Nutrition in the Newborn

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Introduction

It is important that pregnant women be educated on different options for feeding prior to delivery. Breastfeeding is the ideal source of infant nutrition. The American Academy of Pediatrics (AAP) recommends breastfeeding for at least 1 year, including exclusively for 6 months. Breastfeeding reduces the incidence of respiratory tract infections, otitis media, gastrointestinal tract infections, and necrotizing enterocolitis in the infant [1, 2]. Breastfed infants are at reduced risk of SIDS; clinical allergic disease such as clinical asthma, atopic dermatitis, and eczema; celiac disease; and inflammatory bowel disease [3–6]. Rates of obesity are significantly lower in children who were breastfed, and there is also a reduced incidence of both type 1 and type 2 diabetes [3, 7, 8] (Fig. 12.1). Researchers have found a correlation between breastfeeding and a reduction in leukemia [9]. Studies also suggest that breastfeeding has cognitive neurodevelopmental benefits for the baby, although there may be confounding factors, such as socioeconomic status, child-rearing environment, the psychobiology of maternal behavior and mother-infant relationships, and maternal intelligence [10–13].

Breastfeeding also notably benefits mothers by decreasing postpartum blood loss and causing a more rapid involution of the uterus. Additionally, breastfeeding has been associated with decreased rates of postpartum depression, diabetes, hypertension, cardiovascular disease, and breast and ovarian cancer [14–16]. Mothers should be encouraged to pump breast milk when actual breastfeeding is not an option. The target goals of Healthy People 2020, a federal initiative of the US Department of Health and Human Services, are listed in Table 12.1.

Breastfeeding mothers should have a healthy diet that includes calcium, protein, iron, and folic acid and continue prenatal vitamins to ensure adequate essential vitamins and minerals that help stimulate the baby's development. The AAP recommends at least 400 IU of vitamin D daily to prevent vitamin D deficiency and rickets in healthy newborns. All breastfed infants should be supplemented with 400 IU daily of vitamin D until the infant is weaned to 1 L or 1 quart daily of vitamin D-fortified formula or whole milk [17]. Whole milk should be started at 1 year of age. Non-breastfed infants should also be supplemented with 400 IU of vitamin D daily, which can include other vitamin D fortified foods.

Supplemental nutrition, in the form of infant formula, may be necessary or desired by the mother. Basic formulas for full-term infants contain 20 kcal per ounce, cow's milk protein, and lactose. To prevent iron deficiency anemia, infants should receive iron-fortified formula.

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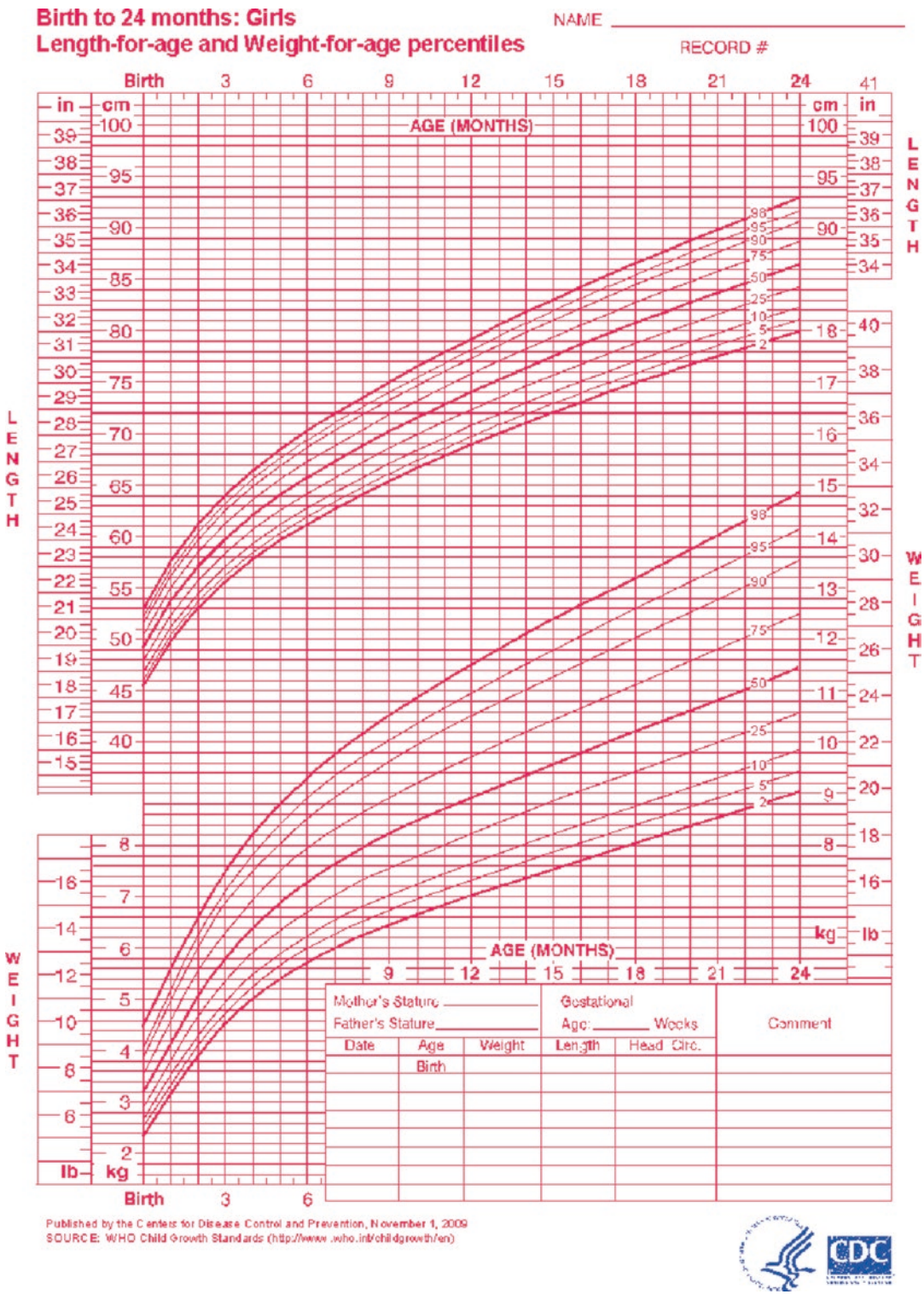

