative infant doses less than 2% of weight-adjusted maternal dose and/or milk-plasma ratios less than 1.[13] However, the percentage of maternal doses that approach clinically significant levels (10% or more) have been reported for bupropion,[14] diazepam,[13] fluoxetine,[15] citalopram,[16] lithium,[17] lamotrigine,[18] and venlafaxine.[19] Data on drug excretion in human milk are not available for up to one-third of psychoactive therapies.[13]

Because of the long half-life of some of these compounds and/or their metabolites, coupled with an infant's immature hepatic and renal function, nursing infants may have measurable amounts of the drug or its metabolites in plasma and potentially in neural tissue. Infant plasma concentrations that exceed 10% of therapeutic maternal plasma concentrations have been reported for a number of selective serotonin reuptake inhibitors, antipsychotics, anxiolytics, and mood stabilizers (see Table 1).

TABLE 1 Psychoactive Drugs With Infant Serum Concentrations Exceeding 10% of Maternal Plasma Concentrations[a]

Agent	Reference
Citalopram	Weissman 2004[20]
Clomipramine	Schimmell 1991[21]
Diazepam	Wesson 1985[22]
Doxepin	Moretti 2009[16]
Fluoxetine	Weissman 2004,[20] product labeling
Fluvoxamine	Weissman 2004[20]
Lamotrigine	Newport 2008,[18] Fotopoulou 2009[23]
Lithium	Viguerra 2007,[24] Grandjean 2009,[25] Bogen 2012[26]
Mirtazapine	Tonn 2009[27]
Nortriptyline	Weissman 2004[20]
Olanzapine	Whitworth 2008[28]
Sertraline	Hendrick 2001,[29] Stowe 2003[30]
Venlafaxine	Newport 2009[19]

[a] Based on individual maternal-infant pair(s); may include active metabolites.

Mothers who desire to breastfeed their infant(s) while taking these agents should be counseled about the benefits of breastfeeding as well as the potential risk that the infant may be exposed to clinically significant levels and that the long-term effects of this exposure are unknown. Consideration should be given to monitoring growth and neurodevelopment of the infant.

DRUGS FOR SMOKING CESSATION OR TO TREAT SUBSTANCE ABUSE/ ALCOHOL DEPENDENCE

Although many women are appropriately advised to refrain from smoking, drinking, and using recreational drugs during and after pregnancy, in part because of adverse effects on their infants (see Table 2), some are unable to do so and may seek assistance after delivery. Maternal smoking is not an absolute contraindication to breastfeeding.[31] Nonetheless, for multiple reasons, including the association of sudden infant death syndrome with

TABLE 2 Drugs of Abuse for Which Adverse Effects on the Breastfeeding Infant Have Been Reported[a]

Drug	Reported Effect or Reason for Concern	Reference
Alcohol	Impaired motor development or postnatal growth, decreased milk consumption, sleep disturbances.	Koren 2002,[34] Backstrand 2004,[35] Mennella 2007[36]
	Note: Although binge drinking should be avoided, occasional, limited ingestion (0.5 g of alcohol/kg/d; equivalent to 8 oz wine or 2 cans of beer per day) may be acceptable.	National Academy of Sciences 1991[37]
Amphetamines	Hypertension, tachycardia, and seizures.	Product labeling
	In animal studies of postnatal exposure, long-term behavioral effects, including learning and memory deficits and altered locomotor activity, were observed.	
Benzodiazepines	Accumulation of metabolite, prolonged half-life in neonate or preterm infant is noted; chronic use not recommended.	Jain 2005,[38] Malone 2004[39]
	Apnea, cyanosis, withdrawal, sedation, cyanosis, and seizures.	
Cocaine	Intoxication, seizures, irritability, vomiting, diarrhea, tremulousness.	Chasnoff 1987,[40] Winecker 2001[41]
Heroin	Withdrawal symptoms, tremors, restlessness, vomiting, poor feeding.	vandeVelde 2007[42]
LSD	Potent hallucinogen.	
Methamphetamine	Fatality, persists in breast milk for 48 h.	Ariagno 1995,[43] Bartu 2009[44]
Methylene dioxy-methamphetamine (ecstasy)	Closely related products (amphetamines) are concentrated in human milk.	
Marijuana (cannabis)	Neurodevelopmental effects, delayed motor development at 1 y, lethargy, less frequent and shorter feedings, high milk-plasma ratios in heavy users.	Djulus 2005,[45] Campolongo 2009,[46] Garry 2010[47]
Phencyclidine	Potent hallucinogen, infant intoxication.	AAP 2001,[6] Academy of Breastfeeding Medicine[48]

[a] Effect on maternal judgment or mood may affect ability to care for infant.

tobacco exposure,[32,33] lactating women should be strongly encouraged to stop smoking and to minimize secondhand exposure. Exposure to alcohol or recreational drugs may impair a mother's judgment and interfere with her care of the infant and can cause toxicity to the breastfeeding infant (see Table 2).

Limited information is available regarding the use of medications in lactating women to treat substance abuse or alcohol dependence or for smoking cessation. However, the presence of behaviors, such as continued ingestion of illicit drugs or alcohol, and underlying conditions, such as HIV infection, are not compatible with breastfeeding.[49,50] Patients also require ongoing psychosocial support to maintain abstinence.[48]

Methadone, buprenorphine, and naltrexone are 3 agents approved by the FDA for use in the treatment of opioid dependence. Continued breastfeeding by women undergoing such treatment presumes that the patient remains abstinent, is HIV negative, and is enrolled in and closely monitored by an appropriate drug treatment program with significant social support.[48,51]

Potential adverse effects on breastfeeding infants from methadone (according to product labeling) and buprenorphine include lethargy, respiratory difficulty, and poor weight gain.[52] The long-term effects of methadone in humans are unknown. Nonetheless, methadone levels in human milk are low, with calculated infant exposures less than 3% of the maternal weight-adjusted dose.[53,54] Plasma concentrations in infants are also low (less than 3% of maternal trough concentrations) during the neonatal period and up to 6 months postpartum.[55,56] For these reasons, guidelines from the Academy of Breastfeeding Medicine encourage breastfeeding for women treated with methadone who are enrolled in methadone-maintenance programs.[48]

Buprenorphine is excreted into human milk and achieves a level similar to that in maternal plasma.[57] Infant exposure appears to be up to 2.4% of the maternal weight-adjusted dose.[55,56,58] However, buprenorphine can be abused, and although the significance in humans is unknown, labeling for buprenorphine and buprenorphine/naloxone combinations states that use is not advised by lactating women, because animal lactation studies have shown decreased milk production and viability of the offspring. FDA labeling also advises caution for use of naltrexone in nursing infants of opioid-dependent women. Of note, published information on naltrexone is limited to 1 case report that estimates infant exposure to be low (7 μg/kg/d, or 0.86% of the maternal weight-adjusted dose).[59]

Transferred amounts of methadone or buprenorphine are insufficient to prevent symptoms of neonatal abstinence syndrome.[49,60] Neonatal abstinence syndrome can occur after abrupt discontinuation of methadone.[51,61] Thus, breastfeeding should not be stopped abruptly, and gradual

weaning is advised if a decision is made to discontinue breastfeeding.

Limited information is available for disulfiram and naltrexone, agents that are used to treat alcohol dependence. As noted previously, a low relative infant dose (<1%) was observed in a single case report of naltrexone exposure in a 6-week-old breastfed infant.[59] FDA labeling discourages use of disulfiram and both the injectable and oral form of naltrexone in lactating women.

