



Nutrition Education Staff Training

Infant Nutrition Module



Michigan WIC Program
www.Michigan.gov/WIC

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Infant Nutrition Module – Objectives

After completing this module, the learner will be able to:

1. Identify the types of milk that are appropriate to feed an infant during the first year of life.
2. Explain why breast milk is the best milk for most infants in their first year of life and identify the benefits of breastfeeding.
3. Identify brand names of infant formulas that are cow's milk-based, soy-based, and hypoallergenic.
4. Identify how to dilute or mix the following forms of infant formula: powdered, concentrated, and ready-to-feed.
5. Identify reasons to issue ready-to-feed formulas.
6. Explain why it is important that powdered and concentrated infant formulas be mixed with the proper amounts of water.
7. Explain to a client why sterilization and sanitation methods used during bottle preparation are important.
8. Identify how long prepared formula can be safely stored in the refrigerator.
9. Identify how to warm expressed breast milk or formula and check for the correct temperature.
10. List the only three items that should be fed from a bottle.
11. State the importance of burping an infant during and after feedings.
12. Recognize infants' hunger and fullness cues.
13. Identify why cow's milk is not recommended for infants during the first year of life.
14. Recognize appropriate and inappropriate feeding practices for infants.
15. Identify the foods that supply iron for an infant and explain how iron absorption can be increased.
16. Answer a client's basic questions about responsive feeding of infants--birth to 6 months old.
17. State when complementary foods should be introduced and recognize the signs of developmental readiness for introduction of complementary foods.
18. Identify when appropriate to refer to health care providers before highly allergenic foods are introduced.
19. Identify appropriate foods to feed a 6 to 8-month-old infant.
20. Identify appropriate foods to feed a 9 to 12-month-old infant.
21. Name foods that should be avoided because they can cause an infant to choke. State how to modify foods to appropriate consistency.
22. State how to prepare homemade infant foods.
23. Identify why commercially prepared infant foods should not be fed directly from the jar.
24. List three suggestions for caregivers to help an older infant self-feed.
25. Explain to a caregiver the process of weaning an infant from the breast or bottle to a cup.
26. Define "Early Childhood Caries" and list its causes.
27. List appropriate advice for caregivers of infants with constipation, diarrhea, spitting up and colic.
28. Identify and know how to respond to feeding and diet-related nutrition risks for infants.
29. Identify risks and know how to respond to caregiver's concerns about an infant's growth.

Introduction

Growth during the first year of life is faster than at any other time. An infant's birth weight will usually double by six months of age and triple by the first birthday. Good nutrition during this period of rapid growth is important to make sure the infant develops physically and mentally to the fullest potential.

The age recommendations made throughout this module on infant nutrition include the recommended age for a given practice—whether it's introducing complementary foods, finger foods, or weaning from a bottle to a cup. All infants progress at their own rate and differences in developmental rates are to be expected. An infant who does not fall within the average age range for readiness to move to the next feeding method can still be considered normal.

Developmental Milestones for Parents and Caregivers

The eating behavior of the growing infant is greatly influenced by their development. One in 6 children has developmental delays or disabilities and children from WIC families are at greater risk.

You can make a difference by using the “Learn the Signs. Act Early.” materials from the Centers for Disease Control and Prevention (CDC). These resources and more can be found at [cdc.gov/ActEarly](https://www.cdc.gov/ActEarly). The toolkit contains resources for families to track their child's developmental milestones, with quick and easy signs families can look for to monitor their child's development. These resources can help WIC staff promote parent awareness and help know when and where to refer a child with a possible developmental delay.

Parents and caregivers enjoy tracking their infant's development. The checklists are a first step toward families getting help when concerned about developmental issues. Parents and caregivers can recognize signs of possible developmental delay and ask for a developmental screening.

Infant Nutrition Assessment and Follow Up

The caregivers of infants enrolled in WIC receive nutritional assessment and follow up care. Some caregivers will need nutrition counseling because of certain factors related to their infant's health and eating patterns. It is important that you understand the nutritional risks of infancy and how to identify them. This module highlights infant-related nutrition risks and educational points to discuss with caregivers.

Section I: Nutrition for the Preterm Infant

When an infant is born more than three weeks earlier than the estimated date of delivery, that infant is called premature. A full-term pregnancy is 40 weeks. Infants born preterm, before 37 weeks gestation, are considered premature. Almost one out of every 10 infants born in the United States are premature.

Important growth and development happens throughout pregnancy, especially in the last trimester. Infants born too early weigh much less than full-term infants. They may have health problems because their organs did not have enough time to develop.

Conditions that a premature infant may have include:

- Breathing problems
- Development delay
- Feeding difficulties
- Cerebral palsy
- Vision problems
- Hearing problems

Premature infants (preemies) have not grown and developed as much as they should and may need to be cared for in a neonatal intensive care unit. Preemies often don't have enough body fat to hold their body temperature and are kept warm in infant warmers or incubators.

Nutrition for Preterm Infants

Breast milk is the best nutrition for all infants, especially premature infants. Breast milk contains proteins that help protect infants from infection. Most premature infants can't feed directly from the breast and need special feeding devices. For women who can't give breast milk health care providers may suggest pasteurized human breast milk. If the mother or caregiver prefer formula, the health care provider will order a special formula that meets the nutritional needs of the premature infant.

Full term infants are born with large iron stores, related to gestational age (the age of the infant at birth), birth weight or size, which meet their needs until 4 – 6 months of age. Preterm and low birth weight infants are born with much less stored iron and experience rapid growth in the first few months of life. Thus, their iron stores are used up much sooner than the iron stores of term infants (often by 2 – 3 months of age). Likewise, due to rapid growth, preterm infants have a much greater zinc requirement than term infants. Infants born preterm, with low birth weight, facing rapid growth and those with some medical conditions may benefit from an added source of iron and zinc before 6 months of age. Encourage caregivers of medically fragile infants to discuss their infant's individual needs with their health care provider.

The following sections on infant nutrition, birth through 12 months focus on meeting the nutritional needs of full-term infants.

Section II: Nutrition for the Infant: Birth to 6 Months of Age

During the early months after birth, most of the time spent between parents and caregivers and the infant is in feeding. For the infant who is growing well, it is important that caregivers trust their infant and feed the infant on **cue** (as known as “on demand”) by letting them eat as much or as little as they want. During these early months, nutritional needs can be completely met with breast milk or iron-fortified infant formula. Breast milk is normal human nutrition that also contains disease fighting substances and thus is the preferred milk for infants.

If breastfeeding is not chosen, iron-fortified infant formula is the recommended alternative unless medically contraindicated. When infant formula is used, proper preparation and handling is important.

Introduction of complementary foods should occur at around six months of age when infants display all the developmental signs of readiness. Complementary foods introduced too early are of little benefit to the infant and may even be harmful due to the possibility of choking, developing food allergies, or causing an infant to drink less than the needed amount of breast milk or infant formula. Introducing complementary foods too late may cause an infant to develop nutritional deficiencies and/or miss the period of developmental readiness. Even after complementary foods have been introduced, the American Academy of Pediatrics and other major medical organizations *strongly* recommend that infants continue to breastfeed through their first year of life or longer as mutually desired by the mother and infant.

Breastfeeding Is Best

Many health organizations recommend exclusive breastfeeding for at least the first 6 months, except in a few cases in which breastfeeding is contraindicated. Breast milk is the best milk and provides the right nutrition for infants in their first year of life and thereafter, if mutually desired. Breast milk is perfectly suited to the nutritional and developmental needs of the infant, which makes it far superior to infant formula.

Benefits of Breastfeeding

The following is a shortened list of benefits provided to the infant and mom when breastfeeding:

The nutrient composition of breast milk is ideal:

- Breast milk is perfect for infant, it contains nutrients, enzymes, growth factors, antibodies and hormones not found in formula and changes as the infant's needs change. Breast milk is easily digested, and nutrients are easily absorbed.
- Constipation is rare among breastfed infants.
- The fat portion of breast milk is almost completely digestible, providing an excellent source of calories for energy.
- Breast milk contains the appropriate amount of cholesterol, more than in cow's milk and infant formula. Cholesterol is a necessary piece in the creation of myelin, the covering of the nerve and brain cells. This covering is necessary for the development of muscle coordination of the infant during the first year of life.
- Breast milk contains high levels of fatty acids that promote optimal brain development and may improve IQ.
- Breast milk contains factors that help with the absorption of iron and zinc.
- Breastfed infants have fewer illnesses than formula-fed infants. Breast milk is rich in antibodies that protect the infant against infection. Breastfed infants have fewer respiratory illnesses, ear infections, and stomach/intestinal illnesses.
- Colostrum (the first milk) provides infant's first antibodies ("infant's first immunization") and is a gentle laxative that helps to clear infant's intestines, decreasing the risk of jaundice.
- Breastfeeding protects infants from SUID (Sudden Unexplained Infant Death) and reduces the risk of developing childhood obesity, allergies, some chronic diseases, and some childhood cancers.
- Sucking at the breast enhances the development of the infant's oral muscles, facial bones and aids in optimal dental development.
- The benefits of breastfeeding appear to last far beyond when infants are weaned.
- Breastfeeding is easier to manage than bottle feeding.
 - There is no mixing, measuring, or sterilizing involved with breastfeeding.
 - Breast milk is always clean and at the correct temperature for the infant.
 - Breast milk is always ready when it is needed.
- Overfeeding the infant while breastfeeding is less likely. The mom cannot tell how much the infant has eaten during a feeding and therefore, cannot encourage the infant to "finish the bottle." This relates to one of the reasons why formula fed infants are at greater risk for becoming overweight.
- There is less likelihood of developing allergies. Breast milk promotes maturation of the gastrointestinal tract to prevent allergens from entering the body. Cow's milk proteins are highly allergenic and early exposure can result in allergic symptoms later in life.
- Breast milk saves money. There is no need for expensive formulas and fewer trips are made to the health care provider's office with a sick infant - saving the mom time and money.
- Breastfeeding benefits the health of moms by:

- Increasing levels of oxytocin that stimulate uterine contractions, minimize blood loss after birth and help the uterus return to shape and tone.
- Increasing the rate of weight loss and may help moms return to a healthy weight; and reducing the risks of moms developing type 2 diabetes, ovarian and breast cancers.

Support of Breastfeeding

Breastfeeding is recognized by health care professionals as the best feeding choice for infants. The Academy of Nutrition and Dietetics, The American Medical Association, The American Public Health Association, The American Academy of Pediatrics, and The American College of Obstetricians and Gynecologists developed statements supporting the promotion and support of breastfeeding. For breastfeeding to be successful, there must be a strong emotional support system for the mom. This support system includes the WIC team, family and friends, employers, health care providers, childcare providers, and other moms who are supportive. The mother needs breastfeeding information before she starts, ideally during pregnancy, and continued information and support while breastfeeding.

Contraindications to Breastfeeding

There are very few contraindications to breastfeeding. Most women who desire to breastfeed can do so without problems. Under certain circumstances, a physician will need to make a case-by-case assessment to determine whether a woman's environmental exposure or her medical condition warrants her to interrupt or stop breastfeeding. In all cases of nonroutine infectious illness, the mother's health care provider should be consulted for appropriate therapy and guidance on continuation of breastfeeding.

Research has conclusively demonstrated that the human immunodeficiency virus (HIV) can be transmitted through breastfeeding and/or human milk. The AAP and CDC recommend that HIV-positive mothers should not breastfeed their infants. In addition, breastfeeding is not advised for infants of mothers with human T-cell lymphotropic virus type 1 or type 2 (HTLV-1, HTLV-2).

Breastfeeding may need to be temporarily discontinued while therapy is initiated or until the risk of transmission has passed for the following:

- Varicella-zoster virus
- Herpes simplex virus (when lesions occur on the breast)
- Active tuberculosis
- Brucellosis
- Hepatitis (There is no contraindication to breastfeeding for a mother who has tested positive for hepatitis B or C unless her nipples are cracked and bleeding.)
- Cytomegalovirus (CMV) in preterm infants or infants with weakened immunity.

Few medications are contraindicated while breastfeeding; however, breastfeeding may not be advised if the mother is receiving certain prescription medications for illness. She must talk with her health care provider about her specific medications and how to balance the benefits of breastfeeding for the infant against the risk of exposing the infant to a potentially harmful pharmacological substance.

If an infant has a metabolic disease that requires a specialized infant formula, breastfeeding may be contraindicated (e.g., in the case of infants with galactosemia, a rare medical condition). Infants with the metabolic disorder phenylketonuria (PKU) can breastfeed on a limited basis if their diet is supplemented with a special low-phenylalanine infant formula and they are carefully monitored by their health care provider.

The 2012 AAP policy statement, “Breastfeeding and the Use of Human Milk,” states that maternal substance abuse is not a categorical contraindication to breastfeeding; however, it is best for a breastfeeding mother to avoid alcohol, tobacco, and illegal drugs because most maternally ingested substances are transmitted to human milk.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

The following begins a series of Self-Checks that occur throughout this module. The answers are located at the end of the Self-Check.

1. List two reasons why the recommended age for starting complementary foods to infants is at about 6 months of age.
 - a.
 - b.
2. Which of the following are reasons why breast milk is the best milk for infants?
 - a. It is perfectly suited to the nutritional needs of an infant.
 - b. Breast milk has special substances that protect an infant against infections.
 - c. Breast milk is ready to feed on demand.
3. True (T) or False (F)?
 - ___ a. Breast milk is easily digested, and nutrients are easily absorbed.
 - ___ b. Constipation is common among breastfed infants.

- ___ c. Breast milk is always at the correct temperature.
- ___ d. Breast milk is rich in antibodies that protect the infant against infection and serious illness.

ANSWERS

1. a. Infants have no nutritional need for complementary foods before 6 months of age.
b. Infants are not developmentally ready to eat complementary foods before this age.
2. a, b, c
3. a. T c. T
b. F d. T

Formula Feeding

Human milk is the best source of infant nutrition; however, when human milk is not available, iron fortified infant formula is an appropriate alternative during an infant's first year of life. It is important during the first year of life that formula be iron fortified to prevent iron deficiency anemia.

The Food, Drug, and Cosmetic Act mandates that all infant formulas marketed in the United States provide the same nutrition for healthy, full-term infants. The nutrient specifications include minimum amounts for 29 nutrients and maximum amounts for 9 of those nutrients. Because infant formulas are often the only source of nutrition for infants, the FDA monitors infant formula manufacturers very closely to ensure that their products provide the appropriate nutrition for all infants.

Types of Infant Formulas

Infant formulas commercially available may be cow's milk-based, soy-based, and hypoallergenic. Other formulas are designed for infants with special medical or dietary needs.

Types of infant formulas:

- The most common infant formulas are made from modified cow's milk with added carbohydrate (usually lactose), vegetable oils, and vitamins and minerals. Casein is the predominant protein in cow's milk. Since the primary protein in human milk is whey rather than casein, some milk-based formulas have been altered to contain more whey. Enfamil Infant®, Gerber Good Start® Gentle and Similac® Advance® 20 are iron fortified cow's-milk based formulas. Most infants do well on these types of formulas.
- Soy-based formulas were developed for infants who cannot tolerate cow's milk formulas. Some examples of soy-based formulas are Enfamil ProSobee®, Gerber Good Start® Soy and Similac® Soy Isomil® 20.

Did You Know . . .?

Infant formula manufacturers supplement infant formulas with two fatty acids, docosahexanoic acid (DHA) and arachidonic acid (ARA). DHA and ARA are present in breast milk and are thought to be associated with visual and mental development in infants. The theory is that formulas enhanced with DHA and ARA may promote improved visual and mental development outcomes in formula-fed infants, more like breastfed infants. While research suggests that some premature formula-fed infants may benefit from DHA and ARA supplementation, studies involving term infants are inconclusive.

Iron-Fortified Infant Formulas

Use of an iron-fortified formula ensure that formula-fed infants receive an adequate amount of iron, an important nutrient during the first year. Iron deficiency is associated with poor cognitive development and performance in infants. There is no indication for use of low-iron infant formula under any circumstance. Some parents and caregivers have requested or used low-iron formula in the past because they believed that the iron in the regular formula caused gastrointestinal problems such as constipation, colic diarrhea, or vomiting. Studies have shown these problems are not more frequent in low-iron formula fed infants than those fed iron-fortified formula.

Special Formulas

Several kinds of special or exempt formulas are produced for infants who have specific problems such as allergies or intolerances, prematurity, certain diseases, or physical disabilities. These formulas are usually more expensive and must be prescribed by health care providers for a specific time period. WIC requires the Registered Dietitian approve issuance of these formulas.

Use of Soy-based Formulas

An infant's symptoms must be evaluated carefully before advising a change from cow's milk to soy formula, as spitting up, normal gas, and constipation are not indications to make such as change. True intolerance of cow's milk protein usually presents with more significant symptoms, often in the first few months of life:

- Skin rashes
- Swelling of mucus membranes
- Acute vomiting
- Acute respiratory wheezing

Soy infant formulas contain soy protein isolate made from soybean solids as the protein source, vegetable oils as the fat source, added carbohydrate (usually sucrose and/or corn syrup solids), and vitamins and minerals. These formulas are fortified with the essential amino acid methionine, which exists in very low quantities in soybeans.

The AAP has stated that soy-based infant formulas are safe and effective alternatives to cow's milk-based formulas but have no advantage over them. If an infant is found to be truly allergic to cow's milk protein, then an alternate formula should be considered – for example, extensively hydrolyzed or amino acid-based formula.

Soy-based infant formulas may be recommended in the following situations:

- Full-term infants with galactosemia, a rare metabolic disorder, or hereditary lactase deficiency.
- Infant with documented IgE-mediated allergy to cow's milk protein.

The use of soy-based infant formulas is not recommended in the following situations:

- For a preterm infant with a birth weight less than 1800 grams.
- When an infant has colic or allergy
- When an infant has documented cow's milk protein-induced enteropathy or enterocolitis.

Formula Packaging

Milk-based and soy-based infant formulas are available in powdered, concentrated, and ready-to-feed (RTF) forms.

Powdered formula is mixed following the manufacturers' instructions for individual labels when mixing the formula and water. When mixing powdered formula, fill the bottle with water first, and then add the formula to the water. You can remind caregivers not to pack formula tightly in the scoop and always follow the preparation instructions on the label.

Concentrated liquid formula requires dilution with water in a one-to-one ratio; that is, equal part concentrated liquid to equal part water.



Water to Mix Infant Formula

The FDA and the U.S. Environmental Protection Agency (EPA) are both responsible for the safety of drinking water. The EPA regulates public drinking water (tap water); the FDA regulates bottled drinking water.



Water used for mixing infant formula must be from a safe water source, as defined by the state or local health department.

If you are concerned or uncertain about the safety of your tap water, you may use bottled water or bring cold tap water to a rolling boil for 1 minute (no longer), then cool the water to room temperature for no more than 30 minutes before it is used.

Ready-to-feed (RTF) infant formulas and other infant foods are generally manufactured with non-fluoridated water. However, although fluoride is not specifically added to formulas during production, some ingredients besides water naturally contain fluoride. Supplementary fluoride should not be given to a formula-fed infant during the first 6 months of life. After that, supplementation depends on the amount of fluoride in the water used for formula preparation.

Ready-to-feed infant formula requires no mixing or diluting with water and is available in bottles and cans of various sizes. Ready-to-feed formula is generally the most expensive and should be issued under the following special conditions:

- A documented unsanitary or restricted water supply.
- Poor refrigeration.
- The infant's caregiver has difficulty in correctly diluting powder or liquid concentrate formula.
- The product is manufactured in ready-to-feed only.

Formula Preparation

When preparing formulas for feeding, it is important that caregivers follow the dilution directions on the label to correctly mix the formula and to handle it carefully to avoid contamination.

It is very important for you to determine if the formula is mixed or prepared according to the health care provider and label instructions. You should review formula mixing and preparation with caregivers to ensure they properly prepare formula for their infant. You should not recommend that caregivers change the formula dilution unless the Registered Dietitian has discussed it with the health care provider.

Formulas are mixed at different ratios of formula to water. Remind caregivers to follow the directions on the formula container for appropriate mixing.

The World Health Organization (WHO) and Center for Disease Control and Prevention (CDC) have released recommendations for preparing powdered infant formula. Because all powdered infant formulas cannot be sterilized during manufacturing, they can be contaminated with Cronobacter (formerly called *Enterobacter sakazakii*) bacteria or other harmful bacteria (during manufacturing or after opening) that can cause illness, such as severe blood infections and meningitis, and possibly even death.

Ready-to-feed and liquid concentrate formulas are sterile before opening, meaning they do not contain disease causing bacteria. Infants with weakened immune systems are at an increased risk for serious infection. Ready-to-feed and liquid concentrate formulas may be a better choice for these fragile infants. Once ready-to-feed or liquid concentrate formula is opened, it should be covered and refrigerated for up to 48 hours.

To best protect against bacterial contamination and *Cronobacter* infection, caregivers should do the following when preparing powdered infant formulas:

- For the best nutrition and safety for your infant, look at the formula label to follow formula preparation instructions exactly.
- Mix according to formula label instructions or as prescribed by your doctor or dietitian.

To ensure a sanitary feeding for all formula types:

- Wash all parts of the bottle with soap and water before using.
- Thoroughly wash hands, wash the top of the formula can before opening and use a freshly washed can opener, if needed.
- Do not reuse any formula left in the infant bottle 1 hour after the start of a feeding.