Fig. 12.1 Growth curves for female and male newborns (Source: Centers for Disease Control and Prevention)

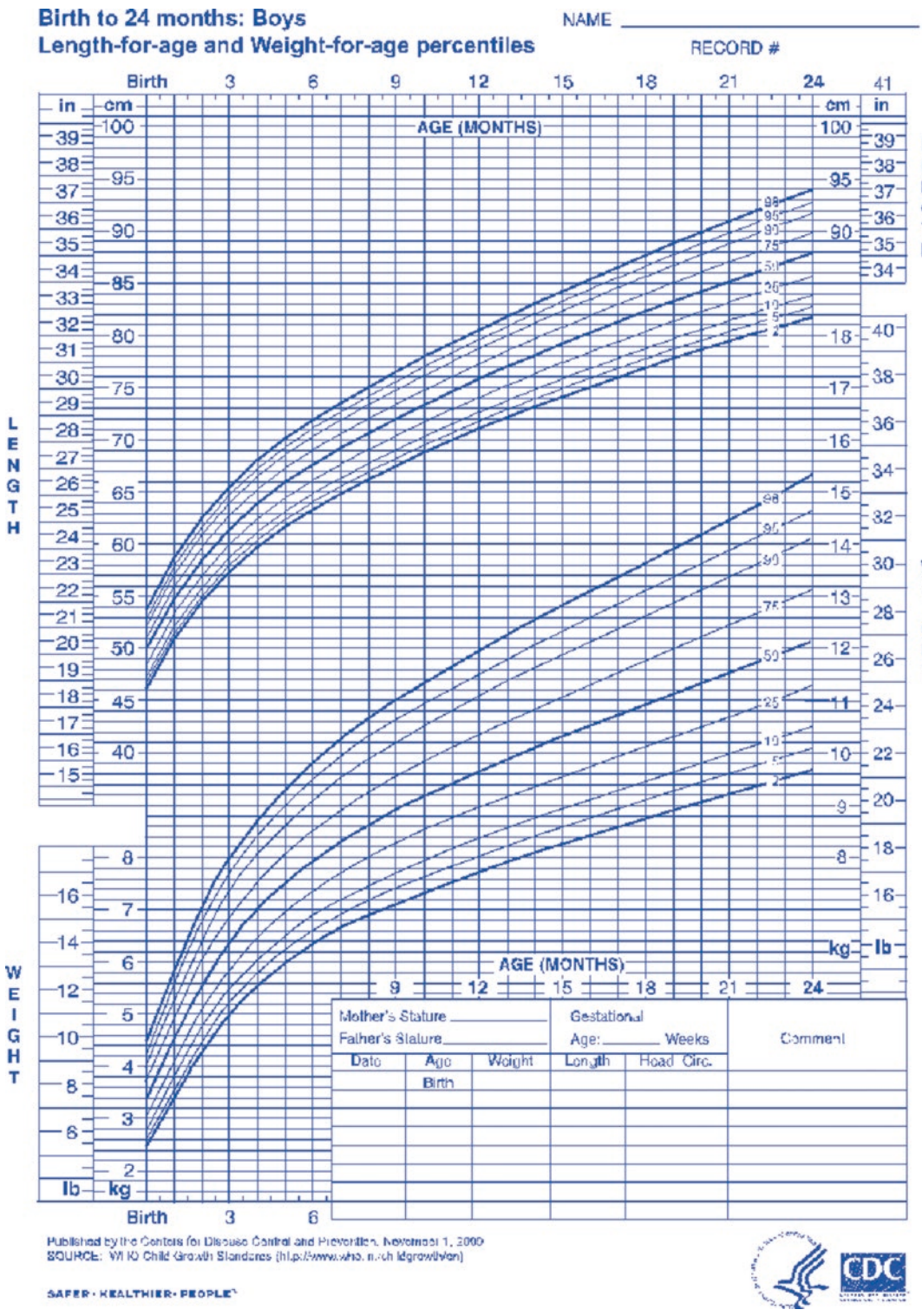

Fig. 12.1 (continued)

Table 12.1 Healthy People 2020 Breastfeeding Goals

Infants who	Target (%)
Ever breastfed	81.9
Breastfed at 6 months	60.6
Breastfed at 1 year	34.1
Exclusively breastfed for 3 months	46.2
Exclusively breastfed for 6 months	25.5

Source: Adapted from Healthypeople.gov

Preterm infants may require enriched formulas that contain more calories per ounce and higher protein concentrations. For infants with feeding intolerance, such as lactose intolerance or milk protein allergy, consider lactose-free formula or elemental formula, respectively [18].

Infant nutrition in the birth hospital is an essential topic in caring for all newborns. What happens in the hospital, even within the first hour of life, can significantly impact how the infant will be fed during the first months of life and have health consequences for families over time. Breastmilk is only produced if milk is first "removed" from the breast, so missed feedings can result in a reduced milk supply.

Mothers may be unable to produce enough milk due to a variety of reasons. If a mother is having difficulty breastfeeding, she should be referred to the birth hospital's lactation consultant – ideally an International Board Certified Lactation Consultant (IBCLC) – who can work with her to ensure that her newborn is establishing a good latch, assess whether she is producing sufficient milk quantities, and address questions and concerns. Mothers should be listened to and supported in their feeding choices. Careful evaluation of the mother-infant dyad is essential, and adaptation of the feeding plan may be necessary. While breastfeeding complications can occur in the hospital, many occur after discharge. Healthcare providers should recognize warning signs and anticipate problems before they negatively impact infant and maternal health and nutrition.