Only one-third of women successfully discontinue smoking without pharmacologic aids.[62] Nicotine replacement therapy, bupropion, and varenicline are agents indicated for use as aids to smoking cessation treatment. Nicotine replacement therapy is compatible with breastfeeding as long as the dose (assuming a cigarette delivers ~1 mg of nicotine) is less than the number of cigarettes typically smoked, because nicotine passes freely into human milk and is orally absorbed as nicotine. Cotinine concentrations are lower than those related to tobacco use. Short-acting products (eg, gum or lozenges) are recommended.[62] Infant exposure decreases proportionally with maternal patch doses.[63]

In contrast, bupropion is excreted into human milk with exposures that may exceed 10% (range, 1.4%–10.6%) of the maternal dose.[14] Although infant levels were not measured, there is a case report of a seizure in a 6-month-old breastfed infant potentially related to bupropion.[64] Limited published information is available for varenicline, but the varenicline label includes a boxed warning for serious neuropsychiatric adverse events, including suicidal ideation or behavior. FDA labeling discourages use of both these agents in lactating women.

PAIN MEDICATIONS

Rarely, normal doses of codeine given to lactating women may result in dangerously high levels of its active metabolite morphine in breastfeeding infants. A fatality has been noted in an infant of a mother with ultrarapid metabolism.[65] In this infant, the postmortem level of morphine (87 ng/mL) greatly exceeded a typical level in a breastfeeding infant (2.2 ng/mL), as well as the therapeutic range for neonates (10–12 ng/mL). In addition, unexplained apnea, bradycardia, cyanosis, and sedation have been reported in nursing infants of mothers receiving codeine.[2,66] Hydrocodone is also metabolized via the CYP2D6 pathway. On the basis of pharmacokinetic data, infants exposed to hydrocodone through human milk may receive up to 9% of the relative maternal dose.[67] Given the reduced clearance of hydrocodone in neonates and the adverse events observed in ultrarapid metabolizers of codeine, caution is advised for use of codeine and hydrocodone in both the mother and nursing infant. Close monitoring for signs and symptoms of neonatal as well as maternal toxicity is recommended. A commercial test to identify ultrarapid metabolizers is not yet widely available. The incidence of this specific CYP2D6 genotype varies with racial and ethnic group as follows: Chinese, Japanese, or Hispanic, 0.5% to 1.0%; Caucasian, 1.0% to 10.0%; African American, 3.0%; and North African, Ethiopian, and Saudi Arabian, 16.0% to 28.0%.[68]

For these reasons, when narcotic agents are needed to treat pain in the breastfeeding woman, agents other than codeine (eg, butorphanol, morphine, or hydromorphone) are preferred. Clinically insignificant levels of butorphanol are excreted into human milk. Morphine appears to be tolerated by the breastfeeding infant, although there is 1 case report of an infant with plasma concentrations within the therapeutic range.[69] Clearance of morphine is decreased in infants younger than 1 month and approaches 80% of adult values by 6 months of age.[70] Limited data suggest that use of hydromorphone for brief periods may be compatible with breastfeeding[71,72]; however, FDA labeling discourages use. Regardless of the choice of therapy, to minimize adverse events for both the mother and her nursing infant, the lowest dose and shortest duration of therapy should be prescribed. Drug delivery via patient-controlled anesthesia or administration by the epidural route may also minimize infant exposure.

Other narcotic agents, such as oxycodone, pentazocine, propoxyphene, and meperidine, are not recommended in the lactating mother. Relatively high amounts of oxycodone are excreted into human milk, and therapeutic concentrations have been detected in the plasma of a nursing infant.[73] Central nervous system depression was noted in 20% of infants exposed to oxycodone during breastfeeding.[74] Thus, use of oxycodone should be discouraged. Limited published data are available about pentazocine. However, respiratory depression and apnea occur frequently in infants, particularly in neonates or in preterm infants, who are treated with pentazocine. Propoxyphene has been associated with unexplained apnea, bradycardia, and cyanosis, as well as hypotonia in nursing infants.[75,76] Moreover, propoxyphene was withdrawn from the market because significant QT prolongation occurred at therapeutic doses.[77] Meperidine use is associated with decreased alertness of the infant and is likely to interfere with breastfeeding.[71] Although estimates of meperidine exposure are low (approximately 2% to 3% of the maternal weight-adjusted dose), the half-life of the active metabolite for meperidine is prolonged, and it may accumulate in infant blood or tissue.[71,72]

When narcotics are not required to relieve mild to moderate pain, other analgesic agents can be used. Presuming that pain relief is adequate, short-acting agents, such as ibuprofen and acetaminophen, are acceptable.[78] Although the half-life of ibuprofen may be prolonged in neonates, particularly in preterm infants (according to product labeling), minimal amounts of ibuprofen are excreted into human milk.[72] Despite reduced clearance of acetaminophen,[79] hepatotoxicity is less common in neonates than in older infants, in part because of low levels of certain cytochrome P-450 enzymes, which convert acetaminophen into toxic metabolites.[80] Acetaminophen is available for both oral and intravenous administration.

Although all nonsteroidal antiinflammatory drugs (NSAIDs) carry a boxed warning regarding gastrointestinal bleeding and potential long-term cardiac toxicity, according to their product labeling and Gardiner et al,[81] celecoxib, flurbiprofen, and naproxen are considered to be compatible with breastfeeding, because less than 1% is excreted into human milk. In addition, a breastfeeding infant would receive less than 1% of the relative pediatric dose of celecoxib prescribed for a 2-year-old (according to product labeling). However, long-term use of naproxen is not recommended because of the drug's long half-life and case reports of gastrointestinal tract bleeding and emesis. Avoiding NSAIDs in breastfeeding infants with ductal-dependent cardiac lesions may be prudent.

Limited published data on other NSAIDs (etodolac, fenoprofen, meloxicam, oxaprozin, piroxicam, sulindac, and tolmetin) are available, and FDA labeling discourages their use for a variety of reasons. Although the implications for humans are unknown, meloxicam concentrations in milk of lactating animals exceed plasma concentrations. Diflunisal has a long half-life and is not recommended because of potential adverse events, including cataracts and fatality, in neonatal animals. Similarly, mefenamic acid has a prolonged half-life in preterm infants. Injectable and oral forms of ketorolac are contraindicated in nursing women, according to product labeling, because of potential adverse effects related to closure of the ductus arteriosus in neonates. Less than 1% of ketorolac nasal spray is excreted into human milk, and unlike the oral and intravenous forms of ketorolac, use is not contraindicated (product labeling).

Carisoprodol and its active metabolite, meprobamate, are concentrated in human milk (2–4 times maternal plasma concentrations). Impaired milk production has been observed, and animal studies suggest maternal use may lead to less effective infant feeding (because of sedation) and/or decreased milk production (according to product labeling).

Low doses (75–162 mg/d) of aspirin may be acceptable[82]; however, use of high-dose aspirin therapy during breastfeeding is not advised, because the serum concentration of salicylate in breastfeeding infants has been reported to reach approximately 40% of therapeutic concentrations. Adverse events, such as rash, platelet abnormalities, bleeding, and metabolic acidosis have also been reported.[71]

GALACTAGOGUES

Galactagogues, or agents to stimulate lactation, are often used to facilitate lactation, particularly for mothers of preterm infants. They also may be used to induce lactation in an adoptive mother. However, evidence to support these agents, including use of dopamine antagonists, such as domperidone and metoclopramide; herbal treatments; and hormonal manipulation, is lacking.[83]

Although a placebo-controlled study (n = 42) suggested that domperidone may increase milk volume in mothers of preterm infants,[84] maternal safety has not been established. The FDA issued a warning in June 2004 regarding use of domperidone in breastfeeding women because of safety concerns based on published reports of arrhythmia, cardiac arrest, and sudden death associated with intravenous therapy. Furthermore, treatment with oral domperidone is associated with QT prolongation in children and infants.[85,86] Domperidone is not an approved product in the United States, and labeling for oral formulations marketed outside the United States do not recommend use during lactation.