Caregivers should consider using formula sold as a liquid rather than a powder if their infant is any of the following:

- Less than 3 months old
- Born prematurely
- Has a weakened immune system

Infant formula does not need to be warmed before feeding, but some people like to warm their infant's bottle. If they warm the bottle, you can remind caregivers to never use a microwave. Microwaves heat unevenly, resulting in "hot spots" that can burn an infant's mouth and throat.

Warming a Bottle

To warm a bottle, caregivers should place the bottle under running warm water, taking care to keep the water from getting into the bottle or on the nipple. Put a couple drops of infant formula on the back of their hand to determine if it is too hot.

Other Considerations When Preparing Powdered Infant Formula

You can remind caregivers to check that the formula is not expired and that the container is in good condition. They should keep powdered formula lids and scoops clean and close containers of formula as soon as possible.

Caregivers may want to consider taking the following extra steps to protect against *Cronobacter*:

- Boil water and let it cool before pouring it into a clean and sterilized feeding cup with a lid, or bottle. Water should cool within 30 minutes after boiling.

- Add the exact amount of formula listed on the container and carefully shake the bottle rather than stirring the mixture.
- Immediately cool the formula to body temperature to ensure it is not too hot before feeding their infant. Run the prepared, capped bottle under cool water or place it into an ice bath. Do not let the cooling water get into the bottle or on the nipple.
- Before feeding their infant, remind caregivers to test the formula's temperature by shaking a few drops on their wrist to see if it's too hot.

Use formula within 2 hours of preparing it. If your infant does not finish the entire bottle of formula, throw away leftover formula. If they do not plan to use the prepared formula right away, refrigerate it immediately. Use refrigerated formula within 24 hours.

Handwashing and Handling Precautions

Caregivers should wash their hands carefully with soap and water, especially after using the toilet or changing diapers. They should be reminded to always wash hands carefully with soap and water during key times:

- Before preparing and feeding bottles or foods for their infant.
- Before touching their infant's mouth.
- Before touching pacifiers or other things that go into their infant's mouth.
- After using the toilet or changing diapers.

Bottle and Formula Preparation and Sterilization

If soap and water are not available, caregivers can use an alcohol-based hand sanitizer with at least 60% alcohol. Hand sanitizers with at least 60% alcohol kills *Cronobacter* germs but wash with soap and water as soon as possible after using hand sanitizer.

Against Bacterial Contamination and *Cronobacter* Infection

Ready-to-use and liquid concentrate formulas are sterile before opening, meaning they do not contain disease causing bacteria. Infants less than 3 months old, born prematurely and those with weakened immune systems are at an increased risk for serious infections. Ready-to-use and liquid concentrate formulas are a better choice for these fragile infants. Once ready-to-feed or liquid concentrate formulas are opened or prepared, the containers should be covered and refrigerated for up to 48 hours.

To best protect against bacterial contamination and *Cronobacter* infection, caregivers should do the following when preparing powdered infant formulas:

- Heat water to at or near boiling.
- Thoroughly wash hands, wash the top of the formula can before opening and use a freshly washed can opener.

- Fill the bottle with cooled water and add powdered infant formula to water according to dilution instructions on the formula can label.
- Carefully shake the formula in the bottle to mix.
- Cool the formula quickly by running the prepared bottle under cold water or placing it into an ice bath or cold water.
- Take care to make sure the formula is not too hot before feeding the infant, test the temperature by shaking a few drops on the wrist.

Cleanliness during formula preparation and proper refrigeration of bottles is very important through the first year of life because these measures help prevent gastrointestinal problems and illness caused by bacteria. Once powdered formula is prepared, it can be safely fed to an infant if refrigerated up to 24 hours. Once a can of powdered formula is opened, it should be covered and stored in a cool, dry place for no longer than one month.

Some caregivers use bottled water or “nursery” water to mix powdered infant formula because of fear of water safety. Counsel caregivers to treat bottled water the same as tap water. It should be boiled, mixed with the powdered formula, and then allowed to cool quickly before feeding.

Cleaning and Sterilizing the Bottles

Infants 3 months of age and younger are more likely to contract illnesses from microorganisms in bottles and nipples that are improperly cleaned, cleaned in contaminated water, or filled with contaminated water. Therefore, for infants less than 3 months old, hard plastic bottles and bottle parts (nipples, caps, rings) should first be thoroughly cleaned using soap, hot water, and bottle and nipple brushes, and then either:

Washed in a properly functioning dishwasher machine -or- sterilized in boiling water.

The following describes the steps to be taken for sterilizing bottles in boiling water:

1. Thoroughly wash hands. Wash bottles, nipples, caps, rings, and tongs in hot, soapy water, using a bottle brush. Squeeze clean water through nipple holes to be sure they are open. Rinse well.
2. Place these objects in a large pan and cover with water. Boil for 5 minutes with the lid on. Let cool. Remove bottle supplies from the pan with tongs and place on clean cloth or paper towel to air dry.
3. Cleaning and sterilizing bottles by either of the above methods should be continued until the infant is at least 3 months old. This same process should be used for bottles that will contain expressed breast milk. If disposable plastic bottle liners are used, the bags should be discarded after one use and the nipples, rings, and caps sterilized in boiling water or washed in a dishwasher until the infant is at least 3 months old. After 3 months, unless otherwise indicated by a health care provider, bottles should be

thoroughly washed using a bottle brush, soap, and hot water, or cleaned in a dishwasher.

Safe Advice

Formula should never be made with water from the hot water faucet. The hotter the water may run through a lead pipe, the greater the risk of lead leaching into the water.

Remind moms to use **COLD** tap water, have them boil it for the recommended amount of time, and then mix while hot with formula.

Preparing the Water

Formula makers provide directions for mixing their products with water, but don't specify the water source or necessity of heating the water to kill potential bacteria contamination.

Some caregivers use bottled water or "nursery" water to mix infant formula because of fear of water safety. You can remind caregivers to treat bottled water the same as tap water,

If the family is using water from their private well, you can encourage them to learn about the safety of their home's water. They can have their water tested for bacteria, nitrates, and heavy metals (for example, lead) contamination by the local health department.

Nitrates in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. Boiling water will not free the water of nitrates or heavy metals. Because of evaporation the nitrates or metals will be more concentrated in the remaining water. If the quality of the water is unsafe, the family should use store-bought bottled water.

Fluoride content in water is another issue that must be considered, whether tap or bottled water is used. Fluoridated water is beneficial in reducing tooth decay. However, excessive amounts of fluoride can cause staining or "mottling" of the tooth enamel.

Refer the caregiver to the health care provider or dentist for suggestions on how to give the right amount of fluoride to their infant. This table shows acceptable fluoride concentrations for bottled water given to infants as their primary water source.

Table 1. Fluoride Concentration Guidelines for Bottled Water Given to Infants

Age	Optimal	Minimal	Maximum
Birth to 6 months	0.7 mg/L	0.0 mg/L	1.2 mg/L
6-12 months	0.7 mg/L	0.3 mg/L	1.2 mg/L

Reasons Caregivers Incorrectly Mix Formula

There are a variety of reasons why a caregiver may not follow the instructions for proper mixing. Some reasons that caregivers will **over-dilute** formulas (formula mixed with too much water) are because they may believe:

- It will help an infant with constipation, spitting up, or diarrhea.

- It will help control the infant's weight.
- It will reduce the amount of iron to the infant.
- It will make the formula last longer.

Some reasons caregivers **over-concentrate** formula (formula mixed with too little water) are because they may believe:

- It will help the infant sleep through the night.
- It will help the infant grow faster.
- It will thicken the formula to fill the infant up.

Some caregivers have difficulty measuring the formula, and therefore, over-concentrate it.

Storing the Formula

It is best to keep the formula in its original container and fill bottles as needed. Using tongs, place nipples (upside down), rings, and caps on the filled bottles.

Bottles of concentrate or ready-to-feed formula should be refrigerated and used within 48 hours from when they were prepared. Bottles prepared from powdered formula should be refrigerated and used within 24 hours. Formula can be kept up to 1 hour without refrigeration.

Unused Formula

Formula left in the bottle after a feeding must be thrown away because it has the infant's saliva mixed in with it. This provides an ideal breeding ground for bacteria. If formula is offered to an infant and the infant drinks it for 5 minutes and then stops, it should be thrown away after one hour if the infant doesn't continue to drink. Also, a dropped bottle whose nipple has come into contact with the floor or another unsanitary source should not be given to the infant.

When away from home, it is important that proper care is taken with the infant's bottles packed in a bag. The formula in the bottles should start out very cold. The bottles should be insulated (wrapped in a thick cloth) to keep them cold. If the caregiver will not have access to refrigeration for a very long time, it is a good idea to use powdered formula, mixed at the time of feeding.

Proper Feeding Temperature of Formula

Infants can be fed formula that is room temperature, slightly cooler, or slightly warmer. If an infant prefers a warm bottle, special care must be given not to warm the formula beyond body temperature. The best way to warm a bottle of previously prepared or ready-to-feed infant formula is to set it in a pan or bowl of warm water for a few minutes or shake it under warm tap water.

A few drops of formula on the wrist are a good test of temperature: if it feels slightly warm on the wrist, it is the correct temperature for the infant. Caregivers should be reminded not use microwaves to warm breast milk or formula.

The following risks are too great and outweigh the convenience of using microwaves for heating infant formula:

- After microwaving bottles can remain cool to the touch while the formula inside them can be scalding hot. Microwaving heats liquids unevenly. The formula may feel lukewarm to touch and will have scalding hot spots.
- After microwaving, formula in bottles with disposable plastic liners can become so hot that the plastic liners may burst.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

1. Circle the infant formulas that are made from cow's milk. Underline the ones that are made from soybean milk.

Enfamil Infant®

Similac Advance® 20

Gerber Good Start Soy®

Enfamil ProSobee®

Gerber Good Start Gentle®

Similac Soy Isomil® 20

2. Cow's milk-based formula and soy-based formula are packaged in three different forms: concentrated, powdered, and ready-to-feed. Circle the forms recommended for infants under 3 months, born premature, or weakened immune systems.

Concentrated

Powdered

Ready-To-Feed

Complete the sentences to make accurate statements in questions 3, 4 and 5.

3. Improper dilution of infant formula can result in _____.
4. Sterilization of water and bottles and overall cleanliness during formula preparation are necessary in order to prevent _____.
5. Liquid formula (RTF or prepared from concentrate) may be stored in the refrigerator up to _____ hours after the formula has been opened. Formula prepared from powder may be stored in the refrigerator up to _____ hours after being mixed.

ANSWERS

1. Cow's milk-based: Enfamil Infant®, Similac Advance® 20, Gerber Good Start Gentle®
Soy milk-based: Enfamil ProSobee®, Similac Soy Isomil® 20, Gerber Good Start Soy®
2. Concentrated and Ready-To-Feed (RTF)
3. Improper dilution of infant formula can result in very serious health problems for the infant. Formula mixed with too little water might be too concentrated for an infant to digest easily. Formula mixed with too much water might not supply calories needed for proper growth and may provide an overload of water that can be dangerous to the infant.
4. Sterilization of water and bottles (for infants 3 months of age and younger) and overall cleanliness during formula preparation are necessary in order to prevent illness.
5. Liquid formula (RTF or prepared from concentrate) may be stored in the refrigerator up to 48 hours after the formula has been opened. Formula prepared from powder may be stored in the refrigerator up to 24 hours after being mixed.

Cow's Milk During the First Year

Fresh or powdered milk (whole, 2%, 1%, and fat-free), evaporated milk, sweetened condensed milk, soymilk, almond milk, goat's milk, and other non-dairy milks are not recommended for infants during the first year of life. WIC and the American Academy of Pediatrics strongly recommend that infants continue to be breastfed or receive iron-fortified formula through the first year of life.

Reasons cow's milk (whole, 2%, 1% fat-free, powdered) is not acceptable for infants before age one, include:

- Cow's milk has a higher level of protein and minerals than breast milk or iron-fortified infant formulas. The high levels of protein and minerals in cow's milk place stress on the kidneys of young infants.
- The immature digestive system of the young infant is not able to adequately digest cow's milk.
- In the early months, the feeding of cow's milk has been associated with gastrointestinal blood loss, which puts infants at risk for the development of iron-deficiency anemia.

- Fresh or powdered cow's milk, evaporated milk, sweetened condensed milk, goat's milk and other non-dairy milks (for example, soymilk) are poor sources of iron. Prolonged use in early infancy may result in iron-deficiency anemia. These types of milk do not contain many essential nutrients such as vitamin C, some B vitamins, folate, and some minerals that are needed for growth and development of the infant.

Beyond 12 months of age, breast milk continues to be appropriate if mutually desired by mother and infant. Whole milk is recommended for most children between 12 to 24 months of age. However, the American Academy of Pediatrics recommends the use of reduced-fat milk for children who are overweight or obese or have a family history of obesity, dyslipidemia (high cholesterol or fat in the blood), or cardiovascular disease (condition that involves narrowed or blocked blood vessels that can lead to a heart attack, chest pain or stroke.). After age two, 1% or fat-free milk is encouraged for all healthy children who are growing well.

Feeding the Newborn

The close physical contact during feeding creates healthy social and emotional development. Caregivers gain a sense of responsibility by caring for their infant, and quickly become experts at communicating, soothing, and handling their infant. However, when it comes to feeding their infants, caregivers may not easily understand their infants' cues and often have questions.

Newborns, whether breastfed or formula fed, need small amounts of breast milk or infant formula often throughout the day and night because their stomachs cannot hold a large amount. An infant's digestive system is not designed to go a long amount of time without food. Infants need the important nutrition that night feedings can provide for growth and development. Night feedings are also important for the breastfeeding mother because they help maintain a healthy milk supply and prevent the mother's breasts from becoming too full.

Hunger and Fullness Cues

Newborns should be fed when they are hungry and eat until they are full. This is called feeding "on cue" or feeding on demand. Infants give cues to "tell" caregivers what they need. Common questions caregivers may have are:

- "How much or how often should I feed my infant?"
- "How can I tell when my infant's ready to eat?"

Most newborns lose weight the first few days of life. Usually they lose no more than 8% of their birth weight. However, they should regain that weight within one week. That would mean an 8-pound infant at birth might lose up to 10-ounces during the first few days of life. An infant that loses more than 8% of their birth weight should be evaluated immediately by a health care provider.

By the time they are 4 to 6 months old, infants typically have doubled their birth weight, gaining about 4 to 7 ounces per week. Infants typically triple their birth weight by 1 year of age, gaining about 3 to 5 ounces per week from 6 to 12 months of age.

- “How long does a feeding last?”
- “How can I tell if my infant’s eating enough?”

While there are general guidelines that address these questions, infants are usually excellent at communicating when they are hungry and when they are full. Infants use both obvious and subtle cues to communicate these needs. That means caregivers need to be aware of these cues and should avoid strict feeding schedules.

Feeding on cue helps the infant connect feelings of hunger and fullness with the beginning and end of a feeding and helps the infant learn to eat based on his appetite. Most infants will feed every 1½ to 3 hours (8 to 12 times in a 24-hour period) during the early weeks of life. Sleepy infants may need to be awakened to feed. The amount of time between feedings typically increases as the infant grows older. Newborn feedings can be expected to last 20-30 minutes. Infants may feed more during growth spurts, usually around 2-3 weeks, 6 weeks, and 12 weeks. Growth spurts generally last 2-3 days.

Caregivers play a key role in helping infants feel comfortable and safe by learning to recognize and respond to their infants’ needs. It is important that caregivers recognize when an infant is full. Trying to force an infant to take extra formula or breast milk can lead to a negative feeding relationship. By ending a feeding when the infant shows signs of fullness, a caregiver reinforces the infant’s natural ability to stop eating when they are satisfied and prevents overfeeding.

Recognizing Hunger Cues

When infants are hungry, they will do everything they can to communicate it. These cues are clustered, meaning infants will use multiple cues together to convey their hunger. Hunger cues include:

- Clenched fingers.
- Fists over their chest and tummy.
- Bringing hands to their face.
- Flexed arms and legs.
- Mouthing, rooting (looking for the nipple).
- Fast breathing, and sucking noises or motions.

Some caregivers may think that crying and waking are hunger cues, but these behaviors on their own without any of the other cues aren’t signs of hunger. Caregivers may need help learning to recognize hunger cues so they understand when they see hunger cues, they should feed their infants. When caregivers respond to these early hunger cues, they can reduce crying. Late hunger cues include furrowing the brow, moving the head frantically from side to side and crying.

It is important for caregivers to learn the difference between hunger cues and other cues. A hungry infant may cry, but he will also show other cues first. Encourage caregivers to be

flexible and responsive to their infant's signs of hunger before he reaches the late stage of crying. Suggest caregivers talk with their health care provider if they have concerns about growth or persistent crying (inconsolable crying, crying that continues despite soothing, changes in environment or other interventions).

Recognizing Fullness Cues

Like hunger cues, clustered cues are commonly used together to show fullness/satisfaction. Signs of satiety and fullness are when the infant:

- Ends the feeding by releasing the breast.
- Turns away from breast or bottle.
- Sucks slower or stops sucking.
- Pushes away.
- Seals the lips together.
- Seems content and calm.
- Falls asleep.
- Hands, toes, legs and arms open and become relaxed.

Sleeping Through the Night

A big milestone that many caregivers look forward to celebrating is when their infant sleeps through the night. Caregivers may share their sleep stories and tips for getting infants to sleep through the night at an early age. New caregivers receive a lot of conflicting information about what is normal. It is commonly thought that feeding infant cereal at a very early age will help the infant sleep through the night. Research studies have failed to find truth in this common belief.

Another misconception is the belief that breastfed infants sleep differently than formula-fed infants. Although there are a few differences, studies show minimal difference in *maternal* sleep among mothers who exclusively breastfeed, combo feed, or formula-feed their infants. Infants differ in the age they are ready to sleep through the night without feedings.

By six months, infants may be able to sleep up to six hours in one stretch of time. This number is only a guide, every infant is different. Infants, who begin sleeping through the night, may resume night feedings during periods of rapid growth or teething. This is normal infant behavior. Starting complementary foods before an infant is developmentally ready or offering "extra" breast milk or formula will not make an infant any more likely to sleep through the night.

You can help caregivers understand that it is normal to get less sleep with an infant and that sleep patterns will change as the infant gets older. Work with caregivers to help them find ways to function despite the sleep deprivation that comes with the need to care for their infants during the night. Introducing solids too early can be harmful.

Positive Caregiver- Infant Interactions

Over time, caregivers become more skilled at understanding their infant's cues. As they feed their infant, caregivers learn how their actions comfort and satisfy.

A healthy feeding relationship involves a **division of responsibility** between the caregiver and the infant. The caregiver sets an appropriate, safe, and nurturing feeding environment and provides appropriate, healthy foods. The infant decides when and how much to eat. In a healthy infant caregiver feeding relationship, responsive caregiving involves:

- Responding early and appropriately to hunger and fullness cues.
- Recognizing the infant's developmental abilities and feeding skills.
- Balancing the infant's need for assistance with encouragement of self-feeding.
- Allowing the infant to start and guide feeding interactions.

Successful interaction between a caregiver and infant involves three steps:

1. Look.
2. Recognize.
3. Respond.

The purpose of this 3-step assessment is to describe how to help a caregiver understand what his or her infant is trying to communicate.

Typical Breast Milk and Formula Intake

The frequency of breastfeeding or quantity of formula an infant consumes in 24 hours varies depending on the infant's age, size, and level of activity. Infants should be fed as they need it, "on cue"; using the infants early hunger cues as a guide.

Offer the caregiver special instructions to watch for the first signs of fullness (decrease in sucking, lack of interest in the feeding, etc.) to prevent overfeeding. Encourage caregivers to:

- Let the infant decide how much to eat.
- Throw away any breast milk or formula remaining in the bottle if not used within 1 hour after the feeding.
- Do not encourage or force the infant to finish the bottle.

Infants do not always get hungry on a schedule and do not always take the same amount at a feeding. Let the infant decide how much to eat. Table 2 shows typical breast milk/formula daily intake.

Table 2: General Guidelines for Healthy Full-Term Infants

Breastfed Infants:

8-12+ feeding/24 hours; as the infant becomes older, the time between feedings will increase as the capacity of the infant's stomach becomes larger.

Formula Fed Infants (formula or breast milk):

Newborn infant may drink 1-2 ounces every 2-3 hours

1-2-month-old infant may drink 2-3 ounces every 2-3 hours

2-3-month-old infant may drink 4-5 ounces every 3-4 hours

3-4-month-old infant may drink 5-6 ounces every 3-4 hours

4-6-month-old infant may drink 6-8 ounces 4-6 times a day

Signs of Adequate Intake

Infants who are fed on cue usually consume the amount they need to grow well. Growth of exclusively breastfed infants during the first 6 months may exceed that of other infants, but formula-fed infants may gain more rapidly during the remainder of the first year.

Adequate growth of an infant is the best sign that an infant is getting enough breast milk or infant formula.

Caregivers may have concerns whether their infant is gaining enough weight or growing well. Monitoring an infant's growth over time is the best indicator that an infant is getting enough breast milk or formula. While, it is important to find out the number of wet diapers, frequency of nursing, and/or actual amount of formula that the infant is consuming, checking the infant's growth is the only sure way to know if an infant is getting the right amount of calories to meet his/her energy needs.

During the first few days of life, wet and dirty diapers gradually increase. Breastfed and formula-fed infants should have at least 6 wet diapers a day by the fifth day of life. The urine should be clear. Breastfed infants should have 4 or more dirty diapers whereas formula-fed infants may not stool as frequently or as soft. After about 6 weeks of age, the older infant may poop less frequently.