Case Presentation

Maria, a 29-year-old G1P1 mother, just gave birth via cesarean section to a healthy baby boy, John, several hours ago.

Q: What policies can be implemented in the hospital to encourage breastfeeding?

1. Encourage skin-to-skin contact in the delivery room.
2. Establish a liberal policy allowing mothers to have their babies brought from the nursery at any hour.
3. Encourage use of pacifiers.
4. Develop and implement a hospital-wide breastfeeding policy.
5. Offer specialized formulas similar to breast milk.

A: Hospitals are encouraged to strive to meet baby-friendly requirements set forth by the WHO/UNICEF to promote breastfeeding. Under these requirements, a birth hospital can create a written breastfeeding policy and train its staff members to implement it. Pregnant women should be educated on the benefits of breastfeeding and urged to initiate breastfeeding early.

After delivery, mother and baby should be kept together to encourage breastfeeding. Mothers should be offered resources such as access to lactation consultants, "rooming in" with the newborn, and education on newborn feeding cues. Access to formula and pacifiers should be limited until breastfeeding is established. In circumstances where mothers are unable to breastfeed (e.g., baby is premature or mother has a temporary maternal medical contraindication), pumping should be encouraged.

Answer: 1, 4

Maria is concerned that she is not producing enough milk to feed her newborn. You reassure her that her milk will come in, but it can take several days. She wants to know how she can track whether John is getting enough breast milk.

Q: How much milk per feeding should a 3-day-old term newborn take in?