Several small trials (each with fewer than 25 subjects) published before 1990 suggested that metoclopramide increases prolactin concentrations and/or milk production in mothers of both term and preterm infants.[87] However, more recent controlled studies do not replicate this finding.[88,89] Human milk concentrations of metoclopramide are similar to therapeutic concentrations in adult plasma,[88] and measurable amounts can be detected in breastfeeding infants.[90] Clearance of metoclopramide in neonates is prolonged, which may result in excessive serum concentrations and the risk of conditions associated with overdose, such as methemoglobinemia. Of concern, prolactin concentrations were increased in 4 of 7 infants exposed to metoclopramide via human milk.[90] The safety profile for metoclopramide includes adverse reactions, such as dystonia, depression, suicidal ideation, and gastrointestinal tract disturbances, as well as a boxed warning about the risk of tardive dyskinesia. These risks to the mother limit the usefulness of this therapy.

Although a pilot study in 8 lactating women performed decades ago suggested that oxytocin nasal spray

increased human milk production, a larger placebo-controlled trial in 51 women has not confirmed that observation.[91] Oxytocin nasal spray is no longer marketed in the United States. Similarly, anecdotal reports supporting the use of the herb fenugreek to facilitate lactation have not been confirmed by controlled studies.[92,93] Fenugreek contains coumarin, which may interact with NSAIDs.[94] Use of fenugreek in lactating women also is associated with maple-syrup odor in infants.[95] Available data do not support the routine use of other herbal products, such as fennel, to facilitate lactation.[96]

In summary, galactagogues have a limited role in facilitating lactation and have not been subject to full assessments of safety for the nursing infant. Nursing mothers should seek consultation with a lactation specialist and use nonpharmacologic measures to increase milk supply, such as ensuring proper technique, using massage therapy, increasing the frequency of milk expression, prolonging the duration of pumping, and maximizing emotional support.

COMMONLY USED HERBAL PRODUCTS

Despite the frequent use of herbal products in breastfeeding women (up to 43% of lactating mothers in a 2004 survey),[97] reliable information on the safety of many herbal products is lacking. Herbal products are not subject to the same standards for manufacturing and proven effectiveness and safety as are drug products before they are marketed.[98] In fact, the use of several herbal products may be harmful, including kava and yohimbe. For example, the FDA has issued a warning that links kava supplementation to severe liver damage.[99] Breastfeeding mothers should not use yohimbe because of reports of associated fatalities in children.[100] In addition, from 2008 through 2010, the FDA recalled 10 or more dietary supplements each year because of the presence of potentially toxic undeclared ingredients in the supplement.[101] Similarly, the US Government Accountability Office found that 16 of 40 common herbal dietary supplements obtained from retail stores contained pesticide residues.[102]

Safety data are lacking for many herbs commonly used during breastfeeding, such as chamomile,[103] black cohosh,[104] blue cohosh,[105] chastetree,[106] echinacea,[107] ginseng,[108] gingko,[109] *Hypericum* (St John's wort),[110,111] and valerian.[112] Adverse events have been reported in both breastfeeding infants and mothers. For example, St John's wort may cause colic, drowsiness, or lethargy in the breastfed infant even though milk production and infant weight do not appear to be adversely affected[110] and relative maternal dose and infant plasma concentrations are low.[113] Prolonged use of fenugreek may require monitoring of coagulation status and serum glucose concentrations.[114] For these reasons, these aforementioned herbal products are not recommended for use by nursing women.

Although supplementation of nursing mothers with iron and vitamins is safe as long as recommended daily allowances are not exceeded, the use of other nutritional supplements may not be. For instance, L-tryptophan has been associated with eosinophilic myositis.[115] Therefore, physicians should inquire about the use of herbal products and dietary supplements in lactating women and discuss the need for caution because of the paucity of data available.

DIAGNOSTIC IMAGING

When feasible, elective imaging procedures should be delayed until a woman is no longer breastfeeding. For most radiopharmaceuticals, breastfeeding should be interrupted for a time period based on the rate of decline of the agent and dosimetry to avoid infant exposures greater than 1 mSv (100 mrem). For agents that may be concentrated in breast tissue, close contact of the mother with the infant and, consequently, nursing may need to be avoided for a period of time, although expressed milk that has been refrigerated until the radioactivity has decayed may be safe. General guidelines based on Nuclear Regulatory Commission regulations and International Commission on Radiologic Protection guidelines[116] are cited in Tables 3 and 4. However, because there is considerable variability in milk radioactivity, and close contact with an infant may result in additional exposure, consultation with a radiologist should be sought. If deemed necessary, individualized testing of expressed milk may be performed to ensure that radioactivity has reached background levels before breastfeeding is resumed.[117]

Notably, because radiolabeled iodinated products are concentrated in the developing thyroid and radioactivity persists after imaging with most ^{131}I and ^{125}I radiopharmaceuticals (with the exception of ^{125}I- hippurate), breastfeeding should be interrupted for a minimum of 3 weeks. Similarly, ^{22}Na and ^{67}Ga (gallium) administration also require a prolonged (3-week) interruption in breastfeeding. Because the lactating breast has a greater ^{131}I affinity than does the nonlactating breast, women should cease breastfeeding at least 4 weeks before whole-body procedures with ^{131}I and should discontinue breastfeeding thereafter. Doing so will reduce the radiation dose and potential cancer risk to maternal breast tissue.

Traditionally, lactating women receiving intravascular gadolinium or iodinated contrast (as opposed to radiolabeled iodine) are advised to discontinue nursing for 24 hours. However, a minimal amount (0.04%) of the intravenous dose reaches human milk, and, of that, less than 1% to

TABLE 3 Radioactive Compounds That May Require Temporary Cessation of Breastfeeding: Recommendations of the International Commission on Radiologic Protection

Compound	Examples	Example of Procedures	Recommended Time for Cessation of Breastfeeding	Comments
^{14}C-labeled	Triolein, glycocholic acid, urea	*Helicobacter pylori* breath test	None	No approved US products
^{99m}Tc-labeled	DMSA, DTPA, phosphonates (MDP), PYP, tetrofosmin	Multiple: imaging of kidney, bone, lung, heart, tumors	0 to 4 h, as long as no free pertechnetate	Consider discarding at least 1 meal after procedure
	Microspheres, pertechnetate, WBC		12–24 h	Range depends on dose
	Sulfur-colloids, RBC in vivo		6 h	
I-labeled	^{123}I, ^{125}I or ^{131}I-iodo hippurate	Thyroid imaging	12 h	Note: whole-body irradiation with ^{131}I requires prolonged cessation
Others	^{11}C- ^{11}N or ^{11}O-labeled	PET scans	None	Short physical half-life
	^{57}Co-labeled vitamin B_{12}	Schilling test	24 h	Pomeroy 2005[119]
	^{18}F-FDG	PET scans	None, first feeding should be expressed breast milk to avoid direct contact[120]	Use alternatives for 10 half-lives (10×109 min= 18 h)[a]
	^{51}Cr-EDTA	Renal imaging	None	
	^{81m}Kr-gas	Pulmonary imaging	None	No approved US products
	^{82}Rb chloride	PET scan of myocardium	May resume 1 h after last infusion	Half-life 75 s[a]
	^{111}In-octreotide	SPECT, neuroendocrine tumors	None	
	^{111}In -WBC		1 wk	Depends on dose
	^{133}Xe	Cardiac, pulmonary, and cerebral imaging	None	Half-life 5 d[a]

DMSA, dimercaptosuccinic acid; DTPA, diethylenetriaminepentaacetate; EDTA, ethylenediaminetetraacetic acid; FDG, fludeoxyglucose; PET, positron emission tomography; PYP, pyrophosphate; RBC, red blood cell; SPECT, single-photon emission computed tomography; WBC, white blood cell.
[a] FDA-approved drug labeling.