Understanding Hunger Cues

When infants are hungry, they give several cues at once. Teach caregivers to watch for early hunger cues. For example, an infant may suck on his hand, root, and make sucking noises all at once. Watching and responding to early hunger cues can help prevent some crying. If an infant displays hunger cues and all other needs are met, the infant is most likely hungry. Feeding "on cue" will not spoil the infant.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

1. Circle the types of milk that are good to feed an infant during the first year of life:

Breast milk

Iron-fortified infant formula

Sweetened condensed milk

Fresh whole cow's milk

Goat's milk

2%, 1%, cow's or fat-free milk

2. True (T) or False (F)?

- a. Feeding "on cue" will spoil an infant.
- b. To prevent overfeeding, a caregiver should look for signs of fullness, such as a decrease in sucking and lack of interest in the feeding.
- c. Infants are ready to sleep through the night without feedings at different ages.
- d. Fresh and powdered milk (whole, 2%, 1%, or fat-free) are good sources of iron for older infants.
- e. Crying is always a sign of hunger.
- f. Infants may feed more during growth spurts, typically at 2-3 weeks, 6 weeks and 12 weeks.
- g. Moms who formula feed will get more sleep than moms who breastfed.

ANSWERS

1. Iron-fortified infant formula
Breast milk

2. a. F b. T c. T d. F e. F f. T g. F

Feeding with a Bottle

Bottles are appropriate for feeding infants who are not developmentally ready to drink from a cup. However, bottles must be used properly.

Types of Bottles to Use

In 2012, the use of BPA in infant bottles and sippy cups was banned by the US Food & Drug Administration. BPA or Bisphenol A is an industrial chemical used to make hard, clear plastic, which is used in many consumer products. Although the scientific evidence varies, it is recommended to avoid using BPA containing plastic wear, or BPA containing infant feeding products when feeding infants. This includes not heating up human breast milk or infant formula in BPA containing plastics.

Plastic items containing BPA are generally marked with a 7 on the bottom for recycling purposes. Although not all number 7 plastic contains BPA.

What—and What Not—to Put into a Bottle

Only three items should be fed from a bottle:

- Breast milk which has been "expressed" (removed from the breast by hand techniques or by use of a breast pump).
- Infant formula.
- Water, but not given routinely: Breast milk and properly prepared infant formula provide infants with enough water. Supplemental water generally is not recommended for healthy infants who are not eating complementary foods. It can also fill the infant's stomach and cause a feeling of fullness which can decrease an infant's desire to feed. Discourage caregivers from giving water to infants less than 6 months of age. Infants with diarrhea or vomiting should be referred to their health care provider.

There are many items that should not be fed from a bottle:

- Cereals and pureed foods
Complementary foods should not be fed until the infant is developmentally ready to take these foods from a spoon (usually occurs at about six months of age). Feeding solids from a bottle will not help the infant sleep through the night and may lead to overfeeding. Also, feeding infant cereal in a bottle or food from an "infant feeder" can cause choking.
- Juices
Juice can be introduced when the infant is 12 months old, and it should be served in a cup. Drinking juice from a bottle may lead to tooth decay and too much juice consumed. When offering juice use a cup without a lid. Discourage caregivers from

allowing infants or toddlers to carry around cups, especially cups with lids designed to prevent spilling. This practice can lead to excessive consumption of juice. Once the child is 12 months old, limit juice to, at most, 4 ounces a day.

- Sweeteners
Adding sweeteners of any kind including honey, agave nectar, syrup, sugar, Kool-Aid, sports drinks, powdered or liquid drink mixes, or "gelatin water" to the bottle can result in excessive caloric intake and tooth decay.

In addition, honey may contain botulinum spores that are responsible for the very serious food poisoning- botulism. Botulism can cause severe illness and death in infants. Thus, honey should not be given to an infant under one year of age.

Making Infant Comfortable When Bottle Feeding

There are proper ways to hold a bottle while feeding an infant. To make bottle feeding safe and comfortable for infants, encourage caregivers to do the following:

- Hold the infant during feedings in the cradle of the arms or lap. This helps the infant feel secure, as the infant can look at the caregiver's face and the caregiver is able to read and respond to the infant's cues. When in this position the infant's head should be a little higher than the rest of the body, this prevents choking, and milk from backing up in the inner ear and causing an ear infection.
- The bottle should be tilted so that the neck and nipple are always filled with breast milk or formula. This will help prevent the infant from swallowing air. Swallowed air can lead to a decrease in intake because the infant will feel full early in the feeding. It also can cause discomfort for the infant.
- Burp the infant at any natural break or at the end of a feeding to remove swallowed air. There is no need to burp an infant after a certain amount of time or after every couple of ounces because this can be disruptive to the feeding. Burping at natural breaks helps slow the feeding, lessens the amount of air swallowed, and may help reduce gastroesophageal reflux and colic in some infants.
- Burp an infant by gently patting or rubbing the infant's back while he or she is held against the front of the caregiver's shoulder and chest or held and supported in a sitting position in the caregiver's lap.
- Take breaks during the feeding to socialize with the infant, talking gently and smiling.

Crying or fussiness is not always a sign of hunger. Help caregivers understand that breastfeeding or formula feeding should not be used as a substitute for attending to an infant's other needs. Holding and rocking the infant, changing the infant's diaper, or offering a pacifier when the caregiver is certain the infant isn't hungry is often adequate to soothe an infant. Breastfeeding moms should avoid using pacifiers until the infant is about 4 weeks old to ensure mom has established her milk supply.

Propped Bottles Lead to Problems

An infant who is bottle-fed should always be held during feeding while they are too young to hold their own bottle. Holding, touching, and establishing good eye contact increases bonding between the caregiver and infant and allows the caregiver to learn their infant's hunger and fullness cues.

Strongly discourage the practice of propping the bottle with a pillow or blanket. "Bottle propping" is not a safe practice. The infant may choke on the liquid and the fluid can get into the lungs. Furthermore, health care professionals believe that infants who are fed while lying back without their heads being raised a little have a greater incidence of middle ear infections.

Caregivers are not engaged with their infant when they prop the bottle and therefore cannot respond to their infant's needs, for example, if the infant wants to stop feeding. The infant is not able to regulate his/her feeding; thus, the infant may be overfed. Infants need to be held as part of their development, and feeding time is a good time for holding.

Feeding Complementary Foods Too Early

There is no advantage to introducing complementary foods (for example, infant cereal, jarred or home prepared infant foods) before about six months of age. The infant's nutrition needs can be entirely met by breast milk or iron-fortified infant formula from birth to about six months of age.

In fact, some negative effects are associated with the early introduction of complementary foods (that is before about six months of age). Early introduction of solids may result in over-feeding, gastrointestinal problems such as constipation and diarrhea for these infants. A young infant who gets complementary foods in place of breast milk or formula might get too many calories, gain too much weight, and not enough nutrients to grow and develop properly. This is because infant cereal and other infant foods do not provide the same level of calories and nutrients as breast milk and formula.

Young infants who are not developmentally ready for complementary foods may choke on solids, which can force these food particles into their lungs. This aspiration (drawing of food or foreign matter into the lungs with the breath) of food particles can result in pneumonia, or even death, in young infants.

Many caregivers have heard that feeding complementary foods will help infants sleep through the night; however, research does not support this idea. Most infants start sleeping for longer stretches at a time as they get older. The longest stretch can happen during the day or at night. Caregivers may mistakenly associate early introduction of complementary foods with improved sleep versus the age of the infant.

You can help support caregivers to understand that they will get less sleep at first, but as the infant gets older their sleep patterns will change and infants may sleep for longer stretches of

time. "Sleeping through the night" may not be permanent since many infants resume night feedings during growth spurts or teething.

It is commonly thought that feeding infant cereal at a very early age will help the infant sleep through the night, but research studies have failed to find truth in this common belief. It seems that the end of the night feeding is a developmental stage which is reached at any time from the newborn period to 15 months of age.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

1. Name the three items that are appropriate to put in an infant's bottle.
 - a.
 - b.
 - c.

2. Name three items that should not be put in an infant's bottle.
 - a.
 - b.
 - c.

3. True (T) or False (F)?
 - a. Feeding honey to an infant less than one year of age can cause botulism poisoning.
 - b. "Bottle propping" is a good way to feed an infant because it frees up the caregiver to do other things.
 - c. Only bottle-fed infants need to be burped during feedings.
 - d. Young infants who are not developmentally ready for complementary foods may choke, which can force food particles into the lungs.

ANSWERS

1.
 - a. Breast milk
 - b. Infant formula
 - c. Water

2.
 - a. Cereal and pureed foods
 - b. Juice
 - c. Sweeteners

3.
 - a. T
 - b. F
 - c. F
 - d. T

Section III: Nutrition for the Infant: 6 to 8 Months of Age

Developmental Readiness for Complementary Foods

Physical growth, development and nutrition needs vary greatly in each stage of infancy. About six months of age, most infants are ready to begin eating complementary foods with a soft consistency. Breast milk or infant formula alone are no longer enough to meet all the nutrient needs of the infant. During this time, an infant's oral-motor skills and digestive system are more developed and mature. These changes set the stage for starting complementary foods. The American Academy of Pediatrics (AAP) recommends complementary foods be introduced into a healthy infant's diet at approximately 6 months of age.

Determining the best time to introduce an infant to complementary foods can be difficult. The key is to know when an infant has reached developmental readiness. Some signs of developmental readiness include:

- Sits up alone or with support.
- Has head and neck control.
- Opens mouth when sees spoon approaching.
- Brings objects to the mouth.
- Tries to grasp small objects such as toys and food.
- Transfers food from the front to the back of the tongue to swallow.
- Swallows food rather than pushing it back out onto the chin (tongue thrust reflex diminishes).

Complementary foods are foods or beverages other than breast milk or infant formula introduced to an infant to provide additional energy and nutrients to ensure appropriate growth and development.

In general, around 6 months of age, the following developmental changes occur that allow the infant to tolerate complementary foods:

- The infant's intestinal tract develops immunologically, gaining defense mechanisms that will protect the infant from foreign proteins. Thus, the risk of hypersensitive, or allergic, reactions to the proteins in complementary foods is reduced.
- The infant's ability to digest and absorb proteins, fats, and carbohydrates, other than those in human milk and formula, increases rapidly.
- The infant's kidneys develop the ability to excrete the waste products from foods with a high renal solute load, such as meat.
- The infant develops the neuromuscular mechanisms needed for recognizing and accepting a spoon, masticating, swallowing nonliquid foods, and appreciating variation in the taste, color, and texture of foods.

Recommendations on the introduction of complementary foods provided to parents or caregiver of infants should consider the following:

- The infant’s developmental stage and nutritional status
- Coexisting medical conditions
- Cultural, ethnic, and religious food preferences of the family
- The nutritional values of key foods, which are accessible and easy to prepare

A healthy infant is generally ready to eat complementary foods, at about 6 months, which is a critical time in their development. The jaw and muscle development that occurs when an infant eats complementary food at the appropriate age contributes to later speech development.

In WIC, issuance of infant cereal and infant foods can begin when the infant is 6 months old. The first month after an infant turns 6 months old, the food package changes to add infant cereal, and infant food fruits and vegetables (and infant food meat for exclusively breastfed infants).

Introducing complementary foods later than 6 months of age for infants who are not developmentally delayed may cause negative effects. The infant may then have difficulty developing skills to eat independently. It may also interfere with the infant consuming an adequate variety and amount of food to meet their nutritional needs. Iron levels may start to drop if an infant does not get enough iron in their diet at about 6 months of age. Breast milk or infant formula alone does not provide an adequate concentration or balance of nutrients for the older infant.

Therefore, complementary foods serve an important purpose in the daily diet of infants who are developmentally ready for them.

Developmental Delays May Affect an Infant’s Feeding Skills

An infant’s development does not always match his or her chronological age. Infants may be developmentally delayed in their feeding skills due to:

- Prematurity
- Low-birth weight
- Multiple hospitalizations
- Failure to thrive
- Neuromuscular delay
- Abuse or neglect
- Cleft lip or cleft palate
- Inability to feed by mouth (for example, fed intravenously or via tube) for an extended period
- A medical condition (for example, Down’s syndrome or cerebral palsy)

Food allergies are often outgrown.

About 80% to 90% of egg, milk, wheat, and soy allergies go away by age 5.

Fewer children outgrow allergies to peanuts, other nuts and seafood.

Infants with these conditions may not be developmentally ready for complementary foods at similar chronological ages as full-term, healthy infants. A caregiver of a developmentally

delayed infant will need instructions on feeding techniques from the infant's health care provider or a trained professional.

Foods Hypersensitivities/Allergies

A food hypersensitivity, also called allergy, is an adverse health effect arising from a specific immune response. When a food allergy is present, the immune system reacts to a certain food with symptoms such as the following:

Reactions can occur immediately or hours after eating. The reaction can range from mild to severe. It is estimated that food allergies affect 4% to 8% of all children in the United States. Some of the most common foods that cause allergies are listed below, although any food can cause a reaction.

Common foods that cause allergies are:

- Dairy, such as cow's milk, cheese, cream, yogurt, butter, sour cream, ice cream, and cottage cheese.
- Eggs
- Peanuts
- Nuts from trees, such as cashew, walnut, hazel, etc.
- Fish
- Shellfish, such as shrimp and lobster
- Wheat
- Soy

Allergic reactions to a certain food can include the following symptoms:

- Gastrointestinal system: nausea, vomiting, diarrhea, abdominal pain
- Respiratory system: coughing, wheezing, mouth itch, runny nose ear infection
- Skin: hives, atopic dermatitis (skin rash, such as eczema)
- Full system: life threatening anaphylaxis

If several areas of the body are affected, the reaction may be severe or even life-threatening. This type of allergic reaction, anaphylaxis, requires immediate medical attention.

Food intolerances or food sensitivities are not the same as food allergies because the immune system is not causing the problem. Lactose intolerance is an example of a food intolerance that is often confused with a food allergy. Those with lactose intolerance lack the intestinal enzyme, lactase, that digests the sugar in milk, lactose, leading to abdominal discomfort, bloating and loose stools.

Celiac disease occurs when gluten, a combination of proteins found in wheat, rye, oats, barley, and buckwheat, damages the lining of the small intestine, and interferes with absorption of nutrients from food.

Other reactions that can occur from sometimes unexpected sources:

Awareness of Negative Food Reactions

Once solids are introduced into an infant's diet, only one new food at a time should be given, and the new food should be fed for 3 to 5 days prior to the introduction of another new food.

If sensitivity to the food such as skin rash, diarrhea, hives, or vomiting is shown, the food can be easily identified and removed from the diet until a later date.

- Food additives such as artificial food colorings
- Natural substances in foods, such as caffeine or fiber
- Substances or microorganisms that cause food poisoning.

After any new food is introduced, watch for the following reactions:

- Excessive intestinal gas after consuming certain food (e.g., certain vegetables, legumes)
- Vomiting
- Diarrhea
- Skin rashes

What May Help Reduce the Likelihood of Food Allergies

Feeding choices can make a difference in an infant's likelihood of developing allergies. An infant's nutrition plays an important role in prevention. Breastfeeding is the best way to feed an infant and research shows breastfed infants have fewer rates of allergies, asthma, respiratory illnesses and eczema compared to formula-fed infants. Breast milk is least likely to trigger an allergic reaction; it is easy to digest and strengthens an infant's immune system.

Introducing Potential Allergenic Complementary Foods

In the past, it was recommended that common allergenic foods like dairy products (for example, cheese or yogurt) whole eggs (egg white), peanuts and fish not be introduced until after an infant's first birthday. More recently, evidence has shown that there is no reason to delay introduction of these potential allergenic foods.

Potential allergenic foods can be introduced at about 6 months of age, just as other complementary foods are introduced. For example, this includes dairy products such as cheese or yogurt (not cow's milk to drink due to nutrition reasons not related to allergies); whole eggs; soy; wheat; peanut and tree nuts in a form of thinned butter or paste (not whole peanuts or tree nuts due to choking risk); and fish and shellfish.

Certain steps are encouraged when introducing potential allergenic foods. Safe ways to instruct caregivers to do this include:

- Potential allergenic foods should only be introduced once several other complementary foods have been fed and tolerated.
- Introduce the first taste at home rather than at day care or a restaurant.
- Wait 3 to 5 days before introducing another food.
- Introduce in appropriate ways as to avoid choking. Dilute creamy smooth peanut or nut butters with breast milk or formula to a thin consistency or mix into prepared infant cereal and offer only a small amount at a time. Chunks of peanut or nut butters pose a choking risk.
- Introduce in safe way, to avoid food-borne illness (for example, fully cooked eggs and fish).

- If the infant is “at-risk”, defined as those with pre-existing allergies or suspected allergies, sibling or first degree relative with an allergy, recommend they discuss the introduction of these foods with a health care provider *before* introducing potential allergenic foods.

Infants At-Risk of Food Allergy

There are certain situations that place an infant at higher risk of potentially developing a negative reaction to food. Introducing potential allergenic foods should first be discussed with the health care provider for a plan of how to introduce potential allergenic foods for infants with a higher risk of developing an allergy. The following are recommendations on when to refer a family to their health care provider:

- If one or both parents or other siblings have an allergic disease, specifically a peanut allergy, the infant is more likely to develop a food allergy or eczema.
- If an infant has persistent moderate-to-severe eczema that is not well managed.
- Infants with one underlying food allergy or history of reacting immediately to a food.
- If the caregiver believes the infant has a food allergy and, thus, that caregiver is limiting the infant’s diet.

For those infants considered not at-risk for the development of food allergies there are no restricted foods except for cow’s milk and other “milks” (for example, soy, almond and goat’s milk, etc.) and honey until after one year of age.

Iron Needs During Infancy

Iron is an important mineral needed throughout life but is especially important during infancy and childhood when growth is rapid. Iron is a part of red blood cells, and it carries oxygen to all parts of the body. Adequate oxygen is necessary for normal growth.

Healthy full-term infants are born with a supply of iron that will last for about 4 to 6 months. Breast milk contains a perfect form of iron that is well absorbed and used by infants. Iron-fortified infant formula is an excellent source of iron for infants. However, between 4 and 6 months of age the supply is used up and iron must come from iron containing foods in the infant’s diet. This is especially true for the mostly breast-fed infant.

Iron levels will start to drop if an infant does not get enough iron in the diet at about 6 months of age. This can lead to a risk of iron-deficiency anemia.

Recommendations to prevent iron-deficiency anemia starting at about 6 months of age:

- Provide plain, iron-fortified infant cereal and/or pureed meat.
 - Pureed meat is especially beneficial for the mostly breast-fed infant as it also provides an excellent source of zinc.
 - Just two or more servings a day can meet an infant’s iron needs at this age. The suggested amount is approximately 1-2 oz/day meat (or 1-2 small jars of

- commercially prepared meat/day) or 2 servings/day for cereal (2 tablespoons/servings).
- Even after other complementary foods have been introduced, iron-fortified infant cereals and/or meats remain a good food source of iron for infants through their first year. Meats should be home prepared or commercially prepared plain and pureed (smooth consistency).
- The iron in meats is readily absorbed in the body. Iron in non-meat sources, such as cooked dry beans, is not as easily absorbed by the body. To enhance the absorption of iron from non-meat sources, offer a vitamin C- rich food during the same meal to improve iron absorption. For example, iron-fortified infant cereal and pureed broccoli or sweet potato.
- Delay low-iron milks (for example, cow's milk, goat's milk, soymilk) until the infant is at least 12 months old.
- For infants who were born early or small, refer to the health care provider, as iron supplements may be prescribed.
- If an infant cannot get two or more servings per day of iron rich foods (such as pureed meats and/or iron-fortified cereal), refer to the health care provider, an iron supplement may be prescribed.

Potential Food Contaminants- Arsenic

Reports have focused on arsenic in foods, especially rice and rice products, such as infant rice cereal.

The [FDA](#) and the [AAP](#) provide guidelines on how to limit exposure to arsenic for infants, including breastfeeding, offering a variety of foods, offering other infant cereal grains, and avoiding rice syrup and rice milk.

Other complementary foods that supply iron for an infant over 6 months of age are:

- Cooked dry beans and peas (for example, black-eyed peas, chickpeas)–pureed or mashed.
- Dark green leafy vegetables such as spinach- pureed with a little water or broth.
- Iron-fortified infant cereal.

Poor sources of iron

- Fruits, most vegetables, and commercial infant food dinners provide very small amounts of iron.
- Cow, goat and soymilk (which should not be fed to infants less than one year of age) are a poor source of iron and can prevent iron absorption.
- Coffee and tea can prevent iron absorption and should be discouraged.

Introducing Complementary Foods

Complementary foods refer to foods and beverages that are introduced during infancy to complement human milk and/or infant formula. Complementary foods continue as the infant transitions to family foods.

The ideal time to introduce complementary foods in the diets of infants varies because infants develop at different rates. When complementary foods are introduced appropriate to the infant's developmental stage, nutritional requirements can be met and eating using self-feeding skills can develop properly. Pediatric nutrition authorities agree that complementary foods should not be introduced to infants before they are developmentally ready. Infants are often developmentally ready to consume certain complementary foods around 6 months of age.

Complementary foods should be given, along breast milk or formula, in amounts, frequency, and consistency that include a variety of foods to meet the calorie and nutrient needs of the growing infant.