1. 0–5 ml
2. 10–20 ml
3. >30 ml

A: It is important to educate mothers that newborn infants have very small stomachs. The newborn stomach size is appropriately matched to the amount of milk that is produced by mothers who recently gave birth. Newborns can generally digest 0–5 ml (~1 teaspoon) of milk per feeding comfortably on day 1 of life, which then increases to 10–20 ml (~1 tablespoon) by day 3 and more than 30 ml (>1 oz.) by 5 days of age.

As the infant grows, the stomach will expand to accept more liquid per feed. By 1–6 months of age, an exclusively breastfed baby can tolerate between 19 and 30 oz. Breastfed babies on average get 3 ounces per feed; therefore 8 feeds a day will give a total of 24 oz. of breastmilk [20].

Answer: 2

Maria tells the lactation consultant that she feeds John for about 15 min every 2 h. She doesn't remember how many stools or wet diapers John has had, but if she had to guess, it would be 1–2 stools and 3 wet diapers. The stools were dark-colored.

Q: Which of these findings is concerning?

1. Stool color is unusual.
2. Too few stools, so baby may not be getting enough milk.
3. Too few wet diapers, so baby is dehydrated.
4. These findings are normal.

A: A baby who is getting enough milk will have one or two bowel movements per day and an increasing number of them over the next week. Stools are initially black and tarry (meconium) but quickly progress to yellow and seedy by a week of age. When a mother's milk production increases, the baby will often stool with each feeding for the first month of life. During the first week of life, a baby should urinate the same number of times per day as their number of days of life leading up to an average of 6 to 8 times a day by 1 week of age [21]. See Table 12.2 for details on the numbers of stool and wet diapers during the first 5 days of life.

Table 12.2 Breastfed newborn intake/output norms [19]

Day	Age (h)	Milk volume per feeding (mL)	No. of feeds	No. of voids	No. of stools
1	0–24	0–5	>6	≥1	≥1
2	24–48	5–10	≥8	2–3	1–2
3	48–72	10–20	≥8	4–6	≥3
4	72–96	20–30	≥8	4–6	≥4
5	>96	>30	≥8	6–8	≥4

The newborn should void within 24 h and stool within 48 h of birth

Answer: 4

Despite these reassurances, Maria is still concerned about her milk supply.

Q: How would you advise her?

1. Keep a log of feeding and elimination patterns.
2. Supplement with formula.
3. Recommend keeping the baby skin to skin often.
4. Recommend fenugreek herbal supplement.
5. Recommend a galactagogue, like domperidone or metoclopramide.
6. Hand expression.

A: There is no panacea for low breast milk supply, but counseling families about what to expect, working with them individually, and employing evidence-based strategies can help. Keeping a log of feeding and elimination patterns can help the mother and her providers assess breastfeeding progress.

Skin-to-skin contact increases milk supply by promoting frequent feedings. It is best practice for infants to room-in with their mothers to facilitate skin-to-skin contact and feeding on cue. There are no galactagogues or herbal products currently recommended by the Academy of Breastfeeding Medicine (ABM) or AAP because studies of efficacy have been inconclusive or negative [22]. Some may not even be safe [23]. All breastfeeding mothers should be taught how to hand express breast milk effectively. This will increase milk supply by increasing perception of

demand, provide milk for the baby if they cannot feed at the breast, relieve mastitis, and alleviate fears of low milk supply.

Expressed human milk and formula can be fed to infants in a variety of ways, and each mother-infant dyad should be assessed individually for the method that is right for them. Factors to consider include cost and availability, ease of use and cleaning, stress to the infant, adequacy of milk intake, anticipated time period for usage, maternal preference, staff expertise, and whether the method supports development of breastfeeding skills [24]. Some studies suggest that the use of teats or artificial nipples (such as those on bottles) may decrease the likelihood of exclusive breastfeeding [24–26]. Step 9 of the WHO's Ten Steps to Successful Breastfeeding indicates that no artificial teats or pacifiers should be given to breastfeeding infants, and cup feeding is preferred [27]. The AAP qualifies this recommendation by indicating that pacifier use should be delayed until breastfeeding is well established, usually about 3 to 4 weeks after birth [28]. Thus, bottle-feeding and use of artificial teats should be delayed for the same amount of time, if possible.

Answer: 1, 3, 6

Maria tries hand expression and is concerned by the thick consistency of her milk. She asks if this is normal.

Q: How should you respond?

1. This is normal.
2. She is dehydrated and should drink more water.
3. She may have a yeast infection, so appropriate testing should be ordered.

A: Human milk has a unique composition that changes over time in response to the infant's needs. Colostrum, the first milk that is produced and released, has a thicker, yellowish consistency, so the mother should not be concerned about this milk. It contains a high concentration of antibodies, immunoglobulins, and proteins to help build her newborn's immune system. It also has laxative properties to help the infants pass early stools.