TABLE 4 Radioactive Compounds Requiring Prolonged Cessation of Breastfeeding

Compound	Examples	Example of Procedures	Recommended Time for Cessation of Breastfeeding	Comments
I-labled	^{123}I- BMIPP, -HSA, -IPPA, -MIBG, -NaI, or -HSA	Imaging of tumors	Greater than 3 wk	Essentially need to stop breastfeeding
	^{131}I-MIBG or -NaI			
Others	^{201}Tl-chloride	Cardiac imaging	48 h to 2 wk	Half-life 73 h[a]
	^{67}Ga-citrate	Imaging of tumors	1 wk to 1 mo	Depends on dose
	^{22}Na, ^{75}Se		Greater than 3 wk	Essentially need to stop breastfeeding

Use of expressed human milk recommended because of exposure via direct contact.[120] BMIPP, β-methyl-p-iodophenyl-pentadecanoic acid; HSA, human serum albumin; IPPA, iodophenylpentadecanoic; MIBG, metaiodobenzylguanidine; NaI, sodium iodide.
[a] FDA-approved drug labeling.

2% is absorbed by the infant. Therefore, breastfeeding can be continued without interruption after the use of iodinated contrast or gadolinium.[118]

BREASTFEEDING AND VACCINES

With rare exceptions, maternal immunization does not create any problems for breastfeeding infants, although questions concerning 2 topics often arise regarding lactation and immunization: the effect of lactation on the infant's immune response to a vaccine and a potential adverse effect on the infant from maternal immunization. Breastfeeding does not interfere with the infant's immune response to most routine immunizations (eg, diphtheria and tetanus toxoids and acellular pertussis vaccine, inactivated poliovirus vaccine, and hepatitis B vaccine [HBV]),[121] despite the presence of maternal antibodies in human milk. Seroconversion rates are also similar between breastfed and formula-fed infants receiving rotavirus vaccine; however, vaccine efficacy for severe rotavirus gastroenteritis appears to be higher in formula-fed infants compared with exclusively breastfed infants, particularly during the second season (98% vs 88%) when breastfeeding has been discontinued.[122] Nonetheless, protection during the first year is similar. Moreover, breastfeeding enhances the antibody response to pneumococcal and *Haemophilus influenzae* type b vaccines.[123] Breastfeeding may also decrease the incidence of fever after infant immunization.[124] Therefore, the timing of infant feeding (including human milk) relative to immunization is not restricted, even for live vaccines, such as rotavirus.

Lactating women may need to be immunized. Inactivated vaccines (such as tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; inactivated poliovirus vaccine; influenza; hepatitis A vaccine; HBV; or human papillomavirus vaccine [HPV]) given to

a nursing mother do not pose a risk to the breastfeeding infant. Several vaccines, such as tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine and influenza vaccine, are recommended for the mother during the postpartum period to protect the infant as well as the mother. Other routine or catch-up vaccines, such as HPV, hepatitis A vaccine, and HBV, can be given to the lactating mother. HPV immunization is recommended for women younger than 27 years. The incidence of adverse reactions in nursing infants within 30 days of maternal immunization with HPV was similar to nursing infants of women receiving the control except for acute respiratory illness (according to Gardasil labeling). Hence, caution is warranted when immunizing mothers of infants who are vulnerable to respiratory illnesses (eg, preterm infants, infants with congenital heart disease or chronic respiratory problems).

Most live vaccines are not associated with virus secretion in human milk. For example, despite maternal seroconversion, neither the varicella virus nor antibody to varicella DNA has been detected in breastfeeding infants.[125] Although attenuated rubella can be secreted into human milk and transmitted to breastfed infants, infections are usually asymptomatic or mild. Consequently, postpartum immunization with measles-mumps-rubella vaccine is recommended for women who lack immunity, especially to rubella.[126] In contrast, infants are considered to be at high risk of developing vaccinia after exposure to smallpox vaccine or encephalitis after yellow fever vaccine. Two cases of meningoencephalitis in nursing infants whose mothers had been immunized against yellow fever are documented in the literature.[127,128] Therefore, most vaccines, with the exception of smallpox or yellow-fever vaccine, which are contraindicated in nonemergency situations, may be administered during lactation.

SUMMARY

The benefits of breastfeeding outweigh the risk of exposure to most therapeutic agents via human milk. Although most drugs and therapeutic agents do not pose a risk to the mother or nursing infant, careful consideration of the individual risk/benefit ratio is necessary for certain agents, particularly those that are concentrated in human milk or result in exposures in the infant that may be clinically significant on the basis of relative infant dose or detectable serum concentrations. Caution is also advised for drugs and agents with unproven benefits, with long half-lives that may lead to drug accumulation, or with known toxicity to the mother or infant. In addition, specific infants may be more vulnerable to adverse events because of immature organ function (eg, preterm infants or neonates) or underlying medical conditions. Several excellent resources are available for the pediatrician, including product labeling and the peer-reviewed database, LactMed. Consultation with a specialist may be indicated, particularly when the use of radiopharmaceuticals, oncologic drugs, or other therapies not addressed by LactMed is contemplated. Additional information about topics outside the scope of this report, such as environmental agents, can be obtained from the third edition of the AAP textbook *Pediatric Environmental Health*.[129]

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Appendix H

CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

American Academy of Pediatrics
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Promoting Human Milk and Breastfeeding for the Very Low Birth Weight Infant

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Provision of mother's own milk for hospitalized very low birth weight (VLBW) (≤1500 g) infants in the NICU provides short- and long-term health benefits. Mother's own milk, appropriately fortified, is the optimal nutrition source for VLBW infants. Every mother should receive information about the critical importance of mother's own milk to the health of a VLBW infant. Pasteurized human donor milk is recommended when mother's own milk is not available or sufficient. Neonatal health care providers can support lactation in the NICU and potentially reduce disparities in the provision of mother's own milk by providing institutional supports for early and frequent milk expression and by promoting skin-to-skin contact and direct breastfeeding, when appropriate. Promotion of human milk and breastfeeding for VLBW infants requires multidisciplinary and system-wide adoption of lactation support practices.

STATEMENT OF PROBLEM

Provision of mother's own milk for hospitalized very low birth weight (VLBW) (≤1500 g) infants in the NICU provides short- and long-term health benefits. Mothers of very preterm infants face many challenges in the provision of breast milk. The goal of this clinical report is to provide neonatal clinicians up-to-date information regarding NICU lactation support for mothers of VLBW infants.

abstract

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BACKGROUND INFORMATION

Epidemiology

National data from more than 800 NICUs that participate in the Vermont Oxford Network Quality Collaborative showed that provision of human milk at discharge among VLBW infants has increased from 44% in 2008 to 52% in 2017, but disparities persist according to maternal race and ethnicity and US census region.[1] Human milk provision is lowest among non-Hispanic Black and American Indian/Alaska Native populations and within the southern region of the United States (Fig 1). Currently, there is no mechanism for national surveillance of hospital-based practices known to support breastfeeding among VLBW infants, although such surveillance has been conducted intermittently at the state[2,3] or individual NICU level.[4–7] Hereafter, breast milk terminology is used according to definitions in Table 1.