First Foods

It is a commonly held belief that foods should be introduced in a certain order. For example, offering vegetables before fruits, because of the belief that infants prefer the sweet flavor of fruits over vegetables. There is no scientific evidence that supports offering foods in a certain order. In other words, an infant is not more likely to like a new food based on the order it was introduced.

Research does not support introducing foods in a particular order; however, it is recommended to introduce one single-ingredient food at a time, starting with iron-rich, and zinc-rich or fortified infant foods, such as fortified infant cereals or meats.

While every infant has their own taste preferences, food acceptance can be influenced. For this reason, caregivers should be encouraged to offer food multiple times (> 10 exposures) to allow opportunities for infants to accept a new food. The pace at which infants accept new tastes and textures varies greatly. Caregivers should be encouraged to respect the pace their infant sets, and they should be reassured those infants who are healthy will eventually be able and willing to handle a wide variety of texture and tastes.

By tradition, rice cereal was usually introduced first based on the idea that it was less likely to cause an allergic reaction. Newer evidence no longer supports this practice. However, single-grain (rice, barley, oat, wheat) iron-fortified infant cereals are popular first options because they contribute important nutrients such as iron and zinc to the diet. Also, iron-fortified infant cereal's texture can be easily altered to meet an infant's developmental needs: more liquid makes it a soupy, easy-to-swallow first cereal, and less liquid makes it thicker and lumpier as feeding skills advance.

Infants, especially those who are mostly breastfed, will benefit from the early introduction of pureed meat. Meats contain sources of iron and zinc that are better absorbed and needed by

about 6 months of age when an infant's prenatal iron stores are depleted. For mostly breastfed infants, after 6 months of age, a natural gap exists between the amounts of iron and zinc breast milk provided and the growing needs of the infant. The amount of iron and zinc in breast milk is not related to the diet of the mother. This need is one reason for starting complementary foods.

The food package for fully breast-fed infants provides commercial infant food meats to support the infant's need for iron and zinc (in a form with good absorption). If pureed meat is not introduced starting at about 6 months, then commercially prepared infant cereal should be served 1 to 2 times daily to meet iron requirements. Although all commercially prepared infant cereal is fortified with iron, zinc fortification of infant cereals may vary, and the zinc content of plant foods tends to be low and/or poorly absorbed. Some brands of infant cereals are fortified with zinc. However, introduction of meats around 6 months for mostly breast-fed infants is encouraged.

Beyond suggestions that an adequate source of iron and zinc be introduced by 6 months of age, especially for the breast fed infant, The American Academy of Pediatrics recommends the progression of new foods from different food groups (cereals, meats, fruits, vegetables) should continue within the first month of complementary feeding. That means an infant who began eating foods at 6 months could reasonably be eating foods from all food groups by 7 to 8 months of age.

The First Feeding

It is important for an infant to begin good habits early and get used to the process of eating - sitting up, taking food from a spoon, resting between bites, and stopping when full - using the infant's cues as a guide.

Suggestions for the first feeding:

- Offer the first food after feeding some breast milk or infant formula. This way, hunger is less of a factor, and it is easier to judge the infant's readiness to accept a food. The infant will be less likely to get frustrated if he/she is not overly hungry.
- Start with a small amount (about 1- 2 teaspoons). Allow the infant to lead on how often and how fast to feed.
- Show a positive attitude when introducing food to an infant. If the infant becomes upset or refuses to eat, offer it again at another time. Infants are developing their sense of trust in the world and depend on the caregiver to read their reactions. Infants show their desire for food by drooling, opening their mouths, and leaning forward. On the other hand, they show lack of interest or fullness by leaning back, turning away, pushing the spoon or food away, or closing their mouths.
- Introduce single-ingredient foods one at a time. This will help the caregiver identify negative food reactions. The AAP suggests waiting 3 to 5 days between each new food.
- If using infant cereal, mix dry infant cereal with breast milk or infant formula. Do not mix cereal with water; water does not contain any calories or nutrients. Start with a

teaspoon of cereal mixed with the liquid in a small dish to form a very thin cereal. Offer the cereal one or two times a day. As the infant gets used to eating cereal, larger portions can be offered, and the cereal can be made thicker. Serve infant cereal plain, without added sugar or sweeteners.

Modifying Foods to Prevent Choking

Caregivers can greatly reduce the risk of choking by serving food that is the appropriate texture for the infant's development. Such as blending or pureeing food; mashing food with a fork until it is soft and small enough to swallow; or chopping food into bite-sized pieces using a food chopper, food processor, or knife.

Parents and caregivers are strongly encouraged to take the following steps to create an appropriate feeding environment to prevent incidents of choking:

- Prepare the proper foods in the appropriate size, consistency, and shape that will allow an infant to eat and swallow easily.
- Feed small portions and encourage infants to eat slowly.
- Avoid giving the infant any medicine for teething discomfort before meals because this may anesthetize the mouth.
- Make sure the infant is seated in an upright position. Sit with the infant and watch over him or her carefully during all mealtimes and snack times. Do not leave an infant alone when they are eating.
- Maintain a calm atmosphere during eating time so the infant is not distracted by loud music, television, or activities of other family members.
- Avoid feeding an infant while in the car because the driver may be the only adult present and cannot assist a choking infant.
- Closely supervise eating during mealtimes.

Infants should have enough teeth and the muscular developmental ability needed to chew and swallow the foods being served. Remember, not all infants of the same age will be at the same developmental level. Infants with special health care needs may be at great risk for choking. Suggestions to prevent choking include:

- Remove all bones from poultry and meat, especially from fish, before cooking.
- Cook food until it is soft enough to easily mash with a fork.
- Grind up or puree chicken and other tough foods.
- Mash or puree vegetables, fruits, and other foods until they are smooth.
- Cut soft foods into small pieces (ideally cubes of food not larger than a half inch) or thin slices that can easily be chewed.
- Cut cylindrical food such as hot dogs or string cheese into short, thin strips rather than round pieces that could become stuck in the airway.
- Cut small spherical foods such as grapes, cherry tomatoes, and grape tomatoes lengthwise and then cut them again, into smaller pieces.
- Remove seeds and hard pits from fruit and then cut the fruit into small pieces.

- Grate or thinly slice cheeses.
- Cook and finely grind or mash whole-grain kernels of wheat, barley, and other grains.
- Spread peanut butter, nut butter, or seed butter thinly on crackers. Or mix them with applesauce and cinnamon and spread thinly on bread. Use only creamy, not chunky, peanut, nut, and seed butters.

Baby-Led Weaning

Some parents and caregivers express interest in using a method called baby-led weaning (BLW) to introduce their infants to complementary foods. Although BLW has several proposed advantages, there is concern that BLW may increase the risk of food-related choking. Complementary feeding usually begins with pureed foods being spoon-fed to the infant by a parent or caregiver. In BLW, infants feed themselves all their foods, in the form of graspable pieces. Studies suggest that while gagging continues to be a greater possibility with BLW than with regular spoon-feeding, if the BLW method is followed carefully, choking is no more of a hazard than it is for spoon-fed infants.

Iron-fortified infant cereals

Iron-fortified single-grain infant cereal is a good choice to include in the infant's daily diet since it provides a source of iron. Infant cereal has additional iron to meet the rapidly growing needs of the infant. It is important to note that the manufacturers of infant cereal add a form of iron to the infant cereals which is better absorbed by the infant's body. Thus, only infant cereals should be given. Iron-fortified cereals not specifically made for infants do not generally contain a form of iron that is easily absorbed by the body. In addition, infant cereals provide a smooth texture and can be varied in thickness to help the infant adjust to the new eating experience.

Mixed-grain infant cereals and fruit combinations may be introduced after an infant has been introduced to each grain separately.

Dry infant cereals may be less expensive than jars of prepared cereals and they are more nutritious. Jars of prepared cereals are usually mixed with fruit, which makes them higher in calories.

Homemade Cereals

Some caregivers may want to make their own homemade cereal versus buying pre-packaged commercially prepared infant cereal. The reason commercially prepared infant cereals are typically recommended is because they are fortified with iron and in some cases additional nutrients like zinc. Iron and zinc must be obtained from complementary foods during late infancy, particularly for breastfed infants. Homemade infant cereal won't be fortified with iron or zinc. Considering that commercial infant cereals serve as the cornerstone of many infant diets, they go a long way towards preventing iron deficiency in infants who don't have the benefit of receiving other good sources of iron. They're also convenient and safe. They're stable to store and easy to mix with breast milk or formula. Of course, if a caregiver chooses to prepare their own homemade cereal ensure the caregiver is aware that the infant needs other

sources of iron, especially the mostly breastfed infant, such as pureed meats or beans 1-2 times daily.

Protein foods

Meats such as poultry and beef should be among the first complementary foods introduced into an infant's diet; specially to breastfed infants. Fish is another key protein-rich food. Commercially or home-prepared meats are a good source of iron and zinc, in addition to iron-fortified infant cereal.

When a new meat is given it should be a single meat, that is, pureed beef instead of a combination dinner that contains beef. Introduce one meat at a time, waiting 3 to 5 days between exposing each new food while observing the infant closely for reactions to the foods.

Chicken, turkey, seafood, and lean red meats are the recommended choices for an infant's first pureed protein—if they are thoroughly cooked first. Lamb and pork are also choices, but they carry harmful bacteria that pose great risk for an infant if the food is not fully cooked before being pureed and served.

Due to their high salt and/or fat content, hot dogs, sausage, bacon, bologna, salami, luncheon meats, other cured meats, fried animal foods, and the fat and skin trimmed from meats are not recommended for infants. In addition, hot dogs, bologna, and luncheon meats may contain harmful bacteria unless they are heated thoroughly until steaming hot. Hot dogs are also a major choking risk.

Eggs are also an excellent source of protein and may be offered to the infant. The egg may be hard cooked or scrambled. To prevent the risk of food-borne illness all eggs should be fully cooked. All eggs and egg-rich foods must be carefully handled and properly prepared to reduce the possibility of contamination with salmonella and other bacteria. Raw or partially cooked eggs or foods that contain them, such as homemade ice cream, mayonnaise, or eggnog, should never be fed to infants (or anyone else) because they may contain bacteria that can cause illness.

Cottage cheese, hard cheeses, and yogurt can be gradually introduced as occasional protein foods. Since these foods contain proteins like those in cow's milk, infants should be observed closely for reactions after eating these foods. However, cow's milk should be avoided until 12 months of age.

Cooked legumes (dried beans and peas) or tofu (bean curd made from soybeans) can be introduced in small quantities into an infant's diet as a protein food. As for any new food, parents and caregivers should observe whether the infant has a reaction to them or appears to have difficulty digesting them. If so, legumes and tofu can be introduced again later.

Discourage the commercially prepared pureed dinners (vegetable/meat combination) because of their low nutrient content.

After a variety of plain pureed or mashed meats, vegetables, and fruits have been introduced by 7 to 8 months of age, begin to add more textures with foods, such as minced meats, cooked vegetables, coarsely chopped fruits, shredded cheese, etc. using the infant as a guide to determine the appropriate texture based on their development. Use plain, unsalted table foods and modify the texture by hand chopping or using an infant food grinder.

Vegetables and Fruits

Vegetables and fruits provide infants with carbohydrates (including fiber), vitamins, and minerals. The following vegetables are high in nutrients and can be prepared to the desired texture: asparagus, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, collard greens, green beans, green peas, green peppers, kohlrabi, kale, plantains, potatoes, spinach, summer or winter squash, and sweet potatoes.

Commercially prepared (for infant) pureed carrots, peas, green beans, sweet potatoes and squash are common vegetables for infants. Look for no salt added canned vegetables if preparing it for infants. Regular canned vegetables not specifically made for infants should be avoided because of the high salt content. Vegetables should be served plain without added fat (margarine, lard, etc.), salt, or sauces. When a new vegetable is given, it should be a single vegetable, for example, pureed carrots instead of "peas and carrots".

Infants are born with preference for sweet foods and will enjoy trying fruit foods of varied flavors. Commercially or home-prepared fruits can be fed to infants. A wide variety of fruits should be introduced over time.

If they are soft and ripe, the following fresh fruits can be mashed after peeling without cooking: apricots, avocados, bananas, cantaloupes, mangoes, melons, nectarines, papayas, peaches, pears, and plums. Apples and pears usually need to be cooked in order to be easily pureed or mashed.

There is a wide variety of commercially prepared fruits available, such as pureed pears, applesauce, plums, apricots, and peaches, etc. Soft, ripe bananas or unsweetened applesauce are also good fruits for an infant.

Fruits packed in heavy syrup should be avoided because of higher sugar content. Commercially prepared infant desserts, such as chocolate pudding, peach cobbler, as well as other desserts, should be discouraged because of their high sugar content.

No Fruit Juice for Infants

Fruit juice should not be introduced to infants before 1 year of age. Instead caregivers can be encouraged to offer whole fruit that is pureed, mashed or diced while continuing to offer breastmilk or formula to drink. Because juice is viewed as nutritious, caregivers may not think

twice about waiting to introduce juice. You can inform caregivers early on that fruit juice offers no nutritional benefit for infants and it lacks fiber that whole fruit provides.

In addition to 100% fruit juice, fruit drinks, artificially colored and flavored drinks, sweetened drinks, sports drinks, tea, “gelatin water”, and soda, should also not be offered to infants.

After one year of age, fruit juice can be used as part of a meal or snack. Children ages 1 to 3 need one cup of fruit a day, and up to 4 ounces or ½ cup of that can come from 100 percent fruit juice.

Juices should be offered in a cup, not a bottle and not at bedtime. It should not be sipped throughout the day by allowing a child to carry a bottle, cup with a lid (also known as a sippy cup), open cup or box of juice around. This can lead to tooth decay because the teeth are exposed to sugar for longer periods of time.

Some additional points:

- The American Academy of Pediatrics has concluded that fruit juice offers no nutritional benefit over whole fruits, therefore whole fruits should be encouraged.
- For children older than 1 year, 100% fruit juice, in limited quantities, about 4 oz a day, can be part of a well-balanced diet. Too much juice may give the toddler a feeling of fullness and, therefore, other important foods may not be eaten. Too much juice may also cause stomach upset, diarrhea, and tooth decay.
- Diluting juice with water does not necessarily decrease the risk of tooth decay.
- Citrus juices such as orange juice may cause a rash around the mouth. This is due to irritation from the acid in the food, not necessarily from an allergic reaction.
- Educate caregivers to select only pasteurized juice. Unpasteurized juices should never be given to infants or older children because there is a risk of the infant being exposed to pathogens such as *Escherichia coli* (E Coli), *Salmonella*, and *Cryptosporidia* organisms which can cause serious disease.
- Infant juices are expensive and not necessary. Thus, families can be encouraged to offer infants whole fruit that is pureed or mashed.
- Imported canned juices are not advised for infants or older children. It is possible that the seams of cans manufactured outside the United States may contain lead which can leach into the food. Cans manufactured in the United States do not contain lead seams.

Appropriate Infant Feeding Practices

Feeding practices influence an infant’s health and lifelong eating habits. The following practices are recommended:

- It is best to feed infants in a high-chair or propped in a safe chair. Another good position is to seat the infant upright on the caregiver’s lap. This helps to make the infant feel secure about this new feeding experience. The caregiver and infant should have good eye contact so that they can readily see each other. Always check the infant to make sure the food is being swallowed easily.

- Feed complementary foods from a spoon. Spoon-feeding is an important part of developing the ability to self-feed. It also promotes the proper development of tongue muscles that are important for speech and allows the infant to experience the taste and texture of foods. There are several inexpensive feeding utensils especially designed for infant feeding. Long-handled spoons with small shallow bowls and infant cups with handles make feeding easier for the infant and caregiver.
- Offer one new food at a time, spaced 3-5 days apart. This allows the infant to become accustomed to new foods. It will also provide an opportunity for caregivers to easily identify if any one food causes an adverse reaction such as rash, hives, vomiting, diarrhea, or respiratory problems. In the case of an adverse reaction, eliminate the food from the diet and reintroduce later.
- Introduce new foods when the infant is in a good mood and hungry, but not overly hungry.
- Start new foods in small quantities--a teaspoon--and slowly increase to a tablespoon or more.
- Let infants set the pace for feeding. Wait for the infant to open their mouth before trying to feed. Feed as slowly or as fast as the infant wants. Let the infant touch the food.
- Wash infant food jars before opening. Jar lids should make a popping sound when opened. The popping indicates the product was safely processed and stored. If the "bubble" on the top of the jar has already popped up, the food in that jar should not be fed to the infant.
- Do not force new foods that are rejected by an infant, but rather offer them at another time. Infants will generally learn to accept most new foods if they are offered repeatedly. It may take 10-15 exposures to a new food before an infant will accept it. Caregivers can encourage acceptance of new foods by showing a positive attitude about them. Infants will not necessarily refuse foods that other family members do not like. Infants who are exposed to more foods are more likely to enjoy a greater variety of foods as an adult.
- It is not necessary for an infant to finish a bottle or food. The infant is usually the best judge of how much to eat. Pay attention to their signals. Infants show lack of interest or fullness by leaning back, turning away, pushing the spoon or food away, or closing their mouths. Overfeeding or forcing an infant to eat may lead to an overweight infant or to habits that may eventually cause obesity.

Suggested Meal Pattern

This is a guide for healthy infants. Every infant is different. Infants may consume more or less than these amounts. Its important caregivers understand and look for their infant's cues of hunger and fullness to guide how much to feed. Infants 6 – 8 months old still rely mostly on breast milk or formula to grow and develop.

Age	Infant's Abilities	Foods
At about 6 months of age	<ul style="list-style-type: none"> -Sits up alone or with help- Holds head steady & straight. -Opens mouth when sees food coming. -Opens mouth for spoon -Keeps tongue low and flat to receive the spoon. -Closes lips over spoon & pull food into mouth. -Keeps most food in the mouth rather than pushing it back out onto the chin. -Turns head away from food when full. 	<p>Morning Snack: 1-2 tablespoons plain pureed meat or single-grain infant cereal mixed with 4-5 tablespoons of breast milk or formula.</p> <p>Afternoon Snack: 1-2 tablespoons plain pureed meat or single-grain infant cereal mixed with 4-5 tablespoons of breast milk or formula.</p> <p>Start with one new food every 3-5 days. Continue to offer new foods. By 7-8 months of age, an infant should be eating foods from all food groups (cereal, protein [pureed meat, mashed beans, egg, tofu], fruit, vegetable). Gradually thicken the consistency.</p> <p>Breastfed infants usually nurse six or more times a day. Formula-fed infants drink about 27 to 32 ounces a day.</p>
7-8 months of age	<ul style="list-style-type: none"> - Sits without help. -Starts drinking from a cup with help. -Moves food from front to back of mouth. -Starts to mash food with gums. -Clenches mouth shut, turns head away or pushes food away when full. 	<p>Morning: 2 tablespoons infant cereal mixed with breast milk or formula to desired thicker consistency and 1 tablespoon pureed or fork-mashed fruit.</p> <p>Afternoon: 2 tablespoons pureed or fork-mashed vegetables or fruit, 2 tablespoons yogurt.</p> <p>Evening: 2 tablespoons pureed or fork-mashed vegetables, 1-2 tablespoons plain pureed meat or other protein food (mashed beans, egg, tofu), and 2 tablespoons prepared infant cereal.</p> <p>Breastfed infants usually nurse six or more times a day. Formula-fed infants drink about 27 to 32 ounces a day.</p> <p>Vary the texture. Try new foods spaced every 3-5 days. Like mashed cooked eggs, beans, tofu, shredded cheese, thinned peanut or nut butters added to cereal.</p>

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

1. Fill in the blanks to complete the sentences.
 - a. Most infants are ready to begin eating complementary foods at about _____ months of age.
 - b. An infant's nutritional needs can be entirely met by _____ or _____ from birth to 6 months of age.

2. Which of the following statements are signs of a 6-month-old infant's readiness to start complementary foods? (Circle the letters.)
 - a. Ability to sleep through the night.
 - b. Ability to keep the tongue low and flat to receive the spoon.
 - c. Ability of the infant to sit up alone or with support.
 - d. The infant has at least 2 teeth.
 - e. Ability to keep food in the mouth and swallow it rather than pushing it back out onto the chin.

3. Circle the foods that would be most appropriate for a 7-month-old infant.

Iron-fortified infant cereal	Pureed fruit	Pureed beef
Banana/apple dessert	Chunks of meat	Orange juice
Pureed vegetable	Egg	Chicken noodle dinner (from a jar)

4. Circle the items that are good sources of iron for the infant:

Iron-fortified formula	Fortified infant cereal
Breast milk	Pureed meats
Fresh whole milk	Mashed cooked dry beans
Pureed fruits	Tea

5. True (T) or False (F)?

_____ a. Infants need juice to meet their nutritional needs.
_____ b. Introduce new foods to infants when they aren't overly hungry and are in a good mood.
_____ c. Forcing an infant to eat may lead to habits that may cause obesity later in life.

1. a. 6 months of age.
b. breast milk
iron-fortified infant formula.
2. b, c, e
3. Iron-fortified infant cereal
Pureed vegetable
Pureed fruit
Egg
Pureed beef
4. Iron-fortified formula, breast milk, fortified infant cereal, pureed meats, mashed cooked dry beans.
5. a. False
b. True
c. True

Oral Health

Good oral health is integral to general health and means a lot more than having healthy teeth that are free of decay. A person cannot be healthy without having a healthy mouth. The mouth and surrounding structure allow us to speak, smell, taste, chew, swallow, and express emotions from cries to smiles. The oral area helps a person interact with the world.