Answer: 1

Q: You examine John on day 2 of life. John's weight loss is 8.5% down from his birth weight. He is being exclusively breastfed (birth weight, 3.250 kg; current weight, 2.973 kg).

Are you concerned about John's weight loss?

1. Yes, weight loss between 7% and 10% should be evaluated.
2. No, formula supplementation now will help the infant gain weight.

A: Infants should lose no more than 10% of their birth weight and have no further weight loss by day 5 of life. Weight loss of 7% or more should be evaluated and followed up closely [29]. If such weight loss is noted with breastfeeding, supplementation is not immediately necessary. However, a thorough evaluation of the breastfeeding dyad by a physician and lactation consultant should be conducted, including observation of feedings and evaluation of elimination patterns. They may be able to help correct any issues that may be contributing to weight loss.

Answer: 1

Q: What aspects of the dyad's history may be related to this weight loss?

1. Infant was delivered by C-section.
2. Mother is under 30.
3. Infant is male.
4. Infant is exclusively breastfed.
5. Full term.

A: Infants delivered by C-section are more likely to lose more weight, because of possible delayed milk production and lactation difficulty in the mother [30–32]. Older age has been positively associated with increased weight loss in newborns, suggesting that John's weight loss is more likely caused by other factors [33, 34]. Gender of the infant has not been shown to

influence newborn weight loss [33]. Exclusive breastfeeding, however, is associated with newborn weight loss in several studies [30, 31, 35], but the association between breastfeeding and neonatal weight loss can be addressed by carefully monitoring infant weight, ensuring that breastfeeding is evaluated and supported effectively, and addressing any excess weight loss promptly [36]. Full-term infants are not as likely to experience more weight loss. Rather, preterm babies tend to display postnatal growth retardation [37]. Additionally, primiparity and long labor (>14 h) have also been associated with suboptimal breastfeeding and weight loss [38]. Presence of any of these risk factors may indicate the need for special care and follow-up.

Answer: 1, 4

Maria has been exclusively breastfeeding, but recently, she has been experiencing some nipple pain and describes being perpetually exhausted. She asks you if she would still experience all the benefits of breastfeeding if she supplements occasionally with formula.

Q: Which of these statements might you include in your response to Maria?

1. Though there are benefits to breastfeeding exclusively, breastfeeding and formula feeding provide similar nutrition, so supplementing occasionally will not make a difference.
2. Nipple pain is normal and she just has to push through until the nipples toughen up.
3. Maria must continue breastfeeding; her baby will not be healthy if she does not.

A: Breastfeeding should not cause nipple pain. A lactation counselor can assist with assessing and correcting latch and positioning to prevent pain. There are demonstrated benefits to breastfeeding exclusively that include development of the infant gut microbiome, protection from future infections, and facilitation of iron absorption and digestion. Unlike formula, breast milk contains living properties such as bioactive proteins, enzymes, immune cells, growth factors, and hormones that help the baby develop and grow [39]. However, formula does contain the necessary nutrients for growth and development. Ultimately, breastfeeding is the mother's choice – though it should be a fully informed one. All mothers should be supported in their breastfeeding and feeding goals, and no one should be shamed for not being able to breastfeed or simply not choosing to do so.

You call in a lactation consultant to help address the weight loss and nipple pain. She sees that the baby's position and latch angle may be causing some of the nipple pain that Jane is experiencing. She shows Jane some different positions to try. She lets her know about the hospital's breastfeeding support group and encourages her to attend.

There is no picture of a "perfect" latch, but there are elements of the latch that are important to focus on. Certain factors may lead to inadequate intake for the infant and subsequent weight loss, as well as pain for the mother.

Elements of a good latch include the following:

- *Body Positioning*: The infant's entire body with head, hips, and shoulders aligned should be turned toward the mother's body. Their arms and hands should be around the breast so that their hand motions can stimulate oxytocin release and milk letdown. The mother's hand should support the infant's head at the base of the neck rather than the back of the head.
- *Latch Observation*: The infant's mouth should open wide to initiate the latch, and the bottom lip and tongue, not the top lip, should touch the breast first. The infant's chin should be firmly touching the breast, the nose should be close to or touching the breast, and more than just the nipple should be in their mouth. The infant's bottom lip should be covering more of the areola than the top lip so that the nipple is not being sucked on directly. The infant's mouth should be open wide with both the top and bottom lips sealed (not turned inwards toward their mouth) on the breast. The infant's cheek should be rounded, not dimpled.