Health Outcomes

Mother's own milk contains macronutrients and micronutrients as well as active biological components, including immunoglobulins, cytokines, growth factors, hormones, antimicrobial agents, immune cells, stem cells, and prebiotic oligosaccharides.[8] A substantial portion of the breast milk microbiome comprises probiotic bacteria.[9] Mother's own milk has been associated with multiple health benefits for VLBW infants, including lower incidences of necrotizing enterocolitis (NEC), late-onset sepsis, chronic lung disease, retinopathy of prematurity, and neurodevelopmental impairment (Tables 2 and 3). Generally, higher doses of mother's own milk are associated with increased health benefits; however, exposures of human milk are highly variable among studies (Table 2) and there is a paucity of data comparing infants exclusively fed mother's own milk, pasteurized donor milk, or preterm formula.

Pasteurized donor milk is recommended for VLBW infants when mother's own milk is not available[10]; however, pasteurization, freeze-thaw cycles, multiple container changes, and prolonged storage times required for donor milk processing reduce bioactivity.[11] When provided as an exclusive diet or in combination with mother's own milk feeding, pasteurized donor milk is protective against NEC but does not appear to confer the additional health benefits that have been reported with mother's own milk, such as reduction in late-onset sepsis or improvements in neurodevelopment.[12] Pasteurized donor milk may be considered a "bridge" until a full supply of mother's own milk is available.

Although the benefits of a human milk-based diet for preterm infants are established, studies examining the impact of an exclusive human milk diet on the risk of NEC versus a diet with any bovine components (preterm formula or bovine-derived human milk fortifier [HMF]) have had mixed results (Table 3). Several randomized control trials (RCTs) and observational studies reported reductions in NEC when very preterm infants received an exclusive human milk diet versus a diet with any bovine formula or bovine-derived HMF.[13–16] These data are countered by the largest RCT of an exclusive human milk diet of 127 infants with birth weight <1250 g who received bovine- versus human-derived HMF as a supplement to mother's own milk or pasteurized donor milk, which found no difference between groups in feeding tolerance or NEC.[17] Studies comparing human-derived HMF with hydrolyzed bovine protein HMF are not available at the time of this report.

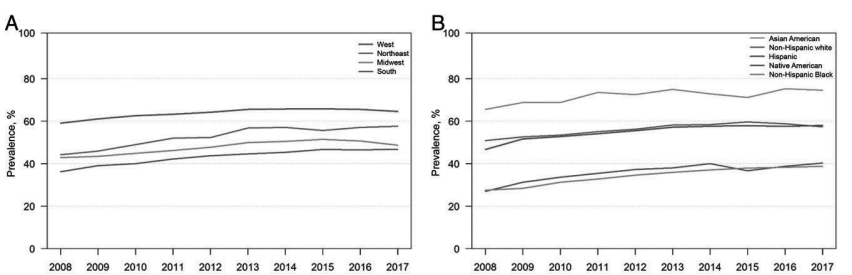


FIGURE 1 Any human milk at discharge among VLBW infants in the United States, 2008–2017. A, Any human milk at discharge among VLBW infants according to US region. B, any human milk at discharge according to maternal race/ethnicity. Adapted with permission from Parker et al.[1]

TABLE 1 Breast Milk Terms

Term	Definition
Mother's own milk	Milk from an infant's own mother
Pasteurized donor milk	Breast milk donated to a milk bank and pasteurized to eliminate pathogens
Informally shared milk	Unpasteurized milk from another infant's mother
Human milk	Mother's own milk or pasteurized donor milk
Bovine-derived HMF	Cow's milk protein–based nutritional fortifier for human milk
Human-derived HMF	Human milk protein–based nutritional fortifier for human milk
Exclusive human milk diet	Mother's own milk or pasteurized donor milk with a human-derived HMF

LACTATION CARE FOR THE VLBW INFANT

Institutional Lactation Supports

Mothers of very preterm infants are more likely to initiate lactation compared with mothers of term infants,[18] yet many of these mothers do not meet their intended feeding goals.[19] Mothers of VLBW infants face several challenges, including (1) preexisting and pregnancy-related medical morbidities that may contribute to delayed lactogenesis and/or reduced milk production[20–22]; (2) prolonged mother–infant separation; (3) dependence on pumping to maintain milk production, rather than direct breastfeeding; and (4) competing demands on their time that impede frequent milk expression and NICU visitation, such as requirements to return to work and care for other children and family members, among other factors.[23,24] Multidisciplinary NICU teams can play a critical role in ongoing lactation support by providing education, institutional supports for milk provision, and medical practices that support lactation.[4,5,25,26]

Lactation Education and Consultation

Family education has been shown to increase breastfeeding intent and reduce maternal anxiety.[27–30] Staff lactation education increases staff knowledge about breastfeeding and changes attitudes toward the use of human milk among preterm infants.[31] Readily available lactation consultants with NICU expertise improves maternal support in lacation.[25,32] However, bedside nurses also provide significant lactation education and education reinforcement.[4] Family education may include information on the health benefits of mother's own milk for VLBW infants, the need for early and frequent milk expression, the role of skin-to-skin contact (SSC), nonnutritive suckling and direct breastfeeding when physiologically appropriate, and technical information on proper milk handling, storage, and transport. NICU staff need familiarity with the technical skills of hand expression, pumping, and stepwise progression from enteral tube to oral feedings at the breast.[25,32] Family-centered care models promote family integration in medical care and improve duration of lactation.[33,34]

Milk Expression: Timing, Frequency, and Modality

Initiating milk expression soon after birth is important to stimulate milk production and provide early feedings with beneficial effects on the VLBW infant[35]; however, the optimal timing is unclear. A multisite observational study of 1157 mother-VLBW dyads found that first milk expression within 8 hours after birth predicted the highest likelihood of lactation until hospital discharge.[36] An RCT of 180 mothers who first expressed milk 1 to 60 minutes, 61 to 180 minutes, and 181 to 360 minutes after birth found no difference in lactation at 6 weeks or mother's milk feeding at discharge but found a greater volume of milk production over the first 6 weeks within the group expressing milk at 181 to 360 minutes.[35] It remains unclear whether hand expression or use of a breast pump is best for initial milk expression. One study of 11 mothers reported that hand expression in the first 48 hours was superior,[36] but a larger RCT of hand expression versus pumping for the first 7 days after birth reported that pumping was superior.[37]

Frequent milk expression is associated with a longer duration of milk production and greater milk volumes throughout the NICU hospitalization in observational studies[38–43]; however, the optimal frequency of milk expression is difficult to ascertain because studies differ in pumping frequency cut-points (≥4 to 7 times per day).[38–44] Frequent milk expression is needed to maintain ongoing milk supply. Milk production ≥500 mL per day by day 14 after birth has been shown to predict a longer duration of milk production during the NICU hospitalization among mothers of VLBW infants.[42,43] Mothers should pump with an effective and efficient double electric breast pump at home and in the hospital when possible because these pumps are superior to manual pumps.[37,45,46] It is useful

TABLE 2 Dose-Response Studies Examining Health Benefits of Human Milk for VLBW Infants