Tooth decay is the most common chronic infectious disease that does not respond to antibiotics and does not heal itself. Good nutrition, use of proper feeding techniques, and careful attention to keeping the mouth and teeth clean are all important for ensuring that an infant develops and maintains healthy, strong teeth.

The primary teeth and many permanent teeth begin forming inside the jaw bones before birth. Both the primary teeth, which erupt over the first 2 ½ years of the infant's life, and the permanent teeth that follow serve important purposes. The primary teeth are critical for the following key points in development:

- Chewing and eating food
- Normal formation of the jaw bones and muscles

- Correct placement of the permanent teeth
- Facial appearance
- Proper speech development

Good nutrition during pregnancy and infancy helps to form teeth that are strong and healthy. Breastfeeding also helps by promoting optimal jaw and tooth development. A breastfed child is less likely to have crooked teeth, with the risk decreasing the longer a child is breastfed.

Several nutrients are necessary for the development of healthy teeth, but the most important ones are **protein, calcium, phosphorus, and fluoride**. Many communities add fluoride to the water supply if it is not present naturally. The American Academy of Pediatrics and the American Dental Association recommend fluoride supplements for infants starting at 6 months of age if the water supply does not have adequate fluoride. Refer caregivers to their local water treatment plant to learn if the community water supply has adequate fluoride.

If prescribed by a health care provider, fluoride supplements can be given by mouth from a dropper, or drops can be added to the infant's drinking water, or infant formula. Caregivers should give only the amount of fluoride prescribed. Too much fluoride over time can cause staining of the teeth called **mottling**.

Early Childhood Caries (cavities)

Caries = Cavities = Tooth Decay

Early Childhood Caries are caused by bacteria called *Streptococcus mutans*. People who do not have good oral care often have a large amount of this bacteria in their mouths and are more likely to spread it to others. Infants do not have the bacteria when they are born, but they can get it from others. The presence of this bacterium, combined with improper feeding practices such as allowing infants to be put to bed with a bottle of infant formula, milk, juice, or sweetened drink increases the chances that early childhood caries will occur.

The transfer of *S. mutans* is not limited to mother and infant saliva transfer but applies to any saliva transfer for example a caregiver or sibling. For this reason, it is advisable for parents and caregivers to take the following steps:

- Avoid exposing the infant to their saliva by sharing eating utensils or toothbrushes or cleaning a dropped spoon or pacifier with their saliva.
- Avoid chewing food themselves and then feeding it to their infants.
- Take care of their mouth with regular brushing with fluoride toothpaste, flossing, and dental care.
- Obtain treatment for any existing dental caries.

Sugar is a natural ingredient in all milks including breast milk and infant formula. Juices, Kool-Aid, and other drinks also contain natural or added sugars. The sugar in these liquids is used by the *Streptococcus mutans* bacteria in the infant's mouth and acid is formed. The acid attacks the teeth causing decay. The upper front teeth are usually the most affected in infants and these sometimes fall out or need to be pulled or capped when decay is excessive.

Early childhood caries are not only painful and unattractive, but also cause problems later on, such as crooked permanent teeth, and speech problems, such as lisping.

Care of the Gums and Teeth

The primary teeth usually begin to appear near the age of six months and are at risk to decay from the time they first appear. Therefore, care of the gums and teeth should begin in the first months of life.

Preventing Early Childhood Caries

- Good oral health, including daily cleaning of the gums and teeth, should be started early in life. Even before the teeth appear, caregivers can clean the infant's gums with a clean cloth or gauze. This removes residues from the mouth and gets infants used to having their mouth cleaned.
- When teeth do appear, caregivers should begin brushing infant's teeth using fluoride toothpaste in an amount no more than a smear or the size of a grain of rice. Brush teeth thoroughly twice per day (morning and night) or as directed by a dentist or physician. Do not share eating utensils and toothbrushes among family members.
- Discourage the practice of caregivers chewing the food to give to the infant to prevent the transfer of *Streptococcus mutans* from the adult's mouth to the infant.
- Infants should never be put to bed with a bottle of infant formula, milk, juice, or sweet drink. Encourage caregivers to hold their infants when feeding them and to teach them to fall asleep without a bottle.
- Avoid the use of juice in infants under 12 months of age.
- Do not give toddlers a bottle, spill-proof cup, or open cup filled with juice, etc., to carry around throughout the day.
- Begin weaning from bottle to cup near 7 months of age. Breastfed infants can be introduced to a cup at this time and may never need a bottle. Complete weaning from the bottle near the time of the first birthday. As weaning occurs, formula or breast milk can be offered in the cup.
- Never dip pacifiers in honey, sugar, or syrup.
- Take the infant to see a dentist before he or she is 1 year old, or sooner if there are any concerns.

For more information on oral health, click on the link below to access the AAP Pediatric Guide to Oral Health Flip Chart and Reference Guide produced by The American Academy of Pediatrics. The PowerPoint presentation provides up-to-date information on oral health issues such as breastfeeding and bottle-feeding, use of sippy cups, non-nutritive sucking, fluoride supplementation and tooth brushing.

American Academy of Pediatrics, Pediatric Oral Health Materials and Resources can be found at:

<https://services.aap.org/en/news-room/campaigns-and-toolkits/oral-health/>

Common Concerns in Infancy

Some infants will experience digestive problems like spitting up, colic or a small bout of diarrhea or constipation. Some infants may have more serious digestive issues that require medical treatment. This section will cover common infant health issues. When counseling families about feeding their infants, you can help them understand normal infant behaviors and refer them to their health care provider for further assessment when necessary.

Constipation

Many caregivers become concerned if their infants do not have daily bowel movements. Although many infants have a daily stool, others may only have a stool every 2 to 3 days. The older breastfed infant (over 2 months of age) as well as formula-fed infant may have infrequent stools. Frequency is not a good indicator of constipation.

Caregivers may also worry that straining is a sign of constipation, but this is normal for infants as their muscles and digestive tracts develop. Constipation in infants is better characterized by hard, dry stools that are difficult to pass.

Part of the difficulty in determining whether an infant is constipated is that each caregiver may have a different belief of how often an infant should have a bowel movement and whether an infant's stool is "too hard". Constipation is not very common among breastfed infants. Formula-fed infants tend to have firmer stools, but this does not necessarily mean the infant is constipated. Some caregivers believe iron causes their infant to be constipated, but studies have demonstrated no relationship between iron-fortified infant formula and constipation. Therefore, the amount of iron supplied by iron-fortified infant formula does not cause constipation.

Constipation can be caused by a variety of factors or conditions, including:

- Dietary influences, such as:
 - Inadequate breast milk, infant formula, complementary foods, or fluid intake.
 - Improper dilution of infant formula.
 - Early introduction of complementary foods.
- Abnormal anatomy or neurologic functioning of the digestive tract.
- Use of certain medications.
- A variety of medical conditions and hormonal abnormalities.
- Stool withholding due to rectal irritation from thermometers, vigorous wiping, etc.
- Excessive fluid losses due to vomiting or fever.
- Lack of movement or activity.
- Abnormal muscle tone.

If a caregiver complains that the infant is constipated, refer the infant to a health care provider for medical evaluation. Assess the infant's diet and guide the parent or caregiver to follow these preventive measures:

- Ensure adequate intake of breast milk or infant formula.
- Ensure proper infant formula preparation and dilution if formula-fed.
- Ensure that appropriate types and amounts of complementary foods are consumed.

Diarrhea

Diarrhea is defined as the frequent passage of loose, watery stools that can occur as often as 12 times a day. Diarrhea is difficult to define, however, because each infant has his own pattern of bowel movements, and what is normal for one infant may not be normal for another.

For example, breastfed infants may normally have loose, frequent stools. This is not a concern. However, if the stools become green or black (after the first few days of life), explosive, and foul smelling, then there is cause for concern.

Persistent diarrhea can be dangerous. Infants with diarrhea should be referred to their health care provider for treatment to prevent dehydration and other serious complications in the infant. Use of sports drinks, such as Gatorade, is not recommended for hydrating infants.

Diarrhea in infants can be caused by the following factors:

- Improper infant formula preparation and storage techniques
- A reaction to a food
- Excessive juice consumption
- Use of certain medications, such as antibiotics
- Medical conditions such as lactose intolerance
- Infections such as viral rotavirus or norovirus, bacterial Salmonella or Shigella, and parasitic Giardia
- Malabsorption of food due to protein allergies, such as allergic gastroenteropathy
- Consuming contaminated food or water

Spitting Up

Spitting up is different from vomiting. Spitting up involves small amounts of milk that are spilled from the mouth, as opposed to forcefully ejected out of the mouth. This may occur several times a day during or shortly after feeding. It can occur with jostling, squeezing, or even just laying the infant down. Spitting up is harmless if the infant is growing well and content.

Occasionally, a change in feeding techniques may help the problem. Techniques to reduce excessive spitting up include the following:

- Burp the infant several times during a feeding. Burping is generally done during normal breaks in a feeding; it slows a feeding and can lessen the amount of air swallowed.
- After feeding hold the infant in an upright position for about 15 to 30 minutes.
- Avoid excessive movement or play right after eating.
- Avoid forcing the infant to eat or drink when full and satisfied (encourage caregivers to watch for signs of fullness).

Refer the family to their health care provider if a formula change is requested. Forceful and persistent vomiting may be a symptom of a more serious illness.

Colic

Up to one-fifth of all infants experience colic in the first few months of life. Colic is described as prolonged and intense crying in a healthy infant that appears to be related to abdominal pain. It often occurs in the evening and can last for hours and infants often to pull up their legs in pain. Colic usually develops between 2 to 4 weeks of age and may continue until the infant is 3 to 4 months old.

Colic differs from normal crying, as it is usually louder, more intense, and higher pitched. Infants may sound more like they are screaming, and parents often are unable to console or settle their baby during a bout of colic.

What you can do

- Empathize with caregivers and try to understand their frustrations or feelings of helplessness.
- Encourage parents to try ways to soothe their infant such as reducing stimulation and reassure them that colic typically resolves by 4 months of age.
- Suggest they contact their health care provider to rule out other medical conditions and explore treatment options for colic.
- Offer strategies when feeling overwhelmed.
 - Identify someone they can contact if they feel they may lose control.
 - Gently lay the infant in a crib or safe place and walk away.
- Never shake a baby.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

1. Fill in the blanks:
 - a. The four most important nutrients for healthy teeth are:
_____ _____
_____ _____
 - b. The American Academy of Pediatrics and the American Dental Association recommend that a supplement of _____ be given to infants six months old and older if the water supply does not have adequate amounts of it.
 - c. Early childhood caries are caused by a bacteria called _____
2. List one way the bacteria that causes dental caries is spread:
3. True (T) or False (F)?
 - a. _____ Infants put to bed with a bottle of formula, milk, or juice can develop tooth decay.
 - b. _____ Good dental health practices begin early in life, even before infants have teeth.
 - c. _____ It is acceptable to dilute formula for 2-3 days for infants with constipation.
4. List four feeding techniques to reduce excessive spitting up.
 - a.
 - b.
 - c.
 - d.
5. List three things you can do when talking to a caregiver of an infant experiencing colic.
 - a.
 - b.
 - c.

ANSWERS

1.
 - a. Protein, Calcium, Phosphorous, Fluoride
 - b. Fluoride
 - c. *Streptococcus mutans*

2. Either of the following:
Sharing eating utensils
Putting objects in an adult's mouth then into the infant's mouth (pre-chewed foods, pacifier)

3.
 - a. True
 - b. True
 - c. False; never dilute formula.

4.
 - a. Burp the infant several times during a feeding
 - b. After feeding hold the infant in an upright position for about 15 to 30 minutes
 - c. Avoid excessive movement or play right after eating
 - d. Avoid forcing the infant to eat or drink when full and satisfied

5. Any three of the following:
 - a. Show empathy if they share frustrations or helplessness.
 - b. Suggest they try to soothe their infant by reducing stimulation.
 - c. Reassure caregivers that colic typically resolves by 4 months of age.
 - d. Suggest they contact their health care provider to rule out medical conditions and explore treatment options.
 - e. Suggest they lay their baby in a safe place and walk away if they feel like they may lose control.
 - f. Remind caregivers to never shake a baby.

Section III: Nutrition for the Older Infant: 8 to 12 Months of Age

Changing from pureed foods to foods with more texture is an important part of developing the skills to learn to eat independently. In WIC, issuance of fresh fruits and vegetables in lieu of some jarred infant food fruits and vegetables can be given as an option when the infant is 9 months old. This food package option should be discussed with the endorser to determine if the infant is developmentally ready to consume foods of increased texture and consistency. Compass will not automatically change the food package.

Finger Foods

At about 6 months of age, infants develop the innate palmar reflex, a grasping reflex, to begin pushing food into the palm with their fingers. Between 6 to 8 months old, they develop the ability to hold something between their thumb and forefinger. This is called a pincer grasp. By this time, infants can begin to feed themselves with their hands and try some finger foods. The foods should have the following characteristics:

- Pieces small enough for an infant to pick up
- Food is soft enough for the infant to chew on

Appropriate finger foods include cooked macaroni or noodles, small pieces of bread, small pieces of soft, ripe peeled fruit or soft cooked vegetables, small slices of milk cheese, crackers, and teething biscuits.

This is a messy stage but allowing infants to feed themselves is very important to their development of feeding skills. Using a high-chair or booster seat with a removable tray that can be washed easily or covering the area under the infant's seat with newspaper or a plastic mat will help manage the mess.

By about 10 to 12 months of age, most healthy, full-term infants can feed themselves chopped foods from the table with their fingers. Parents and caregivers should be alerted to the risk of infants choking and instructed to closely supervise infants while they are eating.

Food in small, round, or hard pieces that can become lodged in the infant's throat or that can "ball up" in the infant's throat should not be given. Examples of such foods are nuts, popcorn, raisins, raw vegetables, grapes, cherries, hot dogs, or meat sticks (whole or coined shaped cut pieces), and peanut butter on soft bread.

Self-Feeding Skills

By about 10 to 12 months of age, most healthy, full-term infants can feed themselves chopped foods from the table with their fingers. Parents and caregivers should be alerted to the risk of infants choking and instructed to closely supervise infant while they are eating.

This is their way of experimenting with food. It is important that infants be allowed to take part in this activity, even though it is messy, because it is an important part of learning to feed themselves.

Near the age of one year, infants become interested in holding utensils and feeding themselves. They enjoy playing with spoons during mealtime or playtime. This is a good way for them to begin to learn to use a spoon. Infants gradually learn to get food on the spoon and the spoon to their mouth, although food is often spilled before it gets into their mouth.

Some suggestions you can offer to caregivers of infants who are learning to feed themselves include:

- Make mealtime happy and calm. Smile and talk to the infant.
- Be patient with the infant during this learning period.
- Pick a time to allow the infant to “play” with his food.
- Cover the floor under the infant’s chair with paper or an old shower curtain and dress the infant in clothing that will not be harmed by spilled food.
- Include foods which are fed to the infant, as well as items that the infant can feed him/herself at meals.
- Give the infant small portions of food.
- Avoid spicy foods. Infants also do not need added butter, salt, or sugar.
- Let the infant use a cup with all meals.
- Stay with the infant when he/she eats so that it is a social experience and to be there should he/she gag or choke.

Each infant develops at his own rate. Full-term infants should be trying to feed themselves finger foods by nine months of age. The process of learning to eat independently continues into the second year of life.

Meal Planning

An infant who is 9 months to 12 months of age should be eating many types of complementary foods with a variety of textures and colors. Finger foods should be included at meals and snack time. Foods from all food groups should include daily in the infant’s diet. Encourage caregivers to offer complementary foods following a schedule that considers the infant's appetite and the family's schedule. Smaller infants and infants at the lower end of the age range require smaller portion sizes than older, larger infants. Offer breast milk or formula in a cup.

Developing Healthy Eating Habits

The following are some tips to keep in mind when working with parents and caregivers of infants, about feeding habits and how all this information relates to their infants' attitudes toward eating:

Lifelong eating habits are formed in infancy and childhood and early positive experiences with foods can encourage acceptance of them later in life.

It takes time to learn to enjoy some foods. Caregivers should keep offering foods so they become familiar to the infant and children.

Allow infants and children to develop their own food likes and dislikes. Caregivers can serve as good examples for their infants and children by eating a variety of healthy foods and trying new foods themselves.

The habits of eating sugar, salt, and fat begin early in life for many people. These habits can be harmful if learned while young and continued throughout life. Thus, caregivers should avoid or limit less-nutrient-dense foods such as potato chips, soft drinks, and desserts.

Have the infant take part in the family's mealtime. It is an important time for children to learn good eating habits. Perhaps feed the infant earlier and give him finger foods while the rest of the family eats.

Caregivers are responsible for presenting appropriate food in a supportive way. The infant should be allowed to make the choice about how much to eat. If an infant is pressured to eat, feeding problems can occur.

Vegetarian Diets for Infants

Families choose vegetarian diets for religious, philosophical, economic, ecological, health or personal reasons. A vegetarian diet is generally defined as a diet that includes primarily or only plant food (i.e., fruits, vegetables, legumes, and grains) and usually excludes certain or all animal foods (i.e., meats, poultry, fish, eggs, and dairy products).

Vegetarian diets are classified into the following subdivisions, based on the types of animal foods included in each diet. Within each classification, there may be variations of the foods eaten:

- **Lacto-vegetarian diet.** It includes plant food and dairy products; excludes eggs.
- **Lacto-ovo-vegetarian diet.** It includes plant foods, dairy products, and eggs.
- **Semi-vegetarian or partial vegetarian diet.** It includes plant foods and a few to several kinds of animal products such as fish, seafood eggs, and dairy products.

- **Vegan or total vegetarian diet.** It includes plant foods only; excludes any foods from animal sources, such as dairy products, gelatin, and honey.
- **Macrobiotic diet.** It includes unpolished rice and other whole grains, legumes, seaweed, fermented foods, vegetable oils, fruits and vegetables, and occasionally fish. Generally, dairy products, red meat, and poultry are excluded at any stage.
- **Fruitarian diet.** It includes raw or dried fruits, berries, juices, grains legumes, and a few vegetables.

For parents and caregivers who want their infants to follow a vegetarian or vegan diet, the American Academy of Pediatrics (AAP) has indicated that, besides human milk, soy-based infant formula is an appropriate food. Both provide adequate nutrition for approximately the first 6 months of life. Later, when complementary feeding starts, most vegetarian-oriented infants are on a lacto-vegetarian diet (which includes fruits, vegetables, cereal, human milk, and after 12 months of age, cow's milk). For older infants, the AAP and the Academy of Nutrition and Dietetics have stated that vegetarian or vegan diets can meet infants' needs if attention is paid to specific nutrients such as protein, vitamin A, vitamin B2, vitamin B12, vitamin D, calcium, iron and zinc.

Inadequate vegetarian, particularly, vegan diets may lead to the following conditions in infants:

- Failure to thrive due to lack of nutrients, including vitamin B2, and because excess fiber may inhibit the absorption of nutrients.
- Vitamin B2 deficiency, which contributes to poor growth and eye health, including sensitivity to light.
- Iron deficiency anemia.
- Vitamin B12 deficiency, causing megaloblastic anemia (production of abnormally large red blood cells) and thus fatigue.
- Vitamin D deficiency rickets.
- Vitamin A deficiency, causing keratomalacia (softening and ulceration of the cornea).
- Protein deficiency, leading to diarrhea, fatty liver, and stunted growth.
- Zinc deficiency, which decreases wound healing and promotes anemia.
- Calcium deficiency, causing osteomalacia.

Guidelines for Nutrition Counseling for Vegetarian Diets

When providing nutrition counseling to parents or caregivers of infants on vegetarian diets, the following guidelines should be used:

- Provide nutrition assessment of the diet for nutritional deficiencies and excesses. Determine if the diet is appropriate for the infant's developmental level.
- Inform the parent or caregiver about the limits and potential issues of restrictive diets.
- Refer the infant to a health care provider for a medical evaluation and advice on supplementation if the parent or caregiver decides to keep the infant on a restrictive diet.

- Emphasize the importance of following general guidelines for introducing new foods and of watching for hypersensitivity (allergic) or other reactions an infant may have to new foods.
- Discuss with the parent or caregiver the importance of modifying the texture of foods to meet the infant’s developmental needs.
- Discuss with the parent or caregiver the appropriate amounts and types of foods needed to supply the infant with adequate energy, protein, vitamins, and minerals.

Suggested Meal Pattern

As an infant begins to eat more solid food, their need for breast milk or formula will decrease. By 9 to 12 months of age infants should be eating a wide variety of food with different textures, including some table foods. The table below shows a sample meal pattern for a typical 8 to 12-month old infant.

Age	Infants Abilities	Foods
9 to 12 months	-Starts to pick up food with fingers. -Drinks from a cup with less spilling. -Moves food to the sides of mouth and chews. - Continues practice of drinking from a cup. -Picks up food and puts it in mouth.	<p>Morning: 4-6 tablespoons prepared infant cereal; 2-4 tablespoons diced soft fruit.</p> <p>Mid-Morning Snack: 2 ounces water in a cup, 2-4 tablespoons yogurt, 2-4 tablespoons diced soft fruit.</p> <p>Afternoon: 2-4 tablespoons cooked mashed beans (egg or tofu), 2-4 tablespoons cooked vegetables.</p> <p>Mid-Afternoon Snack: Whole grain toast strips, add a thin smear of smooth peanut or nut butter or top with fork mashed fruit, 2 ounces water in a cup.</p> <p>Evening: 2-4 tablespoons minced moist meat, 2-4 tablespoons cooked vegetables, 2-4 tablespoons fruit, 2 tablespoons cooked whole wheat pasta or brown rice.</p> <p>At this age, breastfed infants usually nurse four or more times a day. Formula-fed infants drink about 24-28 ounces a day.</p>

Home-Prepared Infant Foods

Home-prepared infant foods are a nutritious, inexpensive way to feed an infant. However, care must be taken during the preparation and storage of the food to prevent contamination.