- *Nipple Appearance*: The mother should feel a tugging sensation as the infant feeds but little discomfort. Her nipple should appear similar pre-feeding and post-feeding. If the nipple is shaped differently or discolored after breastfeeding, this may indicate that the latch is not ideal and could cause pain.

All of these "ideal" elements are not necessary for an effective latch, and it may be difficult to evaluate some of these elements with different mother-infant dyads. If breastfeeding is working for the dyad – the baby is swallowing milk and the mother is not experiencing pain – then there is no need to adjust it. Observing and hearing gulping and swallowing during the latch is a good indication that the infant is ingesting milk. Pauses in sucking patterns and a more pronounced and slightly horizontal movement of the jaw indicate swallowing. It may be difficult to tell if swallowing is actually occurring, so keeping track of stooling, urination, and weight gain can help in making a final determination about how to proceed with feeding [40].

A lactation consultant is an expert in breastfeeding and best able to evaluate the latch most effectively. However, everyone who works with newborns should be able to provide basic breastfeeding counsel. Online video resources are helpful in learning to recognize these latch elements and jaw movements – see additional resources at the end of the chapter.

Answer: 1

Q: How would you advise Maria about the exhaustion she reports to be experiencing?

1. Tell her to start pumping so that she can store breast milk and her partner can feed John while she sleeps.
2. Sympathize with her experience and express an understanding that breastfeeding can be difficult, but let her know that many mothers often find it easier to continue by as long as 2 weeks.
3. Tell her to switch to formula if she is having trouble sleeping.

A: Sympathize with and support Maria in her decision to breastfeed, for breastfeeding is often tiring, especially early on. The first few days after delivery are crucial for establishing exclusivity. There is a critical period on the second to third day of life when women are most concerned about not producing enough milk and are often faced with pain and exhaustion.

Every mother-infant dyad's experience is different, but many mothers report that over time breastfeeding becomes easier and less time-consuming than bottle-feeding [41]. After breastfeeding is established, expressing breast milk may be a good way to share feeding responsibilities with other caretakers and can be important for mothers who are returning to work. Mothers should be reminded to continue breastfeeding or expressing milk at regular intervals in order to maintain their milk production even when there is an ample supply of stored milk.

Babies should feed at least 8–12 times a day. Newborns usually nurse on their mothers' breasts every 2–3 h for around 15–20 min each feeding. However, there is no set time for feedings, and they may vary in length, depending on when the baby is satisfied.

Mothers should look for their infants' hunger cues. When a baby is hungry, they will become more alert, put their hands or fingers on their mouth, make sucking motions, stick out their tongue, smack their lips, kick or squirm, or begin rooting (moving the jaw and mouth or head in search of the breast). If they begin crying, this is usually a late signal that they want to eat and are now very hungry.

Cluster feeding occurs in the early days when the baby may take longer at each feed, starting and finishing after 20–30 min and then wanting to feed again shortly thereafter. Babies may engage in cluster feeding in the early weeks or months, if they are sleeping for longer periods, or are experiencing a growth spurt. If moms are not expecting this, they may incorrectly interpret this frequent feeding as an indicator that they are not making enough milk. Instead, these frequent feeds allow the baby to get adequate calories and encourage more milk production to meet its needs during growth spurts. As they

become older, the time between feedings will increase as the capacity of their stomachs becomes larger [42].

Answer: 2

Q: After this evaluation, how would you proceed?

1. Keep Maria and her newborn John in the hospital for one more day to observe if there is any further weight loss.
2. Discharge Maria and John, but ensure that they have a follow-up appointment within 24–48 h scheduled and confirmed.

A: All evaluation metrics indicate that John is feeding sufficiently. As long as an appointment to check for weight gain is scheduled and confirmed, discharge at this point is reasonable. Maria should be provided with resources to call if any issues come up while breastfeeding, including the number of a local lactation consultant.

Answer: 2

Case Presentation

Anna is a 31-year-old now G2P2002 mother, with a history of HIV. She formula fed her older child but heard that breastfeeding is more beneficial than formula.

Q: How do you respond?

1. She should breastfeed this child since breastfeeding is more beneficial.
2. HIV is a contraindication to breastfeeding; she should formula feed her baby.

A: In the U.S., HIV is a contraindication to breastfeeding, as the HIV virus can be transmitted from mother to infant through breast milk. Mothers are advised to seek alternatives to breastfeeding given that formula and clean water are readily available.