		Outcomes					
Study	Exposure	NEC	Late-Onset Sepsis	Chronic Lung Disease	Retinopathy of Prematurity	Neurodevelopment	Hospital Growth
O'Connor et al, 2003 (n = 463)[127]	Mostly HM versus some HM versus mostly PF	—	—	—	—	Favors HM	Favors PF
Furman et al, 2003 (n = 119)[128]	1–24, 25–49, and ≥50 mL/kg of MM versus PF	—	Favors MM	—	—	—	—
Feldman et al, 2003 (n = 86)[129]	<25%, 25% to 75%, and >75% MM	—	—	—	—	Favors MM	—
Vohr et al, 2006 (n = 1035),[150] 2007 (n = 773)[151]	10 mL per day increments of MM	—	—	—	—	Favors MM	—
Meinzen-Derr et al, 2009 (n = 1272)[152]	10% of total diet increments of HM	Favors HM	—	—	—	—	—
Colaizy et al, 2012 (n = 171)[133]	>75% HM versus <75% HM	—	—	—	—	—	Favors less HM
Patel et al, 2013 (n = 175)[134]	Continuous mL/kg per day increments of HM	—	Favors HM	—	—	—	—
Belfort et al, 2016 (n = 180)[135]	Continuous days of >50% diet of MM	—	—	—	—	Favors MM	—
Assad et al, 2016 (n = 293)[16]	Exclusive HM versus MM + bovine HMF versus MM + PF + bovine HMF	Favors exclusive HM	—	Favors exclusive HM	Favors exclusive HM	—	—
Chowning et al, 2016 (n = 550)[136]	<50% days HM versus ≥50% days HM	Favors HM	—	—	—	—	Favors less HM
Hair et al, 2016 (n = 1587)[13]	Exclusive HM versus MM + PF + bovine HMF	Favors exclusive HM	Favors exclusive HM	Favors exclusive HM	Favors exclusive HM	—	—
Jacobi-Pollishook et al, 2016 (n = 611)[137]	25 mL/kg per day increments of MM	—	—	—	—	No difference	—
Patel et al, 2017 (n = 254)[138]	10% of total diet increments of MM	—	—	Favors MM	—	—	—
Sisk et al, 2017 (n = 551)[138]	≥50% MM versus ≥50% DM versus ≥50% PF	Favors HM	—	—	—	—	—
Madore et al, 2017 (n = 81)[139]	100% MM versus >50% DM versus >50% PF	—	—	—	—	Favors PF and MM	Favors PF and MM
Patra et al, 2017 (n = 430)[140]	10 mL per day increments of MM	—	—	—	—	Favors MM	—
Brownell et al, 2018 (n = 314)[77]	10% of total diet increments of MM versus DM versus PF	—	—	—	—	—	Favors PF and MM
Belfort et al, 2019 (n = 263 367)[141]	HM versus mixed HM and formula versus formula	—	—	—	—	—	Favors formula
Hoban et al, 2019 (n = 321)[142]	10% of total diet increments of DM and PF versus 100% MM diet	—	—	—	—	—	Favors PF versus MM; DM versus MM no difference
Miller et al, 2018,[143] meta-analysis of dose-response observational studies (risk ratio [95% confidence interval])	Varied	Favors HM (0.53 [0.42–0.67])	Favors HM (0.7 [0.56–0.90])	Favors HM (0.84 [0.73–0.96])	Favors HM (0.82 [0.70–0.96])	No difference in subcategories of childhood neurodevelopment	Not assessed

DM, donor milk; HM, human milk (combination of mother's milk and donor milk); MM, mother's milk; PF, preterm formula; —, not applicable.

for mothers to be trained in pump use by hospital staff before they are discharged, helping them navigate common technical issues such as suction strength, pain with pumping, and proper flange fit. Mothers may be encouraged to pump at the infants' bedside with accommodations to protect privacy, because greater milk volumes have been reported when mothers pump in close contact with their infants[47]; however, the design of certain centers may mean that a central lactation room is more comfortable for some women. A single-center observational study showed increased milk volume among mothers of infants born at <31 weeks' gestation after training in hand expression while pumping (ie, "hands on pumping"), but this finding has not been examined in an RCT.[39] Mothers need training in appropriate techniques for milk storage and transport and to be provided with rigid, food-grade

TABLE 3 RCTs Examining Health Benefits of Human Milk for VLBW Infants

Study	Intervention	Control	Outcomes						
			NEC	Late-Onset Sepsis	Feeding Tolerance	Chronic Lung Disease	Retinopathy of Prematurity	Neurodevelopment	Hospital Growth
RCT of PF versus DM as a supplement to MM									
Schanler et al, 2005 (n = 243)[144]	MM + PF and MM + DM	MM	No difference	Favors MM	—	—	—	—	Varied[a]
RCTs of exclusive human milk versus not									
Cristofalo et al, 2013 (n = 43)[14]	DM + human HMF	PF + bovine HMF (powder)	Favors DM + human HMF	No difference	Favors DM + human HMF	—	No difference	—	Favors PF + bovine HMF
Sullivan et al, 2010 (n = 207)[15]	Exclusive HM (MM + DM + human HMF)	MM + PF + bovine HMF (powder)	Favors exclusive HM	No difference	No difference	No difference	No difference	—	No difference
Corpeleijn et al, 2016 (n = 373)[145]	MM + DM[b]	MM + PF[b]	No difference	No difference	—	No difference	No difference	—	—
O'Connor et al, 2016 (n = 363)[146]	MM + DM + bovine HMF (powder)	MM + PF + bovine HMF (powder)	Favors MM + DM + bovine HMF	No difference	—	No difference	No difference	No difference	No difference
RCTs of exclusive human milk examining fortifier types									
Moya[c,d] et al, 2012 (n = 150)[84]	MM + DM + bovine HMF (powder)	MM + DM + bovine HMF (liquid)	—	—	—	—	—	—	Favors bovine liquid HMF
Kim[c,e] et al, 2015 (n = 147)[68]	MM + DM + bovine HMF (powder)	MM + DM + bovine HMF (liquid)	—	—	No difference	—	—	—	No difference
O'Connor et al, 2018 (n = 127)[17]	MM + DM + human HMF	MM + DM + bovine HMF (powder)	No difference	No difference	No difference	No difference	Favors human HMF	—	No difference

DM, donor milk; MM, mother's milk; —, not applicable.

[a] Regarding wt gain, MM only was favorable over MM + DM. Regarding length gain, combined MM + PF and MM + was favorable over MM only.

[b] Intervention delivered in first 10 d of hospitalization before fortifier introduction.

[c] In this trial, intact protein was used for the powder fortifier and hydrolyzed protein was used for the liquid fortifier.

[d] In this trial, the powder HMF had 2.6 g per 100 mL and the liquid HMF had 3.2 g per 100 mL.

[e] In this trial, the powder HMF had 3 g per 100 mL and the liquid HMF had 3.6 g per 100 mL.

human milk collection containers.[32,48] Individualized plans for milk production after maternal hospital discharge may be developed with staff and lactation consultants.

NICU Practices Supporting Lactation

Recent reviews of studies examining SSC among mother-VLBW infant dyads found a positive effect of SSC on duration of mother's own milk production[49] as well as other important neonatal outcomes.[50] Early SSC has been associated with changes to the oral infant microbiome,[51] which may have implications for immune health. A previous American Academy of Pediatrics report provides guidance for SSC.[52] Family members can be encouraged to engage in SSC as often as possible and for as long as desired, depending on the infant's clinical condition. SSC can be safely performed among ventilated infants, infants receiving continuous positive airway pressure, and infants with securely placed central catheters. Facilitation of SSC may require the help of multiple hospital providers, including respiratory therapists. Continuous cardiovascular monitoring and monitoring for correct head positioning to maintain airway patency is needed.

Oral colostrum care consists of placing small amounts of colostrum on the infant buccal mucosa, often in the first hours after birth before beginning enteral feeding. Most mothers are able to provide colostrum for this purpose, even if the mother herself is significantly ill. Research in this area is emerging; a recent Cochrane meta-analysis of 6 small studies reported that oral colostrum care was associated with reduced days to enteral feedings (mean difference: −2.58 [95% confidence interval: −4.01 to −1.14]) but was not associated with reduction of NEC, late-onset sepsis, or mortality.[53] No adverse effects have been reported.[53] Research has not yet examined the impact of oral colostrum care in mother's own milk provision or family engagement later in the NICU hospitalization.