The following are guidelines to discuss with caregivers:

- The preparer's hands should be washed in hot, soapy water. All equipment used in the preparation and storage should be thoroughly washed and rinsed.
- Wash fruits and vegetables; and remove skin, pits, and seeds. Boil and steam the vegetables or fruits in a small amount of water to preserve the nutrients. The fruits or vegetables can then be mashed with a fork or put in a blender or food grinder. If liquid is needed in the preparation, use water, breast milk, or formula only.
- Meats should be trimmed and then baked, broiled, or boiled in a small amount of water. The meat can then be put in a blender or food grinder or slowly cooked in a crock pot. Meat should be fully cooked.
- There is no need to add salt, sugar, or fat to foods prepared for the infant. Discourage canned vegetables because of their high sodium content. Recommend no salt added canned vegetables and use canned fruits packed in their own juices instead of those canned in heavy syrup. Suggest to caregivers that luncheon meats, hot dogs, bacon, and sausage be offered sparingly, if at all, because of sodium nitrate, salt, and high fat contents.
- Spoons used to "taste test" foods should not be put back into the food.
- If the food is not to be eaten immediately after it is prepared, it must be properly stored. Home-prepared foods can be stored in a refrigerator for up to 48 hours.
- Foods can be stored in a freezer for one month. To store single servings for the freezer, the food can be frozen in clean ice cube trays or muffin liners and covered with aluminum foil. Once frozen, the food can be removed from the tray and stored in sandwich bags or containers, or glass jars. The frozen foods can be placed in a pan or dish and thawed in the refrigerator or warmed in an oven or pan of water on the stove. Any thawed, heated food that is not eaten should be thrown away.
- Do not feed home-prepared spinach, beets, turnips, carrots, or collard greens to infants less than 6 months of age, as these may contain large amounts of nitrates which could make them sick. Examples of home-prepared vegetables may include sweet potatoes, beans, and green peas.

Using Commercially Prepared Foods

Some caregivers will prefer the convenience of purchasing infant foods from the store. Help caregivers to understand that there will be a point in time when the infant will also be ready for table foods that are easy to chew and safe to swallow, such as rice and pasta. Around one year of age, infants should be able to eat what their caregivers eat – only the size of the pieces of food may need to be changed.

For caregivers who purchase jarred infant food, encourage them to not feed the infant directly from the infant food jar. Instead, food should be placed into a clean dish, and food that is leftover in that dish should be discarded. The reason is if the infant is fed directly from the infant food jar or if leftover food is returned to the jar, the infant's saliva will enter the food. Enzymes in the saliva cause the food to break down and become watery. In addition, the saliva contains bacteria which can cause the food to spoil. If the infant was not fed directly from the jar, any food left over in the jar can be resealed and stored in the refrigerator for up to 48 hours.

Microwave ovens should not be used to warm infant foods, whether left in the jar or placed in another container. The unevenness in the consistency of the infant foods causes the more liquid or watery parts to heat up faster in the microwave than the thicker or more solid parts. This can allow pockets of steam to occur leading to scalds from splattered foods or exploding jars.

Weaning

Weaning from the breast or bottle to a cup is a gradual process. Learning to drink from a cup should begin when the infant is able to sit up without support and is eating complementary foods. Infants can usually start drinking from a cup at 7 months of age and bottle-fed infants should be completely weaned from the bottle near the time of the first birthday. Waiting too long to wean makes it harder on both the infant and the family. Normal, healthy infants should not use bottles after fourteen months of age.

Weaning from the Bottle

When beginning the process, instruct the caregiver to choose a feeding the infant is least interested in (such as the late afternoon feeding) and introduce a cup in its place. Encourage the caregiver to offer help in holding the cup for the early weeks of weaning.

At first, the infant will not drink the same amount of expressed breast milk or formula from a cup as from a bottle. The caregiver should continue with the cup at this feeding for a week or two before another cup feeding is added.

The weaning process should continue gradually until the infant is entirely weaned from the bottle. The bedtime bottle and early morning bottle may be the most difficult to stop. This is a time when the infant is tired and more likely to not want his routine changed. The bottle is often a source of security. To help the infant feel secure, have on-hand a favorite toy or blanket when the bottle is being used, so that when the bottle is removed, the infant has the favorite item.

Weaning from the Breast

The decision to wean the breastfed infant from the breast to the bottle or cup is an individual one and should be left up to the mom.

For moms who decide to wean their infant from the breast before their infant is one year old, you can encourage mothers of older infants (aged 7 months or older) to wean to a cup, while younger infants may need to be weaned to a bottle. You can talk with mothers about breastfeeding to make sure they are deciding to wean based on correct information.

Recommend that weaning be done slowly and gradually. Weaning is usually accomplished by stopping one nursing at a time. It is suggested that the first feeding to stop be the one the infant is least interested, such as the late afternoon feeding. The mom then substitutes a bottle or cup of breast milk or iron-fortified formula for this feeding. The mother or caregiver should

continue to use a bottle or cup at this feeding for 5 to 7 days before another nursing is stopped. During this time give the infant extra cuddling and attention so that weaning does not mean separation from the mom. Continue to hold and cuddle the infant during the feeding as you would at the breast. The weaning process will result in a gradual decrease in the breast milk supply with little or no discomfort to the mom. If the mother should experience some engorgement, she should be instructed to hand express enough milk to relieve the discomfort.

Counseling Tips about Weaning

- Between 7 and 12 months, infants are developmentally ready and usually interested in learning to drink from a cup. Delaying the change to a cup during this period can result in a refusal to change at an older age. At about 6 months of age, allow the infant to play with an empty cup.
- When liquids are first introduced from the cup, the infant's lips may not close around the edge of the cup and liquids will leak. At first it may be helpful for the caregiver to hold the cup.
- When starting cup feedings, give small amounts of water, breast milk, or formula. Sweetened beverages or juice should not be given to infants.
- Some infants do not want to give up breast or bottle-feeding or are unwilling to drink from a cup. The weaning process often requires patience from the caregivers. All caregivers should work together and agree about the weaning process.
- Infants who use the bottle after one year of age may drink too much milk and not eat enough solids which provide iron and other important nutrients. Inadequate iron can lead to anemia. At one year of age, children should be drinking approximately 16 ounces of milk/breast milk daily.
- Continuous sips of milk from a bottle or spill-proof cup can cause tooth decay. Allowing toddlers to use the bottle without restriction (for example, walking around with a bottle) should be discouraged.
- For infants who are bottle fed, the bottle given before a nap or bedtime is often the most difficult one to stop. This bottle can also be the most harmful to the teeth if it is filled with a sugar containing beverage (breast milk, formula, juice) and the infant takes it to bed.

Some suggestions for helping an infant wean from the bedtime bottle include:

- Interest the infant in something other than the bottle at bedtime – a stuffed toy, blanket, etc.
- Provide lots of affection and attention instead of a bottle at bedtime.
- Offer a small snack or beverage from a cup near bedtime.
- Put a small amount of water in the bottle instead of milk.

Bottles are not recommended after 14 months of age. The transition might go more smoothly if during the last weeks of bottle use, the child has had an opportunity to bond to a blanket, stuffed animal or book, so when the bottle is taken "cold turkey" the child still has a security item.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

Place a check mark next to each phrase which correctly completes the statement (may be multiple answers):

1. Finger foods should be offered:
 - a. when the infant starts to walk alone.
 - b. when the infant sleeps through the night.
 - c. when the infant can chew with up and down movements.
 - d. when the infant can move his/her tongue from side to side.
 - e. around 7 or 8 months of age.

2. Place a check mark next to the following choices of finger foods that are appropriate for an older infant (8-12 months).
 - a. soft, peeled fruit
 - b. whole grapes
 - c. toast pieces
 - d. crackers
 - e. popcorn
 - f. peanut butter on soft bread

3. True (T) or False (F):
 - a. Many infants prefer to feed themselves with their hands and fingers rather than with utensils.
 - b. Infants who are learning to feed themselves should be served large portions of food.
 - c. All developmentally normal infants should be able to feed themselves by 9 months of age.
 - d. Infants 9 to 12 months of age should be eating many types of complementary foods with a variety of textures and colors.
 - e. Lifelong eating habits are formed in childhood.

4. Place a check mark in the blank next to all the statements that are true.
 - a. Weaning to a cup from the breast or bottle is a gradual process.
 - b. Weaning to a cup should begin when an infant can sit up without support and is eating complementary foods.
 - c. Infants need help holding the cup for the early weeks of cup feeding.
 - d. There is no harm to putting the infant to bed with a bottle.

- ___e. Infants who drink from the bottle after one year of age may drink too much milk and not eat enough complementary foods.
- ___f. Continuous sips of milk from a bottle or spill-proof cup can cause tooth decay.

5. Circle the letter of the two choices that accurately complete the following statement.
Home-prepared foods for infants:

- a. Can be the same foods that are prepared for the rest of the family with added salt, sugar, etc.
- b. Can be stored in a freezer forever.
- c. Are generally less expensive.
- d. Can be reheated over and over.
- e. Must be prepared and stored with care to prevent contamination of the food.

6. Circle those foods that should never be given to infants because they can cause choking.

Raisins

Whole hot dogs

Apple juice

Soft, ripe bananas

Whole grapes

Popcorn

ANSWERS

- 1. c, d, and e should be checked.
- 2. a, c, and d should be checked.
- 3. a. True
b. False
c. True
d. True
e. True
- 4. a, b, c, e and f should be checked
- 5. c, e
- 6. Raisins, whole hot dogs, whole grapes, popcorn

Section V: WIC Program Infant Nutrition Risks

Adequate nutrition during infancy is very important for long-term growth and health. All infants enrolled in WIC receive a nutritional assessment and follow-up care. Some infants will need special nutrition counseling because of certain risks related to their health. These are called **nutrition risks**. Nutrition risks affect an infant's nutritional needs and his/her food intake.

An infant with a nutritional risk has an increased chance of poor growth and development. Therefore, it is extremely important that we understand the nutritional risks of infancy and how to identify them.

Some infants are identified as **high risk**. These infants have a more serious nutritional risk than others. An example of this is an infant who is not gaining enough weight. Caregivers of high-risk infants need to be referred to a Registered Dietitian for nutrition counseling. All clients identified as high risk must be referred to a Registered Dietitian for counseling.

The Registered Dietitian may also counsel other clients who are not classified as high risk but would benefit from an in-depth assessment, nutrition counseling. As with high risk clients in those situations the Registered Dietitian develops a care plan with the client or client's caregiver.

There are many nutrition risks that will qualify infants for the WIC Program. This section of the module will define and discuss these risks. The first ones to be covered are those related to inappropriate nutrition practices for infants.

Inappropriate Nutrition Practices for Infants

411.01 Inappropriate Infant Feeding Practices, routine use of any of the following:

- During the first 2 months of life, routinely using a substitute for human milk or for FDA approved iron-fortified formula as primary nutrient source.
- Examples:
 - Low iron formula w/o iron supplement before 6 months;
 - Feeding cow's milk, goat's milk, sheep's milk, imitation milks, substitute milks or homemade concoctions in place of human milk or FDA-approved infant formula during the first year of life.

No Dependable Source of Iron for Infants Older than 6 Months of Age

- No routine age-appropriate iron source after 6 months of age, such as:
 - Iron-fortified cereals
 - Iron-fortified infant formula (at least 10 mg of iron per liter of formula prepared at standard dilution)
 - Infant meats
 - Oral iron supplements

During the first year of life, breastfeeding is the preferred method of infant feeding. The American Academy of Pediatrics (AAP) recommends breast milk for the first 12 months of life because of its acknowledged benefits to infant nutrition, gastrointestinal function, host defense, and psychological well-being.

For infants fed infant formula, iron-fortified formula is generally recommended as the substitute for breastfeeding. Rapid growth and increased physical activity significantly increase the need for iron and use iron stores. Body stores do not meet the increased iron needs, making it necessary for the infant to receive a dependable source of iron to prevent iron deficiency anemia. Iron deficiency anemia is associated with cognitive and psychomotor impairments that may be irreversible, along with decreased immune function, apathy, short attention span, and irritability. Feeding of low-iron infant formula can compromise an infant's iron stores and lead to iron deficiency anemia.

Cow's milk has insufficient and inappropriate amounts of nutrients and can cause occult blood loss that can lead to iron deficiency, stress on the kidneys from a high renal solute load, and allergic reactions. Sweetened condensed milk has an abundance of sugar that displaces other nutrients or causes over consumption of calories. Homemade formulas prepared with canned evaporated milk do not contain optimal kinds and amounts of nutrients infants need. Goat's milk, sheep's milk, imitation milks, and substitute milks do not contain nutrients in amounts appropriate for infants.

411.02 Routinely using nursing bottles or cups improperly

- Using a bottle to feed fruit juice.
- Feeding any sugar-containing fluids, such as soda/soft drinks, gelatin water, corn syrup solutions, and sweetened tea.
- Allowing the infant to fall asleep or be put to bed with a bottle at naps or bedtime.
- Allowing the infant to use the bottle without restrictions (for example, walking around with a bottle) or as a pacifier.
- Propping the bottle when feeding.
- Allowing an infant to carry around and drink throughout the day from a covered or training cup.
- Adding any food (cereal or other complementary foods) to the infant's bottle.

Dental caries are a major health problem in preschool children, especially in low-income populations. Eating and feeding habits that affect tooth decay and are started during infancy may continue into early childhood. Most implicated in this rampant disease process is prolonged use of baby bottles during the day or night, containing fermentable sugars, (e.g., fruit juice, soda, and other sweetened drinks), pacifiers dipped in sweet agents such as sugar, honey or syrups, or other high frequency sugar exposures.

The American Academy of Pediatrics (AAP) and the American Academy of Pedodontics recommend that juice should be offered to infants (6 months and older) in a cup, not a bottle, and that infants not be put to bed with a bottle in their mouth.

Allowing infants to sleep with a nursing bottle containing fermentable carbohydrates or to use it unsupervised during waking hours provides an almost constant supply of carbohydrates and sugars. This leads to rapid demineralization of tooth enamel and an increase in the risk of dental caries due to prolonged contact between cariogenic bacteria on the susceptible tooth surface and the sugars in the consumed liquid.

Unrestricted use of a bottle, containing fermentable carbohydrates, is a risk because the more times an infant consumes solid or liquid food, the higher the caries risk.

Propping the bottle deprives infants of vital human contact and nurturing which makes them feel secure. It can cause ear infections because of fluid entering the middle ear and not draining properly; choking from liquid flowing into the lung; and tooth decay from prolonged exposure to carbohydrate-containing liquids.

Add solid food to a nursing bottle results in force-feeding, inappropriately increases the energy and nutrient composition of the formula, deprives the infant of experiences important in the development of feeding behavior, and could cause an infant to choke.

411.03 Inappropriate Complementary Foods (Infants)

- Adding sweet agents such as sugar, honey or syrups to any beverage (including water) or prepared food or used on a pacifier.
- Introducing any food other than human milk or iron-fortified infant formula before 6 months of age.

Feeding complementary foods too early (that is before 6 months of age) or adding diluted cereal or other complementary foods to bottles doesn't allow infants the opportunity to learn to feed themselves. The major objection to the introduction of solids before age 6 months of age is based on the possibility that it may interfere with establishing sound eating habits and may contribute to overfeeding.

In early infancy, the infant possesses an extrusion reflex that enables him/her to swallow only liquid foods. The extrusion reflex is normally diminished by 6 months of age. Gastric secretions, digestive capacity, renal capacity and enzymatic secretions are low, which makes

digestion of solids inefficient and potentially harmful. Furthermore, there is the potential for antigens to be developed against solid foods due to the undigested proteins that may permeate the gut; however, the potential for developing allergic reactions may primarily be in infants with a strong family history of atopy. If solid foods are introduced before the infant is developmentally ready, breast milk or iron-fortified formula necessary for optimum growth is displaced.

Around 6 months of age, the infant is developmentally ready for solid foods when: the infant is better able to express certain feeding cues such as turning head to indicate satiation or feeling full; oral and gross motor skills begin to develop that help the infant to take solid foods; the extrusion reflex disappears; and the infant begins to sit upright and maintain balance with little or no support.

411.04 Routinely Using Inappropriate Feeding Practices and Early Introduction of Solid Food

- Inability to recognize, insensitivity to, or disregarding the infant's cues for hunger and satiety (for example, forcing an infant to eat a certain type and/or amount of food or beverage or ignoring an infant's hunger cues).
- Not supporting an infant's need for growing independence with self-feeding (for example, solely spoon-feeding an infant who is able and ready to finger-feed and/or try self-feeding with appropriate utensils).
- Feeding an infant food with inappropriate textures based on his/her developmental stage (e.g., feeding primarily pureed or liquid foods when the infant is ready and capable of eating mashed, chopped or appropriate finger foods).
- Routinely using feeding practices that disregard developmental needs of the infant such as no solids before 7 months, no spoon, no finger feeding by 7-9 months.
- Feeding foods of inappropriate consistency, size, or shape that put the infant at risk of choking.

Infants held to rigid feeding schedules are often underfed or overfed. Caregivers insensitive to signs of hunger and satiety, or who over manage feeding may inappropriately restrict or encourage excessive intake. Findings show that these practices may promote negative or unpleasant association with eating that may continue into later life and may also contribute to obesity. Infants should be fed foods with a texture appropriate to their developmental level.

411.05 Feeding Potentially Unsafe Food (Infants)

Feeding foods to an infant that could be contaminated with harmful microorganisms.

Examples of potentially harmful foods for an infant are:

- Unpasteurized fruit or vegetable juice.
- Unpasteurized dairy products or soft cheeses such as feta, Brie, Camembert, blue-veined and Mexican-style cheese.
- Honey (added to liquids or complementary foods, used in cooking, as part of processed foods, on a pacifier, etc.).
- Raw or undercooked meat, fish, poultry or eggs.
- Raw vegetable sprouts (alfalfa, clover, bean and radish).
- Deli meat, hot dogs and processed meats (avoid unless heated until steaming hot).
- Donor human milk acquired directly from individuals or the Internet.

Only pasteurized juice, which is free of microorganisms, is safe for infants and children. Pasteurized fruit juices are free of microorganisms. Unpasteurized juice may contain pathogens, such as *Escherichia coli*, *Salmonella*, and *Cryptosporidium* organisms. These organisms can cause serious disease, such as hemolytic-uremic syndrome, and should never be fed to infants and children.

The AAP advises against giving fruit juice to infants younger than 6 months since it offers no nutritional benefit at this age. Infants should not eat raw or unpasteurized milk or cheeses – unpasteurized dairy products could contain harmful bacteria, such as *Brucellae* species, that could cause infants to contract a dangerous food borne illness.

The AAP also recommends that young children should not eat unpasteurized soft cheeses such as feta, Brie, Camembert, blue-veined and Mexican-style cheese – these foods could contain *Listeria* bacteria (hard cheeses, processed cheeses, cream cheese, cottage cheese and yogurt do not need to be avoided).

Honey has been associated as the primary food source of *Clostridium botulinum* during infancy. These spores are extremely resistant to heat, including pasteurization, and are not destroyed by present methods of processing honey.

Botulism in infancy is caused by ingestion of the spores, which germinate into the toxin in the lumen of the bowel.

Ways to reduce the risk of choking in infancy

The AAP recommends keeping these foods away from children under the age of four:

- Hot dogs
- Nuts and seeds
- Chunks of meat or cheese
- Whole grapes
- Hard, gooey, or sticky candy
- Popcorn
- Chunks of peanut butter
- Raw vegetables
- Raisins
- Chewing gum

Infants should not eat raw or undercooked meat or poultry, raw fish or shellfish, including oysters, clams, mussels, and scallops – these foods may contain harmful bacteria or parasites that could cause children to contract dangerous food borne illnesses.

Background information regarding foods that could be contaminated with harmful microorganisms is also included below:

- Raw vegetable sprouts (alfalfa, clover, bean and radish). Sprouts can cause potentially dangerous Salmonella and E-coli 0157 infection. Sprouts grown under clean conditions in the home also present a risk because bacteria may be present in seed. Cook sprouts to significantly reduce the risk of illness.
- Deli meats, hot dogs and processed meats (avoid unless heated until steaming hot) – These foods have been found to be contaminated with *Listeria monocytogenes*; if adequately cooked this bacterium is destroyed. Listeria bacteria live at cold temperatures as well and proper refrigeration does not prevent infection of this type of bacteria.

411.06 Improper Dilution of Formula

- Routine over dilution of formula (failure to follow manufacturer’s dilution instructions or specific instructions accompanying a prescription).
- Routine under dilution of formula (failure to follow manufacturers dilution instruction or specific instructions accompanying a prescription).

Over dilution can result in water intoxication resulting in hyponatremia; irritability; coma; inadequate nutrient intake; failure to thrive; poor growth. Under dilution of formula increases calories, protein and solutes presented to the kidney for excretion and can result in hypernatremia, tetany and obesity.