Other contraindications include active pulmonary tuberculosis and active herpes. When either of these infections are present, mothers are encouraged to formula feed instead of breastfeed. In contrast, maternal hepatitis A, B, and C are generally not passed to the infant through breast milk. However, the infant must receive the first dose of hepatitis B vaccine within 24 h of birth. Of note is that cytomegalovirus is a risk to premature infants, but not full-term infants who are breastfed.

Furthermore, mothers who develop fevers or other signs of non-life-threatening infections may express concern about harm to the infant when breastfeeding. In general, the infants have already been exposed to the infection, so the mother should continue breastfeeding or expressing breast milk. The breast milk will actually provide antibodies and other anti-infective agents to protect the infant. Finally, breastfeeding while the mother has mastitis is safe for the infant and may actually help the mother recover and heal more quickly [43].

Answer: 2

Infants with metabolic disorders that prevent them from breaking down lactose in breast milk, such as galactosemia, should not be breastfed. Other metabolic disorders may not prevent successful breastfeeding; babies with phenylketonuria can breastfeed while being monitored for blood phenylalanine levels because of the low phenylalanine concentrations in breast milk. Taking oral contraceptives is not necessarily a contraindication, but estrogen-containing contraceptives can have a significant effect on milk supply, so they are not recommended for lactating mothers especially before breastfeeding is well established. They may also increase risk of thromboembolism before 3 weeks postpartum. However, progestin-only contraceptives generally have not been associated with reduced milk supply and can be used [44].

Mothers are not advised to breastfeed while taking herbals because they may contain active ingredients that are not controlled or regulated, which can negatively impact the young infant.

When mothers have questions about what medications they can and cannot take, they may

consult LactMed (https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm), a free online database that provides information on the effects of drugs and other chemicals on breastfeeding. LactMed provides further information on whether drugs can be used while breastfeeding and suggests alternatives when appropriate, so that mothers can best make informed decisions about whether to breastfeed or formula feed [45].

Overall, mothers should be supported in making informed decisions about whether to breastfeed or formula feed. While breastfeeding is most often recommended because of its health benefits for the mother and child, some mothers may have various medical or personal reasons for choosing to formula feed. Their decisions should be respected. Additionally, mothers who want to breastfeed and have no contraindications but felt the need to supplement in the hospital for any reason should be given anticipatory guidance in transitioning to breastfeeding to their personal desired extent. They should be reassured that the need for formula may not persist and told how to increase or maintain their milk supply while supplementing.

Anna decides to formula feed her newborn. She is confused about the many brands of formula on the market and wants to choose the best one for her baby. She also wants to know if she can supplement formula feedings with cow's milk, as she says that "real" milk will provide additional benefits beyond what formula can provide.

Q: How should you advise her?

1. Anna can give her baby warmed cow's milk in between feedings of formula.
2. Anna should avoid cow's milk, but giving goat's milk or soy milk to her baby is fine.
3. Besides formula, the only additional liquid that Anna should give her baby is plain water.
4. Anna should only give her baby formula.

A: Iron-fortified infant formula is the acceptable and recommended substitute for breast milk during the first year of life for a full-term infant. As long as formula is iron-fortified, different brands tend to provide similar benefits. Anna should be advised not to give cow's milk to her baby, as infants fed with cow's milk in the first year are at higher risk for iron-deficiency anemia and disruption of intestinal microbial environment. Parents should also avoid other low-iron breast milk substitutes such as goat milk, soy milk, or low-iron formulas, although soy-based and lactose-free formulas may be used in cases such as when the infant has lactose intolerance [46, 47]. Giving plain water alone (i.e., not mixed with formula) is never recommended for young babies as it may dilute out the salt in the body, causing significant medical problems.

In the first few weeks, formula-fed infants generally ingest 2–3 oz. every 3–4 h or about 6–8 times per day. They usually take longer, less frequent feedings than breastfed infants. Anna should feed her infant when he displays signs of hunger, such as putting his hand toward his mouth, sucking, rooting, grimacing, or fussing. Young infants will then turn their heads away, lose interest in eating, or close their mouths when they are full after a feeding. During feeding, the parent can bond with the infant by holding the infant close, in a semi-upright position, and looking into the eyes of the baby. Prepared formula should be used right away and at least within 24 h. At the end of the infant's first month, they should take in about 4 oz. (120 ml) every 4 h, and at the end of 6 months, they should take in 6–8 oz. (180–240 ml) every 5–6 h [48].

Answer: 4

Case Presentation

Anna and her baby are ready for discharge, and she has a few questions about her baby's nutrition at home.

Q: How much weight gain do you expect per day during the early months of life?

1. <0.5 oz.
2. 0.5–1 oz.
3. 1.5 oz.
4. 2 oz.