Transition to Direct Breastfeeding

Observational studies demonstrate that initial oral feedings at the breast, more frequent breastfeeding episodes, and earlier gestational age at the time of first breastfeeding attempt are associated with longer duration of breastfeeding during the hospital and postdischarge time periods.[54–58] Despite these potential benefits, significant barriers impede breastfeeding in the NICU, such as prolonged immature oromotor coordination, mother-infant separation, and the need for fortification of mother's own milk to optimize growth. Mothers can be encouraged to begin oral feeding at the breast as soon as the infant shows physiologic readiness (ie, feeding cues), and the infant's level of respiratory support allows for oral feeding. Oral feedings at the breast have been studied as early as 31 to 33 weeks' postmenstrual age.[54,55,57–59] Direct breastfeeding can occur as often as the infant's condition and mother's presence allows. Pre- and post-breastfeeding weight measurements may be used to monitor milk transfer.[60,61]

Multidisciplinary Team–Based Approaches

Multidisciplinary teams, including nursing, lactation, physicians, dietitians, and feeding therapists may best support lactating mothers.[4] Structured local and statewide quality improvement initiatives focused on adoption of hospital lactation support practices by multidisciplinary teams have successfully increased lactation rates.[3] Facilitators of effective multidisciplinary NICU lactation support teams include the following: consistent communication to families and among hospital staff members, physician buy-in, integration of lactation support practices into daily workflow, and ongoing data-driven feedback.[4,62]

Health Equity

Racial and ethnic disparities in the provision of mother's milk and pasteurized donor milk for VLBW infants are well-described; human milk use is lower among VLBW infants with non-Hispanic Black mothers, compared with those with non-Hispanic White mothers.[1,43,63,64] In addition to adherence to evidenced-based breastfeeding support practices described above for all mothers, several additional approaches have been shown to reduce Black and White disparities in breastfeeding in the NICU setting, including peer-counselor programs and support groups,[65,66] assistance with breast pump acquisition,[67] and transportation for mothers to visit the hospital.[28,30,64]

Growth and Fortification Needs for Human Milk–Fed VLBW Infants

The nutritional objective for hospitalized preterm infants is to match the fetal accretion of nutrients; nonetheless, poor growth continues to affect the majority of hospitalized VLBW infants.[68,69] Nutritional requirements cannot be met with human milk alone in the volumes of milk that are generally tolerated by VLBW infants because requirements exceed those of healthy term newborn infants in protein, energy, fatty acids, minerals, and micronutrients.[70] Multinutrient fortifiers are, therefore, added to human milk–fed to hospitalized VLBW infants.[71] It may be helpful to provide mothers with information on the use of HMFs, emphasizing the critical role of human milk despite

the need for fortification to optimize growth and development.

The macronutrient composition of preterm, term, and pasteurized donor milk is variable (Fig 2),[72–76] as are the needs of individual infants, and therefore, routine growth and nutrition monitoring is needed. Generally, the milk of mothers of preterm infants has higher protein content than the milk of mothers of term infants until about 10 to 12 weeks after birth[75] but still contains less than what is recommended for preterm infants (Fig 2).[70] The macronutrient content of pasteurized donor milk is often lower than that of milk provided by mothers of preterm infants,[74] such that infants supplemented with pasteurized donor milk, even with the addition of fortifiers, have a greater risk of growth failure.[77] Holder pasteurization used for donor milk processing results in a loss of lipase activity,[78] which reduces fat digestibility, which further adds to the risk of poor growth. Retort processing, another pasteurization method used to make shelf-stable donor milk, has been shown to significantly reduce lysozyme and secretory immunoglobulin A.[79] Overall, pasteurized donor milk is nutritionally suboptimal to a mother's own milk, reinforcing the importance of supporting mothers in maximal lactation.

Bovine- and human-derived HMFs are commercially available and vary in macronutrient content and degree to which proteins are hydrolyzed.[80–82] Bovine HMFs exist in powdered and liquid forms. In the United States, there has been a transition to use of liquid fortifier because of reports of bacterial contamination of infant formula powder and transmission of *Cronobacter (Enterobacter) sakazakii* during the hospital time period.[83] The liquid forms are supplied in sterile, single-use aliquots. Newer bovine HMFs provide hydrolyzed protein at higher protein concentrations than previous powder HMFs with intact proteins, which has been associated with improved growth.[80,84] Bovine liquid HMFs may be acidified as part of the sterilization process. A trial comparing acidified to nonacidified liquid HMFs showed similar growth but increased transient metabolic acidosis among VLBW infants receiving acidified liquid HMFs.[85] Optimal timing of fortification remains unclear, but several recent RCTs of fortification at feeding volumes less than 80 mL/kg per day showed no associations with feeding intolerance or NEC.[15,86,87] Adjustable fortification algorithms based on markers such as serum urea nitrogen may improve growth.[88,89] Rapid point-of-care milk analyzers that measure the macronutrient content of milk to facilitate individualized fortification strategies are emerging and have become available for clinical use.[90]

HUMAN MILK SAFETY

Milk Preparation and Storage

NICUs should optimally have institutional protocols and parent education addressing breast pump and pump kit cleaning as well as milk storage, handling, and transportation practices.[48,91,92] Guidelines for milk storage are provided in Table 4.[92–96] Fresh milk feedings maximize bioactive properties that are decreased with freezing.[97–99] Errors in administration of milk (feeding milk to an infant from an unrelated mother) are well-documented, and NICUs are best served by clear site-specific protocols for decreasing the risk of such errors. Two-provider verification as well as the use of systems similar to electronic medication administration bar coding are possible practices for preventing milk misadministration.[100,101] The Centers for Disease Control and Prevention provides guidance for instances when milk

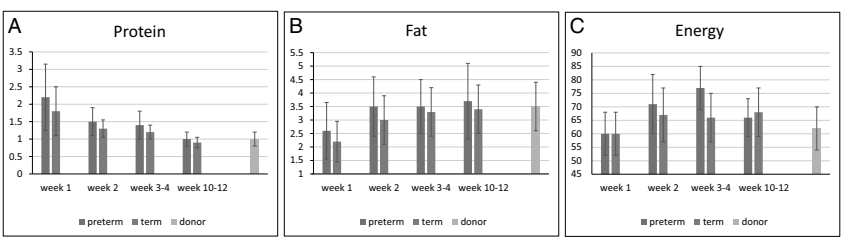


FIGURE 2 Comparison of macronutrient content of preterm, term, and pasteurized donor milk. Error bars indicated 1 SD. A, Protein content (g per 100 mL). B, Fat (g per 100 mL). C, Energy content (kcal per 100 mL). Preterm and term milk results modified from Gidrewicz et al.[75] Donor milk results modified from the mature donor milk category (milk from mothers obtained 4 to 52 weeks after birth) from John et al.[76]

misadministration has occurred (https://www.cdc.gov/breastfeeding/recommendations/other_mothers_milk.htm).[102] Temperature-controlled milk warmers can be used to facilitate safe warming practices.[48]

Informal Milk Sharing

Informal milk sharing is the noncommercial sharing of human milk between mothers for the purpose of infant feeding. This practice is increasing in the United States.[103] Health care providers may choose to discourage families from direct milk sharing and the purchase of human milk from Internet-based sources. Both practices are associated with risks of bacterial or viral contamination of nonpasteurized milk and the possibility of exposure to medications and other substances.[10,104] Informal milk sharing may involve suboptimal milk handling and storage practices that may increase the likelihood of bacterial contamination.[103] Despite counseling, some mothers of VLBW infants will continue to plan on informal milk sharing; mothers are encouraged to discuss this openly with the infant's care team. Some institutions require parents to sign informed consent for hospital use of informally shared milk to document knowledge of the associated risks.