Dehydration and metabolic acidosis can occur with under-dilution of formula. Powdered formulas vary in density, so manufacturer’s scoops are formula-specific to assure correct dilution. One clue for you to identify incorrect formula preparation is to determine if the caregiver is using the correct manufacturer's scoop to prepare the formula.

411.07 Limiting Frequency of Breastfeeding when Human Milk is Sole Source of Nutrients

Examples of inappropriate frequency of breastfeeding:

- Scheduled feedings instead of demand feedings; and
- Less than 8 feedings in 24 hours if less than 2 months of age.

Exclusive breastfeeding provides ideal nutrition to an infant and is sufficient to support optimal growth and development in the first 6 months of life. Frequent breastfeeding is critical to the establishment and maintenance of an adequate milk supply for the infant. Inadequate frequency of breastfeeding may lead to lactation failure in the mother and dehydration, poor weight gain, diarrhea, vomiting, illness, and malnourishment in the infant.

411.08+ Highly Restrictive Diets – Feeding Diet Very Low in Calories or Essential Nutrients, any of the following:

Note: Clients determined to be high risk (+) must be offered a nutrition counseling appointment with a Registered Dietitian.

- Severely limited intake of important food sources of nutrients (example: fruit and nut diet)
- High risk eating pattern
- Inappropriate, infrequent or highly restrictive feeding schedules (such as infrequent breastfeeding infant held to rigid feeding schedules, withholding food, overfeeding) or forcing an infant to eat a certain type and/or amount of food.

Vegan Diets, ALL of the following:

- Consuming only foods of plant origin
- No animal products (no meat, poultry, fish, eggs, milk, cheese or other dairy products)
- Avoidance of foods made with animal product ingredients

Highly restrictive diets prevent adequate intake of nutrients, interfere with growth and development, and may lead to other adverse physiological effects. Infants older than 6 months are potentially at the greatest risk for overt deficiency states related to inappropriate restrictions of the diet, although deficiencies of vitamins B12 and essential fatty acids may appear earlier.

411.09 Routinely Using Inappropriate Sanitation in Preparation, Handling, and Storage of Expressed Human Milk or Formula.

- Limited or no access to safe water supply with no stove for sterilizing or refrigerator/freezer for storage
- Failure to handle or store expressed human milk properly including:
 - Thawing/heating in a microwave
 - Refreezing
 - Adding freshly expressed unrefrigerated human milk to frozen human milk in an amount that is greater than the amount of frozen human milk
 - Feeding thawed human milk more than 24 hours after it was thawed
 - Saving human milk from a used bottle for another feeding
 - Failure to clean breast pump per manufacturer's instruction
 - Donor human milk (acquired from individuals or the Internet)
- Improper preparation, handling and/or storage of bottles or containers of formula including:
 - Storing at room temperature for more than 1 hour
 - Failure to store prepared formula per manufacturer's instructions
 - Using formula in a bottle one hour after the start of a feeding
 - Saving formula from a used bottle for another feeding
 - Failure to clean baby bottle properly

Lack of sanitation in the preparation, handling and storage of expressed human milk or formula may cause gastrointestinal infection. The water used to prepare concentrated or powdered infant formula and prepare bottles and nipples (formula and human milk) must be safe for consumption.

Water contaminated with toxic substances (such as nitrates, lead, or pesticides) poses a hazard to an infant's health and should not be used. In addition, a heat source is necessary to sterilize bottles and other items used in the storage of both human milk and formula. Adequate refrigeration is necessary to safely store human milk and prepared formula.

There is a consensus on the following human milk feeding, handling, and storage practices that are considered inappropriate and unsafe:

- Thawing frozen human milk in the microwave oven
- Refreezing human milk
- Adding freshly expressed unrefrigerated human milk to already frozen milk in a storage container
- Feeding previously frozen human milk thawed in the refrigerator that has been refrigerated for more than 24 hours
- Saving human milk from a used bottle for another use a subsequent feeding
- Failure to clean a breast pump per manufacturer's instruction
- Feeding donor human milk acquired directly from individuals or the Internet

Formula must be properly prepared in a sanitary manner to be safe for consumption. Furthermore, prepared infant formula is a perishable food, and must be handled and stored properly in order to be safe for consumption.

Guidelines on the handling and storage of infant formula indicate that it is unsafe to use prepared formula which:

- Has been held at room temperature longer than 1 hour or longer than recommended by the manufacturer
- Has been held in the refrigerator longer than the safe storage time indicated by the manufacturer
- Remains in a bottle one hour after the start of feeding
- Remains in a bottle from an earlier feeding
- Is fed using improperly cleaned baby bottles

411.10 Inappropriate or Excessive Intake of Dietary Supplements

- Routinely taking inappropriate or excessive amounts of any dietary supplements not prescribed by a physician with potentially harmful consequences, including but not limited to ingestion of unprescribed or excessive or toxic:

- Herbal remedies
- Mineral or botanical supplements/remedies/teas
- Multi or single vitamins

An infant consuming inappropriate or excessive amount of single or multivitamins, minerals or herbal remedies not prescribed by a health care provider is at risk for a variety of adverse effects including harmful nutrient interactions, toxicity and teratogenicity (ability to cause birth defects).

While some herbal teas may be safe, some undesirable effects, particularly on infants who are fed herbal teas or who receive breast milk from mothers who have ingested herbal teas. Examples of teas with potentially harmful effects to children include: licorice, comfrey leaves, sassafras, Senna, buckthorn bark, cinnamon, wormwood, woodruff, valerian, foxglove, poke root or pokeweed, periwinkle, nutmeg, catnip, hydrangea, juniper, Mormon tea, thorn apple, yohimbe bark, lobelia, oleander, Mate, kola nut or gotu cola, and chamomile.

Like drugs, herbal or botanical preparations have chemical and biological activity, may have side effects, and may interact with certain medications – these interactions can cause problems and even be dangerous. Botanical supplements are not necessarily safe because the safety of a botanical depends on many things, such as its chemical makeup, how it works in the body, how it is prepared, and the dose used.

411.11 Vitamin/Mineral Supplementation

- Client not routinely taking a dietary supplement recognized as essential by national public health policy makers because diet alone cannot meet nutrient requirements.
- Examples include but are not limited to:
 - Infants and children age 6 months through 35 months not taking 0.25 mg of fluoride daily when the water supply contains less than 0.3 ppm fluoride.
 - Breastfed and non-breastfed infants who are ingesting less than 1 quart (32 ounces) per day of Vitamin D-fortified formula and are not taking a supplement.

Depending on an infant’s specific needs and environmental circumstances, certain dietary supplements may be recommended by the infant’s health care provider to ensure health. For example, fluoride supplements may be of benefit in reducing dental decay for children living in fluoride-deficient areas.

To prevent rickets and vitamin D deficiency in healthy infants and children, the AAP recommends a supplement of 400 IU per day for the following:

- All breastfed and partially breastfed infants unless they are weaned to at least 1 liter (or 1 quart) per day of vitamin D-fortified formula.
- All non-breastfed infants who are ingesting less than 1 liter (or 1 quart) per day of vitamin D-fortified formula.

428.01 Inappropriate 4-23 mo. old Feeding (Dietary Risk Associated with Complementary Feeding Practices)

Use for 4-23 months after a complete nutrition assessment is performed.

- This criterion may only be assigned after a complete assessment has been performed to assess for risk (including 411.01-411.11, Inappropriate Feeding Practices for Infants or 425.01-425.09, Inappropriate Nutrition Practices for Children) and no other risk is identified.

An infant 4-12 months of age who has begun to or is expected to begin to:

- Consume complementary foods and beverages.
- Eat independently.
- Be weaned from breast milk or infant formula.
- Transition from a diet based on infant/toddler foods to one based on the *Dietary Guidelines for Americans*, is at risk of inappropriate complementary feeding.

Complementary feeding is the gradual addition of foods and beverages to the diet of the infant and young child. The process of adding complementary food should reflect the physical, intellectual, and behavioral stages as well as the nutrient needs of the infant. Inappropriate complementary feeding practices are common and well documented in the literature. Caregivers often do not recognize signs of developmental readiness and, therefore, offer foods and beverages that may be inappropriate in type, amount, consistency and texture.

Responding to Feeding and Diet-Related Risk Conditions

Once a caregiver indicates they are feeding their infant in a way that puts their infant at nutrition or health risk, ask questions to gather more information. For example, you may want to determine why the caregiver is practicing a certain feeding behavior.

"I see that you haven't begun feeding Johnny solids yet. Would you like to tell me more about why you are choosing to wait?"

"You mentioned that you put cereal in Johnny's bottle. What have you heard about offering cereal in the bottle?"

You can ask questions to find out what the caregiver is planning to offer the infant to eat in the coming months.

"I see that you are feeding Tanisha all types of infant foods now. What are you thinking of doing next, to progress her eating skills?"

You may also need to ask about the eating environment and feeding relationship.

"I see that you are propping the bottle for your infant. How do you typically feed him?"

This way, if the caregiver states they usually hold the infant, you can praise them for what they are doing right and then provide education on the reasons why propping the bottle is not a good practice.

You are in a unique role to be able to provide anticipatory guidance (or telling caregivers what to expect next) on feeding and developmental stages. You can provide guidance and information on topics such as the caregiver's role in feeding, introducing new foods, nutrient adequacy, how to prepare formula properly and so on.

You can educate the caregiver on appropriate feeding practices incorporating best practices discussed in this module. Be careful to listen to the caregiver to learn what they would like to work on. Discuss a plan that works toward healthier feeding habits. Find out what might or might not be helpful with carrying out the plan. Work together with the caregiver to find a solution. Offer the caregiver educational resources to help support the appropriate infant feeding practices.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

Match the risks with the correlating reason to identify why it is a risk in infancy.

- | | |
|---|---|
| 1. ____ feeding cow's milk | a. may lead to a mom's low milk supply and result in dehydration, poor weight gain, illness, and malnutrition for the infant. |
| 2. ____ feeding solids from a bottle | b. can lead to overfeeding and delay infant's ability to feed self. |
| 3. ____ strict limits on number of breastfeeding sessions | c. can stress infant's kidneys because of high levels of protein and minerals. |
| 4. ____ propping the bottle in the infant's mouth | d. infant may not receive adequate nutrients for growth and development. |
| 5. ____ feeding a vegan diet | e. limits the ability for an infant to show his fullness and can cause choking. |

ANSWERS

1. c
2. b or e
3. a
4. e or b
5. d

Section VI: Growth-Related Nutrition Risks

Introduction

In addition to feeding and diet-related risks, there are growth related risks that may be affected by nutrition and therefore also will qualify an infant for the WIC Program. An infant's birth weight, length, gestational age at birth, as well as the infant's weight gain during the first year of life are signs of how an infant will likely track in growth. The quality and quantity of the infant's diet will further impact the infant's growth and development.

It is important to recognize that identifying infants participating on the WIC Program as having growth-related risks provides you with a baseline for providing education. It does not necessarily mean that aggressive nutrition intervention is needed.

For example, an infant born with a low birth weight will need to receive optimum nutrition in order to grow to his/her potential. You have an opportunity to greatly improve the outcome of an infant with growth challenges by providing nutrition education and, when necessary, making referrals to Registered Dietitians, health care providers, and other programs to help families with children who have special needs.

If you identify an infant with a rapid increase in weight, (jumping channels on the growth grid) you should gather information on feeding and eating skills and the family environment to assess whether the family may benefit from infant feeding guidance or other nutrition information and education and counseling.

In all situations, an important role you play is to collect information to best understand what the caregiver's concerns are about the infant. In WIC, you become skilled at finding out about the infant's feeding environment (when and where the infant is fed, who feeds the infant, does the infant feed himself, etc.). You can assess the caregiver's level of concern about feeding-related issues and learn how they are responding to them.

Growth and Development in Infants

Growth is an increase in the physical size of the body while development is the process of maturing. Several factors affect these milestones of infancy.

1. Genetics - Inherited family characteristics that influence body build and height as well as inherited hormonal deficiencies such as, hypothyroidism, can affect normal growth and development.

2. Environment - Social and economic variables (such as, caregiver's ability to show affection, living in poverty, parents' educational level) that influence a person's ability to grow and develop.

3. Behaviors - A mom's behaviors can affect an infant's biological abilities for growth.

Habits such as smoking or drug use during pregnancy can reduce birth weight and affect growth.

Caregiver food selection and feeding behaviors can affect growth and development.

For example, a mother is concerned that her infant is small and is not drinking enough formula, so she has been trying to make the infant finish all bottles. The mother may not realize that her feeding approach could make the situation worse. In WIC we want to emphasize healthy feeding relationships rather than focus only on weight.

In this situation, you could acknowledge the mother's concern about the infant's size, discuss the issue, and collect information about the feeding environment.

You will be a great source of nutrition and developmental information for parents and caregivers. By providing anticipatory guidance on the next developmental milestone or expectation with feeding, you can prevent inappropriate feeding behaviors from ever occurring. At every visit, praise caregivers for what they are doing correctly. Help caregivers increase their confidence in care giving and, maybe they'll be more open to other suggestions.

Another important role you'll play is referring clients to their health care providers and other appropriate community resources.

Monitoring Growth

WIC uses the 2006 World Health Organization (WHO) growth charts as a standard to evaluate growth of all infants and children up to 2 years of age. The WHO growth charts are based on a large international sample of predominantly breastfed infants and children who received optimal nutrition and care. All infants included in the study were predominantly (that is, exclusively or nearly exclusively) breastfed for at least 4 months and were still breastfeeding at 12 months. Thus, the growth charts are considered the standard; they identify how children *should* grow when provided with optimal conditions.

The WHO growth standards use values to identify children whose growth might indicate adverse health conditions. Infants at or above the 98th percentile weight for length are defined as "high weight for length." Infants at or below the 2nd percentile weight for length are defined as "underweight." Infants between the 2nd and 5th percentiles are defined as "at risk for underweight."

Percentiles also serve as a reference for comparison. For example, a 6-month-old boy who is at the 25th percentile length for age is taller than 25% of the boys his age and shorter than 75% of the boys his age. Don't get caught up in treating growth curves like grades in school. An infant growing at the 95th percentile isn't doing any better than the one growing at the 5th percentile. The most important part of the growth curve is to be able to compare each individual infant to himself--to evaluate his growth as it progresses from one month to the next.

Weighing and measuring infants and recording measurements from two or more visits allow you to assess an infant's growth pattern over time. In theory an infant whose length is at the 25th percentile should continue to grow so that her length stays at the 25th percentile over time. This is not always true. However, the greater the difference from a percentile line the more

concern there is that something unusual is going on with the infant's growth. Growth that varies greatly from a normal growth channel needs to be referred to the Registered Dietitian for evaluation. Poor growth can indicate poor nutrition (though poor growth can also result from other factors such as illness). You will want to assess whether an odd result is an inaccurate measurement or a potential health problem.

Let's now review the risks related to growth.

The Underweight Infant

Underweight reflects the body's thinness. It doesn't tell us the cause or nature of underweight. Poverty, infectious disease, and inadequate energy intake are some factors that can lead to underweight. The infant who weighs less than other infants of the same length and age may be a sign of a medical problem, a feeding problem, or perhaps it may be a normal weight for the infant.

There are many reasons why an infant may have difficulty with gaining weight. Some of these include:

- Inadequate intake of food being offered (such as with a family in poverty, a depressed caregiver, quiet infant who doesn't let his needs be known, or caregiver who lacks knowledge and information on the needs of an infant).
- Inadequate retention of food, such as is common with vomiting, reflux, and diarrhea.
- Inadequate absorption of food as noted with cystic fibrosis.
- Increased calorie needs.
- Decreased growth efficiency with certain diseases or illnesses (such as with the human immunodeficiency virus).

Education Tips and Follow Up

- Establish a rapport with the caregiver to determine possible factors for the infant's low weight. Ask questions to determine appropriate frequency of feeds and length of feeds.
- If formula feeding, ask how formula is being prepared.
- Find out about the eating environment.
- Find out how the caregiver feels about the infant's weight.
- Ask what the health care provider has said.
- Discuss the general eating behaviors/problems that can lead to inadequate calorie intake.
- Infants with a weight-for-length less than or equal to the 2nd percentile are high risk, so refer the infant to the Registered Dietitian for high-risk counseling within 30 days.

103.01+ At Risk of Underweight

At or below the 2.3rd percentile for weight-for-length.

Note: Clients determined to be high risk (+) must be offered a nutrition counseling appointment with a Registered Dietitian within 30 days.

103.02 At-Risk of Underweight

Above the 2.3rd percentile weight-for-length.

- For infants with a weight-for-length greater than the 5th percentile to less than or equal to the 10th percentile, the growth is probably fine, but growth should be watched and further assessment into feeding practices should occur.

The Infant with Short Stature

Short stature is defined by two risks (see side bar). Stature is the amount of linear growth that has been achieved. Short length may be an indication of some form of chronic undernutrition due to a disease process or inadequate intake of nutrients. Over a long period of time an illness or nutritional deficiency may contribute to linear growth retardation or cessation. Abnormally short stature infants are likely to become short stature children, and short stature children are likely to become short stature adolescents, and so on.

It may also be perfectly normal for an infant to be small. Some children have a family history of short stature and grow at a normal rate; however, short parental stature should not be used as an explanation for a child's poor growth. You must assess normal, healthy feeding and eating to ensure nutrition is not affecting the infant's growth.

Education Tips and Follow Up

- Establish a rapport with the caregiver to find out how they feel about the infant's stature and what the health care provider has mentioned.
- Ask questions to determine appropriate frequency of feeds and length of feeds.
- Find out about the eating environment. Talk about general eating behaviors/problems that can lead to inadequate intake.
- Offer information on the progression of solids and feeding abilities to expect in the coming months.
- A more in-depth dietary assessment and health care provider referral may be necessary to determine underlying issues. More frequent follow-up to monitor growth is appropriate for short or at-risk of short stature.

The Failure to Thrive Infant

Failure to thrive (FTT) is a serious growth problem with an often complex etiology. Some of the indicators that a health care provider might use to diagnose FTT include:

- Weight consistently below the 3rd percentile for age.
- Weight less than 80% of ideal weight for height/age.
- Progressive fall-off in weight to below the 3rd percentile.
- A decrease in expected rate of growth along the child's previously defined growth curve irrespective of its relationship to the 3rd percentile.

121.01 Short Stature

At or below 2.3rd percentile length-for-age.

121.02 At Risk for Short Stature

At or above 2.3rd percentile length-for-age and at or below 5th percentile length-for-age.

There are many causes of failure to thrive. Among the ways to categorize the different conditions that cause failure to thrive and poor weight gain is to group them into conditions that cause a decreased intake of calories or an increased loss of calories.

Education Tips and Follow Up

- Establish a rapport with the caregiver to find out how they feel about the infant's growth and what the health care provider has mentioned.
- Ask open ended questions to determine appropriate frequency of feeds and length of feeds. If formula-fed, question how the formula is mixed. If breastfeeding, assess for restricted feedings.
- Ask questions to determine if there are medical reasons for why the infant is failing to thrive.
- Ask how the caregiver knows when her infant is hungry and full, and about the types of solids being offered.
- Inquire about the eating environment.
- Offer to discuss age-appropriate foods and the general eating behaviors/problems which can lead to inadequate calorie intake.
- Make referrals to community resources as needed.
- Refer to the Registered Dietitian for high-risk counseling within 30 days.

The Infant with a Slowed or Faltering Growth Pattern

A slowed or faltering growth pattern is assessed by measuring the differences of weights and lengths between two points in time. Those measurements are plotted on charts to determine the rate of growth. In most cases, once an infant is established in a percentile rating of growth, she will remain in that percentile track. When an infant does not grow at their expected rate, we become concerned that either they are not receiving adequate nutrition, or that the infant may have a medical problem.

Possible factors associated with not adequately nourishing an infant include:

- A lack of social support for the caregiver.
- A disorganized family.
- A depressed caregiver.
- A caregiver's lack of education, health, and nutrition knowledge.

Education Tips and Follow Up

- Establish a rapport with the caregiver to find out about their infant's growth and what their health care provider has mentioned.
- Ask open ended questions to determine appropriate frequency of feeds and length of feeds. If formula-fed, question how the formula is mixed.
- Ask how the caregiver knows when her infant is hungry and full, and the types of solids being offered.

- Inquire about the eating environment.
- Offer to discuss age-appropriate foods and the general eating behaviors/problems which can lead to inadequate calorie intake.
 - Offer to refer to the Registered Dietitian for high-risk counseling.

Under some conditions, the educators may also choose to have the Registered Dietitian follow up with an infant who is not high risk but has a growth concern.

The Low Birth Weight and Small for Gestational Age Infant

Infants born with a low or very low birth weight have more health challenges than infants born with normal birth weights. Low birth weight infants are either born **small for their gestational age (SGA)** or born prematurely.

SGA infants weigh less and may be shorter than expected for their birth date. This low birth weight may be the result of intrauterine undernutrition. Inadequate nutrition to the uterus can be caused by any condition that interferes with the transfer of nutrients and oxygen from the mother to the infant before birth. This can happen if during pregnancy the mother smoked, had a poor diet, or if the infant had certain medical problems. Appropriate nutrition is necessary for these infants to grow and develop. Some low birth weight infants may not get enough attention from their caregivers if they are too weak to cry loudly or cannot move about normally. Other infants may not get enough to eat if they are too weak to suck.