A: Full-term infants generally should gain about 1 oz. per day in the early months of life.

They are expected to double their birth weight by 4 months of age and triple their birth weight by 1 year. Regardless of how a mother chooses to feed her child, weight gain should be monitored according to the appropriate growth curve. The baby should regain their birth weight no later than 2 weeks. Below are the WHO growth curves for breastfed female and male infants. The CDC and AAP recommend these growth curves as the standards to be used for children under 24 months.

Answer: 2

Q: How would you tell Maria and Anna to heat up pumped breast milk or formula?

1. Microwave.
2. Stove top (be sure to prevent boiling).
3. Run warm water over the bottle.
4. It does not need to be warmed up.

A: Formula or pumped breast milk should be heated by running warm water over the bottle, so that the milk is brought to room temperature. After warming, the caretaker can test the temperature of the milk on his/her arm. In contrast, using a microwave or stovetop might cause uneven heating and create hot pockets that may scald the infant when feeding. Note that prepared formula should be used right away or at least within 24 h.

Mothers should wash their hands and appropriate pumping equipment with soap and water before expressing breast milk. Breast milk should be labeled with the date expressed so that the oldest milk can be used first. Guidelines for storing breast milk are in Table 12.3.

Answer: 3

Besides their patient-centered medical home, it is important to inform patients of all the available resources to assure them that they are not alone if they confront further challenges. Providers should maintain a list of local and national resources that they can share with mothers. Local resources include nearby Women, Infants, and Children (WIC) programs, community support groups (e.g., La Leche League, Baby Café, hospital-based breastfeeding groups, faith-based groups), and private practice lactation consultants. Nationally available resources include online communities such as La Leche League International, mobile applications, and breastfeeding helplines:

- La Leche League Breastfeeding Helpline (available 24/7 in English and Spanish) – 1-877-452-5324
- US Office of Women's Health phone line (Mon-Fri 9 am–6 pm EST in English and Spanish) – 1-800-994-9662

Table 12.3 Storage duration of fresh human milk for use with healthy full-term infants

Location	Temperature	Duration	Comments
Countertop, table	Room temperature (up to 77°F or 25°C)	6–8 h	Containers should be covered and kept as cool as possible; covering the container with a cool towel may keep milk cooler
Insulated cooler bag	5–39°F or −15–4°C	24 h	Keep ice packs in contact with milk containers at all times, limit opening cooler bag
Refrigerator	39 °F or 4 °C	5 days	Store milk in the back of the main body of the refrigerator
Freezer			Store milk toward the back of the freezer, where temperature is most constant. Milk stored for longer durations in the ranges listed is safe, but some of the lipids in the milk undergo degradation resulting in lower quality
Freezer compartment of a refrigerator	5 °F or − 15 °C	2 weeks	
Freezer compartment of refrigerator with separate doors	0°F or −18°C	3–6 months	
Chest or upright deep freezer	−4°F or −20°C	6–12 months	

Source: Centers for Disease Control and Prevention

Clinical Pearls

- Families should be provided with all necessary information and support to make an informed decision about feeding choices for their newborn.
- Breastfeeding is the ideal source of infant nutrition – it offers many benefits to both infant and mother.
- The American Academy of Pediatrics recommends breastfeeding for at least 1 year and exclusively for 6 months.
- Exclusive breastfeeding provides additional benefits beyond mixed feeding strategies.
- Though all maternal-infant healthcare providers should be able to provide basic breastfeeding counsel, the opportunity to meet with a professional lactation expert in the hospital and whenever any issues arise after discharge is valuable for postpartum mothers.
- If infants lose more than 7–10% of their birth weight, careful evaluation of the mother-infant dyad should be conducted, but such weight loss does not necessarily require formula supplementation for an infant that is being breastfed.
- All mothers should be supported in their breastfeeding and feeding goals. No one should be shamed for not being able to breastfeed or simply not choosing to do so.
- Providers should be knowledgeable about breastfeeding and formula feeding and maintain a list of local and national resources that they can share with mothers.

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Additional Resources for Provider Education

Centers for Disease Control and Prevention: https://www.cdc.gov/breastfeeding/index.htm.

HealthyChildren.org (American Academy of Pediatrics: https://www.healthychildren.org/English/ages-stages/baby/breastfeeding/Pages/default.aspx.

Academy of Breastfeeding Medicine Clinical Protocols: http://www.bfmed.org/Resources/Protocols.aspx.

Videos from the International Breastfeeding Centre: https://ibconline.ca/breastfeeding-videos-english/.