Contraindications

Contraindications to breastfeeding are described in detail in previous American Academy of Pediatrics publications related to breastfeeding.[104–107] Providers may use LactMed, a Web-based information source published by the National Library of Medicine and National Institutes of Health,[108] or other valid published sources of guidance in counseling mothers in provision of mother's own milk when receiving medications. Generally, studies examining effects of maternal medications in mother's own milk have not been performed among VLBW infants; thus, providers must weigh the risks of exposure to maternal medications with the benefits of the mother's own milk in clinical decision-making.

Cytomegalovirus

Cytomegalovirus (CMV) is a ubiquitous double-stranded DNA virus with which 60% to 70% of American women are infected before pregnancy.[109] Most CMV immunoglobulin G–positive women shed the virus in breast milk during lactation. Mother's own milk is the primary source of CMV transmission among term newborn infants, and nearly all term infants who acquire CMV during breastfeeding are infected without signs of illness.[110] In contrast, postnatally acquired cytomegalovirus (pCMV) infection in preterm infants can be associated with a sepsis-like illness, increased morbidity, and, rarely, mortality.[111–113] Manifestations of pCMV infection can include apnea, pneumonitis, leukopenia, thrombocytopenia, hepatitis, cholestasis, and colitis.[114] Health care providers caring for VLBW infants fed mother's own milk and presenting with signs suggestive of late-onset sepsis may consider CMV testing as well as evaluation for bacterial infection. The freeze-thawing cycle has been shown to reduce, but not eliminate, the viral load of CMV in mother's own milk[115] and is associated with loss of bioactive components.[97–99] A recent meta-analysis estimated that rates of postnatally acquired CMV infection from consumption of mother's own milk was 19% (11% to 32%) for asymptomatic CMV infection and 4% (2% to 7%) for CMV sepsis-like syndrome.[112] Although the overall rate of acquiring pCMV is decreased among infants fed frozen mother's own milk (13% [7% to 24%]), freezing is not associated with a decreased risk of CMV sepsis-like syndrome (5% [2% to 12%]), suggesting that minimal viral exposure is required to infect the extremely low birth weight infants at the highest risk for symptomatic pCMV sepsis-like syndrome.[112] Two studies have found higher rates of bronchopulmonary dysplasia among VLBW infants with pCMV infection.[114,116] The long-term neurodevelopmental effect of breast milk–acquired pCMV among VLBW infants is unclear, with some studies finding no effect on neurodevelopment and several others attributing varying degrees of cognitive delay to pCMV infection.[117–124] Additional studies are needed to determine the relative impact of breast milk–acquired pCMV infection, given the many

TABLE 4 Maximum Human Milk NICU Storage Recommendations

Environment	Temperature	Freshly Expressed Mother's Milk	Frozen Mother's Milk	Frozen Pasteurized Donor Milk
Room temperature	60°–85°F or 16°–29°C	4 h	4 h[a]	4 h[a]
Refrigerator	39°F or 4°C	96 h	48 h[a,b]	48 h[a]
Freezer (2 door refrigerator and freezer)	0°F or −18°C	9 mo	9 mo	6–8 mo[c]
Deep freezer	0°F or −18°C	12 mo	12 mo	6–12 mo[c]
Laboratory freezer	−94°F or −70°C	12 mo	12 mo	6–12 mo[c]

[a] After thawing.
[b] Per expert opinion.
[c] Varies by milk bank; check expiration date.

benefits of mother's own milk among VLBW infants, particularly for decreasing the risk of NEC. At the current time, evidence is insufficient to support withholding mother's own milk because of the risk of pCMV.

Discharge Planning

Postdischarge plans must be individualized to consider the mother's goals for breastfeeding, bottle-feeding with expressed milk, and/or formula as well as the infant's growth status and anticipated need for postdischarge milk fortification. It is optimal for health insurers to provide coverage for lactation support to mothers who continue to provide breast milk after the VLBW infant is discharged from the hospital. More than one-half of VLBW infants have extrauterine growth failure (weight for gestational age: less than 10th percentile) at discharge.[68] Postdischarge fortification may be considered among these infants. However, current evidence supporting the use of postdischarge fortification among VLBW infants fed mother's own milk is limited. In one small RCT ($n = 39$), researchers examined fortification of half of mother's own milk feedings for 12 weeks versus no fortification and found improved growth outcomes and bone mineral content in the fortification group,[125] and another larger Danish RCT found no growth benefit among very preterm infants who received less fortification (1 fortified mother's own milk feeding per day) versus no fortification.[126] Neither study showed differences in neurodevelopment. The duration and dose of postdischarge fortification to optimize postdischarge growth and neurodevelopment among former VLBW infants fed human milk requires further study. When developing postdischarge feeding plans, the NICU team should optimally balance the need for fortification (on the basis of existing evidence and the individual infant's nutritional and growth status) with the mother's breastfeeding goals. The logistic challenges of expressing and fortifying milk in the home environment should also be considered. It is helpful to communicate postdischarge lactation and nutrition plans to the infant's outpatient pediatric providers.

Summary

Mother's own milk is the normative standard for VLBW infant nutrition and is associated with multiple health benefits. Neonatal staff and health care providers caring for VLBW infants and their mothers play a critical role in advocating and supporting mothers in NICU lactation.

Key Points

1. Human milk is the optimal nutrition for VLBW infants and decreases the risk of significant complications of prematurity, most notably, NEC. Pasteurized donor milk feeding is recommended when mother's own milk is not available, is insufficient, or is contraindicated.
2. Culturally appropriate information on lactation and the health benefits of human milk should be provided to families of VLBW infants.
3. NICU care for VLBW infants includes determination and support of maternal lactation goals. Lactation consultation with expertise in the needs of preterm infants is an integral part of VLBW NICU care.
4. Racial and ethnic disparities in the provision of mother's own milk and pasteurized donor milk for VLBW infants exist and may be best addressed with center-specific efforts to identify and mitigate local disparities.
5. Effective and efficient double electric breast pumps for mothers of VLBW infants will maximally support mothers in milk expression at the hospital and at home.
6. Because of the need for early and frequent milk expression to maintain milk supply, technical assistance in early milk expression should be available to mothers within 6 to 8 hours of birth of any VLBW infant.
7. Mothers should be encouraged to express their milk as often as needed to maintain a milk supply for their infant(s), ideally every 3 to 4 hours.
8. Written protocols and maternal education addressing milk collection, storage, and transport will optimize infant feeding safety.
9. Centers may encourage and support families in SSC, nonnutritive suckling, and direct breastfeeding, when appropriate to the infant's medical condition.
10. Human milk frequently requires fortification to meet the nutritional needs of VLBW infants. Centers may provide mothers with information on the rationale for and the content of HMFs.
11. CMV infection can be acquired through mother's own milk feeding. Current evidence is insufficient to support withholding mother's own milk solely on the basis of this risk.
12. NICU discharge planning optimally includes defined feeding plans that consider and address the mother's breastfeeding goals in conjunction with the infant's need for milk fortification.

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ABBREVIATIONS

CMV: cytomegalovirus
HMF: human milk fortifier
NEC: necrotizing enterocolitis
pCMV: postnatally acquired cytomegalovirus
RCT: randomized control trial
SSC: skin-to-skin contact
VLBW: very low birth weight

The guidance in this report does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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