Education Tips and Follow Up

- Encourage caregivers to follow their health care provider's advice on breast and formula feeding and vitamin and mineral supplements. Support caregiver's plans to breast or formula feed.
- Caregivers of young infants are probably receiving more advice than most other caregivers; be sensitive to the fact that they may be overwhelmed by too much "good advice".
- Find out how the caregiver can tell when the infant is hungry and full.
- When the caregiver is getting ready to progress their infant to solids, review the signs of the infant's development readiness.
- Make referrals to community resources as needed.
- Refer to the Registered Dietitian for high-risk counseling.

141.01+

Low Birth Weight

Birth weight at or less than 2500 gm (5 lb. 8 oz)

Very Low Birth Weight

Birth weight at or less than 1500 gm. (3 lb. 8 oz)

151.01+ Small for Gestational Age (SGA) and Currently Under 24 Months of Age

Diagnosed as small for gestational age

The Infant Born Prematurely

An infant born three or more weeks before the due date (less than 37 weeks gestation) is described as premature. It is difficult for the premature infant, who comes into the world early, to get enough nutrition to complete the rapid growth and development that would normally occur in the last weeks before birth. The premature infant's weight at birth may be appropriate for his gestational age. The infant's nutritional needs are greater than mature term infants because they are continuing to "catch up" in growth and development and to lay down nutrient and energy stores that are normally complete by full term birth. The infant's immature feeding skills, such as sucking and swallowing, and immature digestive system, interfere with meeting these nutritional needs.

Education Tips and Follow Up

- Encourage caregivers to receive and follow their health care provider's advice on breast and formula feeding, and vitamin and mineral supplements. Support caregiver's plans for breast or formula feeding.
- Caregivers of young infants are probably receiving more advice than most other caregivers; be sensitive to the fact that they may be overwhelmed with too much "good advice".
- Find out how the caregiver can tell when the infant is hungry and full.
- When the caregiver is getting ready to progress their infant to solids, the child's health care provider should review the signs of the infant's developmental readiness.
- Preterm infants are considered to be at low risk. Note that an infant who is both premature and low birth weight is high risk due to their low-birth-weight risk, and thus must be referred to the Registered Dietitian for high risk counseling.

The Large for Gestational Age Infant

Infants born with a birth weight of 9 pounds or more (4000 grams or more) are considered **large for gestational age (LGA)**. LGA infants are most often born to mothers who are obese, who gain excessive weight during pregnancy, or who have diabetes. A mother's size and family genetics are also major factors. A woman who herself was over 8 pounds at birth is twice as likely to have a large infant. Native American, Latino and Caucasian women tend to

142.01+ Preterm Delivery

An infant born less than 37 weeks gestation.

142.02 Early Term Delivery

Infant or child born greater than or equal to 37 but less than 39 weeks gestation.

153.01+ Large for Gestational Age

Birth weight at or above 9 pounds

Diagnosed presence of large for gestational age.

have larger infants than women in other ethnic groups. Because of the infant's large size, vaginal delivery may be difficult, take longer, and occasionally results in birth injury, bruising or breathing problems. LGA infants are often listless, limp and feed poorly. Infants born to mothers who have diabetes are very likely to become hypoglycemic in the first one to two hours after delivery. Skin-to-skin contact immediately after birth and breastfeeding in the delivery room is highly recommended to keep the infant's blood sugar from dropping.

The presence of LGA must be diagnosed, documented, or reported by a health care provider or someone working under a health care provider's orders, or as self-reported by the family.

Education Tips and Follow Up

- Complete a thorough nutrition assessment.
- Determine how the caregiver can tell when the infant is hungry and full.
- Encourage caregivers to feed the infant on demand.
- When the caregiver is getting ready to progress the infant to solids, review the signs of the infant's developmental readiness.

The "Overweight" Infant

The rise in the prevalence of overweight and obesity in children adolescents is one of the most important public health issues in the United States today. The risk of an infant growing up to become an overweight adult is related to the size of his/her parents. That is, if one or both infant's parents are overweight, the likelihood that the infant will grow up to be an overweight adult is increased.

Risk Code 114.01 is assigned using the biological mother's most recent pregnancy record.

To identify risk based on the biological father's BMI, it must be self-reported weight and height by the parent in attendance (that is, one parent may not "self-report" for the other parent) or weight and height measurements taken by staff at the time of certification.

High weight-for-length, Risk Code 115.01, is based on the infant's weight. Infants who become overweight should never be put on a diet to lose weight. Weight loss during infancy would

114: At Risk of Overweight

Biological mother with BMI at or over 30 at the time of conception or at any point in the first trimester of pregnancy.

Biological father with a BMI at or above 30 at the time of certification. It must be self-reported by the father.

115.01 High Weight-for-Length

At or above 97.7th percentile weight-for-length

deprive the infant of nutrients needed for growth and development. *These infants should be given time to "grow into" their weight.*

Education Tips and Follow Up

- Complete a thorough nutrition assessment.
- Ask open ended questions to determine how the infant is being fed.
- Determine if eating patterns are developmentally appropriate for the infant -- whether correct formula dilutions are being made, and if any inappropriate foods are being fed.
- Determine if the caregiver knows when the infant is hungry and full.
- Offer to discuss the infant's behaviors and patterns of eating.
- Determine if the feeding relationship could be improved.
- Ask the caregiver about the infant's behavior and patterns of eating. Offer suggestions to improve the feeding relationship. Some suggestions include:
 - If feeding solids in the bottle, recommend only feeding solids from a spoon when developmentally ready.
 - If finger foods include cookies and other high fat treats, suggest nutritious finger foods such as soft fruit and cooked vegetables.
 - If giving sweetened water, juice, or soft drinks, advise that breast milk or formula is the best choice for thirst.
 - Suggest that the caregiver avoid forcing the infant to finish a bottle or food.
 - Offer to discuss how to watch for the infant's signs of fullness and respect them.
 - If food is used to quiet the infant every time he cries, encourage the caregiver to distinguish between cries of hunger and those of discomfort. Offer food only when the infant is hungry.
 - If the infant is kept mostly in an infant carrier, encourage the caregiver to allow the infant to be active by playing with him; let him move unrestricted.
 - Suggest that caregivers respect the infant's food likes, dislikes, and needs. Most infants like plain food. Butter and sugar may make the flavor palatable to caregivers, but adds unnecessary, low nutrient dense calories for infant. Caregivers can learn to read labels on infant food jars and avoid the extra calories provided by sugar.
 - Suggest caregivers take responsibility for the infant's health.

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

1. True (T) or False (F)?

- __a. "Overweight" infants are generally put on a weight-loss diet to avoid obesity in later life.

- __b. Overfeeding of formula or solids for an extended period of time can cause infants to become overweight.
 - __c. A caregiver of an overweight infant should not use food to quiet the infant every time the infant cries.
 - __d. The infant who weighs less than other infants of the same length and age may be of normal weight for that infant.
 - __e. Nutritional deficiencies over a long period of time may lead to growth retardation.
 - __f. Short stature is not a concern if both parents are short.
2. Besides the information collected and infant growth charts, what is a question to ask the caregiver to collect information of the feeding relationship?
 3. An infant is defined as having a low birth weight if (s)he weighs _____ at birth.
 4. An infant is described as premature if (s)he is born before _____ weeks gestation.

ANSWERS

1.

a. F	d. T
b. T	e. T
c. T	f. F, Short stature in parents shouldn't be used to explain poor growth. You must assess feeding and eating to ensure adequate nutrition.
2. Any one of the following:
 - a. How can you tell when your infant is hungry?
 - b. How can you tell when your infant is full?
 - c. Who feeds the infant?
3. ≤ 5 pounds 8 ounces
4. 37

Section VII: Biochemical and Other Medical Indicators of Nutrition Risk

In addition to diet and growth-related risks, there are several biochemical and medical indicators that define nutritional risk.

These include low hemoglobin or hematocrit, elevated blood lead levels, breastfeeding complications, and specific medical conditions.

The Infant with Low Hemoglobin or Low Hematocrit

Hemoglobin and hematocrit are the commonly used tests to screen for iron deficiency anemia. Measurements of hemoglobin and hematocrit reflect the amount of functional iron in the body. Changes in the hemoglobin concentration and hematocrit occur at the late stages of iron deficiency. While neither a hemoglobin or hematocrit test is a direct measure of iron status and do not distinguish among different types of anemia, these tests are useful indicators of iron deficiency anemia.

The most common form of nutrition-related anemia is iron-deficiency, which can be caused by a diet inadequate in iron. Inadequate intake of iron in infancy has been found to be related to poverty, inadequate dietary intake, and malnutrition. Infants who do not receive an appropriate iron source after six months of age are at risk for developing anemia. Iron deficiency can result in poor growth, decreased resistance to infection, fatigue, irritability, behavioral problems, and deficits in cognitive ability. Appropriate iron sources include iron fortified formula, iron-fortified infant cereals, meats, or oral iron supplements. Breastfed infants who are not receiving iron rich solids after six months of age are at risk for anemia. Low birth weight infants are also at increased risk of developing anemia because of low neonatal iron stores. Infants on low-iron formulas are also at risk for anemia. The Colorado WIC Program does not allow the issuance of low-iron formulas.

Education Tips and Follow Up

- Encourage caregivers to receive and follow their health care provider's advice on breast and formula feeding, and vitamin and mineral supplements. Support caregiver's plans for breast or formula feeding.
- Recommend iron fortified formula to all caregivers who choose to offer formula to their infants.
- Educate caregivers on the importance of offering iron-rich foods to an infant over 6 months of age.

201.01 Low Hemoglobin / Low Hematocrit

Hematocrit %/Hemoglobin gm. levels below the following standards:

Infant 6 through 11 months:

Hct % <33.0 Hgb. gm. <11.0

- If the caregiver has not begun these foods, probe to understand her reasons.
- Educate caregivers on sources of iron-rich foods (such as iron-fortified infant cereals, mashed, cooked dry beans, and pureed/minced meats) for infants.
- Refer infants identified as high risk to the Registered Dietitian for follow up.

The Infant with an Elevated Blood Lead Level

Occasionally an infant will be tested for a blood lead level. This information can be obtained from completing a thorough nutrition assessment. Lead poisoning can cause brain damage, mental retardation, and convulsions. Therefore, it is very important to protect infants from sources of lead.

Lead is a metal found in old paint, dust, soil, and sometimes, water. Infants can be exposed to lead by putting objects containing lead (such as paint chips) or contaminated with lead (such as dust that clings to toys or other objects) in their mouths. Encourage caregivers to wash infant's hands before they eat.

211.01+ Elevated Blood Lead Levels

Venous blood lead level at or above 5 micrograms/deciliter within the past 12 months.

Additionally, some folk remedies containing lead should be avoided, for example, Hispanic families may use Azarcon and Greta for colic. Furthermore, an adequate intake of iron, zinc, calcium, and calories is known to decrease an infant's susceptibility to the toxic effects of lead.

Education Tips and Follow Up

- Encourage caregivers to receive and follow their health care provider's advice on vitamin and mineral supplements.
- Determine what the infant's health care provider says regarding the elevated blood lead level.
- Educate caregivers on the importance of offering an iron- and vitamin C-rich and a balanced diet to their infant.
- Discuss ways to protect the infant from household sources of lead.
- Schedule the infant to see the Registered Dietitian.

The Infant with Breastfeeding Complications

Breastfeeding infants identified with breastfeeding complications or a potential complication must be referred to the Breastfeeding Peer Counselor, Lactation Consultant or Health Care Provider.

Breastfeeding complications or potential complications include the following:

- Severe breast engorgement

- Recurrent plugged ducts
- Mastitis (fever or flu-like symptoms with localized breast tenderness)
- Flat or inverted nipples
- Cracked, bleeding or severely sore nipples
- At or older than 40 years of age
- Failure of milk to come in by 4 days postpartum
- Tandem nursing (breastfeeding 2 siblings who are not twins)

The Infant with Specific Medical Conditions

There are only certain medical conditions that can be used as nutrition risks. A medical problem is a nutrition risk if it causes, contributes to, or results from an inability to obtain adequate nutrition for growth and development of the infant or the maintenance of health. To be used, the condition must have been diagnosed by a healthcare provider (as self-reported by the caregiver); or be reported or documented by a health care provider, or someone working under health care provider's orders.

Some of these conditions interfere with eating a large variety of foods such as a wheat allergy (which may prevent eating not only many foods from the grain group, but many other foods containing wheat). Other conditions change the need for nutrients or energy so that they are significantly above or below the normal requirement for the client's age. Examples of these conditions include severe burns, cancer, heart disease, and some kinds of cerebral palsy.

Some medical conditions require special diets, varied timing for when to start solids, nutrition supplements, eating equipment, or medications. For example, special diets are usually prescribed for infants with diabetes and certain metabolic disorders. Clients with cystic fibrosis and heart disease often use nutrition supplements and medications. Clients with severe cerebral palsy or cleft palate may use specially adapted eating utensils.

Education Tips and Follow Up

- Establish a rapport with the caregiver to develop trust.
- Determine if the infant's health care provider requires a special diet for the infant and how you can support the diet if applicable.
- Offer information on the progression of the diet in infancy and educate on general feeding relationship behaviors if appropriate.
- Refer to the Registered Dietitian for high risk counseling within 30 days.

Predisposing Nutrition Risks

Lastly, there are conditions that predispose infants to inadequate nutrition patterns by virtue of caregiver's limited ability to make feeding decisions and/or prepare food, residing in foster care, having a mother on WIC, or a mother who wasn't on WIC but would have qualified, or being the infant of a priority I breastfeeding mother.

Environmental Tobacco Smoke Exposure

Secondhand smoke contains more than 4,000 chemicals, including 50 cancer-causing poisons. Breathing secondhand smoke is harmful to an infant's health. Infants who breathe the poisons found in secondhand smoke are more likely to have asthma attacks, ear infections, allergies, wheezing and coughing spells, bronchitis, and pneumonia. The poisons in secondhand smoke can also lead to childhood asthma, Sudden Infant Death Syndrome (SIDS) and behavior and learning problems in children.

904.01 Exposure to Environmental Tobacco Smoke

Exposure to smoke from tobacco products inside the home.

Education Tips and Follow Up

Complete a thorough nutrition assessment.

- Provide information about the specific risks involved with secondhand smoke.
- Discuss ways the caregiver can protect the child from secondhand smoke (for example, smoke outside; do not smoke in the car, etc.).
- Listen to the caregiver to learn what they would like to work on.
- Offer information on the smoking cessation programs and refer as appropriate.

801.01 Homelessness

An infant who lacks a fixed and regular night time home; or whose primary night time home is a shelter (including a welfare hotel, a congregate shelter, or a shelter for victims of domestic violence) designated to provide temporary living accommodations; an institution that provides temporary housing for individuals intended to be institutionalized; a temporary accommodation of not more than 365 days in the residence of another individual; or a public or private place not designed for, or ordinarily used as, a regular sleeping accommodation for human beings.

802.01 Migrant

An infant who is a member of a family that contains at least one individual whose principal employment is in agriculture on a seasonal basis, who has been employed within the last 24 months, and who establishes, for the purposes of such employment, a temporary abode.

Education Tips and Follow Up

Providing effective and appropriate nutrition education to individuals who have a transient lifestyle requires you understand the client's transient lifestyle. It is important to identify the caregiver's ability to provide regular healthy meals to the infant. Because a client may only be enrolled for a short period of time, ongoing, long-term education goals may not be appropriate. Priority topics to be covered include: (1) how to use the WIC Bridge card, (2) what are WIC-allowable foods, and (3) referral to other services.

Work with the caregiver to select a food package that will fit her ability to store and prepare food. Ready-to-feed formula may be necessary for the homeless infant or the non-breastfed infant of a woman with limited ability to prepare food.

Infant of Primary Caregiver with Limited Ability to Make Feeding Decisions and/or Prepare Food

Infant whose primary caregiver is assessed to have a limited ability to make appropriate feeding decisions and/or prepare food. Examples may include caregivers who are:

703.01 Infant Born of Woman with Mental Retardation or Alcohol or Drug Abuse during Most Recent Pregnancy

- Less than or equal to 17 years of age.
- Mentally disabled/delayed and/or have a mental illness such as clinical depression (diagnosed by a health care provider or licensed psychologist).
- Physically disabled to a degree which restricts or limits food preparation abilities.
- Currently using or having a history of abusing alcohol or other drugs.

Infant of Primary Caregiver with Limited Ability to Make Feeding Decisions and/or Prepare Food

Infant whose primary caregiver is assessed to have a limited ability to make appropriate feeding decisions and/or prepare food. Examples include, but are not limited to, an infant of caregiver with the following:

Documentation or self-report of misuse of alcohol, use of illegal substances, use of marijuana, or misuse of prescription medications.

- Mental illness, including clinical depression diagnosed, documented, or reported by a physician or psychologist or someone working under a physician's orders, or as self-reported by a caregiver.
- Intellectual disability diagnosed documented or reported by a physician or psychologist or someone working under a physician's orders, or as self-reported by a caregiver.
- Physical disability to a degree which impairs ability to feed infants or limits food preparation abilities.

902.01 Infant of Primary Caregiver with Limited Ability to Make Feeding Decisions and/or Prepare Food

Education Tips and Follow-Up

- Cognitive limitation in a parent or primary caregiver has been recognized as a risk factor for failure to thrive, as well as abuse and neglect. The mentally ill caregiver may not exhibit the necessary care giving skills to promote beneficial feeding interactions with the infant.
- Identify nutritional needs of the infant.

- Discuss with the caregiver ways the WIC Program can assist in meeting the client's nutritional needs.
- Provide education, referrals, and coordinate services to help the caregiver develop the necessary skills and locate the resources to assist him/her in caring for the child.

903.01 Foster Care

Entering the foster care system during the previous 6 months or moving from one foster care home to another foster care home during the previous 6 months.

Education Tips and Follow-Up

- Foster children have a high frequency of mental and physical problems that are often the result of abuse and neglect happening before foster care. They are often more likely to have inadequate nutrition.
- Identify nutritional needs.
- Provide a baseline nutrition assessment and provide nutrition education.
- Provide referrals to resources that support the foster parent and client's ability to be healthy.

901.01 Recipient of Abuse

Battering or child abuse/neglect within the past 6 months as self-reported, or as documented by a social worker, health care provider, or on other appropriate documents, or as reported through consultation with a social worker, health care provider, or other appropriate personnel.

Child abuse/neglect is defined as any recent act or failure to act resulting in imminent risk of serious harm, death, serious physical or emotional harm, sexual abuse, or exploitation of an infant or child by a parent or care giver.

Education Tips and Follow-Up

- Serious neglect and abuse have short-and long-term physical, emotional, and functional consequences for children. Nutritional neglect is the most common cause of poor growth in infancy and may account for as much as half of all cases of non-organic failure to thrive.
- Follow the normal nutrition protocols to identify nutritional needs.
- Provide a baseline nutrition assessment and provide nutrition education.
- Report known or suspected child abuse or neglect. (WIC regulations regarding confidentiality do not take precedence over state laws requiring reporting of known or suspected child abuse or neglect.)

Mother Either on WIC or WIC-eligible during Pregnancy

Infants less than 6 months of age whose mother was a WIC client during pregnancy or whose mother's medical records document that the woman was at nutritional risk during pregnancy because of detrimental or abnormal nutritional conditions detectable by biochemical or anthropometric measurements or other documented nutritionally related medical conditions.

701.01 Infant up to 6 Months Old of WIC Mother or of a Woman who would have been Eligible During Pregnancy

Breastfeeding Infant of Woman at Nutritional Risk

A breastfeeding infant of a lactating mother who was enrolled or eligible to be a WIC client any time during pregnancy, or who is currently eligible for WIC with an anthropometric biochemical or clinical/health/medical risk.

Education Tips and Follow-up

- An infant born to a lactating mother who has nutritional risks during pregnancy may not have received optimal nutrition while in the uterus and may be more likely to have nutritional problems after birth.
- Enrolling the infant in WIC means to ensure a healthy diet for the critical first year of life.
- A breastfed infant is dependent on the mother's milk as the primary source of nutrition.
- Inadequate maternal nutrition may result in decreased nutrient content of the milk.
- Special attention should therefore be given to the health and nutritional status of breastfed infants whose moms are at nutritional risk.
- Identify nutritional needs.
- Complete a nutrition assessment and provide nutrition education.
- Provide referrals as needed.

702.01 Breastfed Infant of WIC Eligible or Enrolled Mother 100-300 Risk Series (birth through 11 months)

SELF-CHECK: PRACTICE YOUR KNOWLEDGE

1. Put a check mark next to the nutrition risks for infants.
 - a. Low hematocrit/hemoglobin levels
 - b. Elevated blood lead levels
 - c. Failure to thrive
 - d. Cow's milk allergy
 - e. Jaundice
 - f. Substance Abuse
 - g. Complications of delivery

- h. Gastrointestinal disorders
- i. Infant up to 6 months old of WIC mother
- j. Environmental tobacco smoke exposure
- k. Small for gestational age
- l. Infant of a mom diagnosed with clinical depression
- m. Homelessness
- n. Breastfeeding complications or potential complications

True (T) or False (F)?

- 2. A breastfeeding infant with a poor or weak suck can be referred to a breastfeeding specialist anytime within 30 days of risk identification.
- 3. A 9-month old infant with hemoglobin of 9.7% must be offered an appointment with the Registered Dietitian for high risk counseling within 30 days.

ANSWERS

- 1. All letters except f and g should be checked.
- 2. F; The breastfeeding infant with a poor or weak suck must be referred to a breastfeeding specialist that day.
- 3. T

Training Activity

Once you have completed this module, please take the Infant Nutrition Module post-test.