Recommended Infant Nutrition

- American Academy of Pediatrics (AAP) recommends infants be breastfed exclusively for first 6 months of life
- Breastfeeding should continue for at least 12 months
- If infants are weaned before 12 months, they should receive iron-fortified infant formula
### Benefits of Breastfeeding

- Human milk designed specifically for human infants; nutritionally superior to any alternative
- Breast milk considered living tissue because it contains almost as many live cells as blood
- Bacteriologically safe and always fresh
- Nutrients in breast milk more easily absorbed than those in formula

### Benefits to Mom

- Decreased risk of ovarian, uterine, and breast cancer
- Promotes involution and decreased risk of postpartum hemorrhage
- Tend to lose weight more quickly
- Some protection against osteoporosis
- Unique bonding experience and increases maternal role attainment

### Benefits to Families/Society

- Convenience; no bottles or equipment to purchase, clean, dispose of.
- Portability – travel, fewer supplies
- $$$ saves money – big sell item! Cost of formula far exceeds cost of extra food for the lactating mother…
- WIC – breastfeeding is a cost savings to the country/taxpayers
Contraindications of Breastfeeding

- Maternal cancer therapy or diagnostic and therapeutic radioactive isotopes
- Active tuberculosis not under treatment
- Human immunodeficiency virus (HIV)
- Maternal herpes simplex lesion on a breast
- Galactosemia in infant
- Cytomegalovirus (CMV)
- Maternal substance abuse

Contraindications of Breastfeeding

- Maternal human T-cell leukemia virus type 1
- Mastitis is usually not a contraindication if discomfort is tolerable
- Centers for Disease Control and Prevention currently do not consider maternal hepatitis C to be contraindication for breastfeeding

Choosing an Infant Feeding Method

- Choosing infant feeding method
  - Factual information about nutritional and immunologic needs met by human milk
    - Potential benefits to infant and mother
    - Inherent risks with infant formulas
  - Nurse must provide information to parents in nonjudgmental manner and respect their decision
Choosing an Infant Feeding Method

- Cultural influences on infant feeding
  - Cultural beliefs and practices are significant influences on infant feeding methods
    - Immigrants from poorer countries often choose to formula feed because they believe it a better, "modern" method
    - Others formula feed because they want to adapt to American culture and perceive it the custom to bottle feed

Nutrient Needs

- Energy
- Carbohydrate
- Fat
- Protein
- Fluids
- Vitamins
  - Vitamin D
  - Vitamin K
- Minerals

Energy

- 1st 3 months – 110kcal/kg/day
- Later a little less, 100kcal/kg/day
- Human milk supplies 67kcal/100 ml, or 20 kcal/ounce
- The greatest amount of energy is supplied by the fat content of breast milk
**Carbohydrate**

- Newborns have small glycogen stores.
- CHO provides 40-45% of total calories.
- Newborns have limited ability for gluconeogenesis and ketogenesis so can’t make alternative energy...
- LACTOSE is THE CHO...provides calories in an easily available form. Breaks down and absorbs slowly, increases calcium absorption as well.

**Fat**

- 15% of calories from fat so that infant receive adequate calories.
- The fat must be easily digestible – as in breast milk.
- Essential Fatty Acids in breast milk needed for growth and tissue maintenance. They are a component of cell membranes and precursors to some hormones. Inadequate intake can result in growth failure.

**Protein**

- Protein requirements greater in the newborn that at any other time.
- Protein content of breast milk is ideal for the newborn. More easily digested than casein.
- The metabolic needs of the newborn are best met with the amino acid composition of human milk. If one amino acid is low, the others will increase to meet needs.
Fluid

- Fluid requirement is 100-140ml/kg/day
- Neither breastfed nor formula fed infants need to be fed supplemental water or juice.
- Breast milk is 87% water.
- Infants lose water thru urine and insensible losses (respiration, etc)
- Deficits with illness – GI, CHF, thrush, etc. or poor latch-on

Vitamins/Minerals

- Human milk contains all the vitamins required for infant nutrition.
- Mineral content of cow’s milk formulas is designed to match that of human milk.
- Cow’s milk is too high in minerals for infants to tolerate during the first year, esp. calcium to phosphorus ratio.
- Iron is low in milks… but the iron in human milk is better absorbed because the high lactose and vitamin C levels facilitate iron absorption.

How would you counsel??

- Compare the nutritional content of human milk and cow’s milk-based formula...
- Why would you recommend breastfeeding?
Overview of Lactation

- Breast development
  - Female breast composed of 15 to 20 segments (lobes) embedded in fat and connective tissues, well supplied with blood vessels, lymphatic vessels, and nerves
  - Within each lobe are alveoli, the milk-producing cells, surrounded by myoepithelial cells that contract to send the milk forward into the ductules

Detailed Structural Features of Human Mammary Gland

- Lactiferous duct
- Lactiferous sinus
- Nipple pore
- Ampulla

Overview of Lactation (cont'd)

- Ductules enlarge into lactiferous ducts and sinuses, where milk collects behind nipple
- Each nipple has 15 to 20 pores through which milk is transferred to the suckling infant
- After birth, precipitate decrease in estrogen and progesterone levels triggers release of prolactin from anterior pituitary gland
Overview of Lactation

• Breast development (cont’d)
  ➢ Prolactin levels highest during first 10 days after birth
    • Gradually decline, but remain above baseline levels for duration of lactation
  ➢ Prolactin produced in response to infant suckling and emptying of the breasts
    • Lactating breasts never completely empty
    • Milk constantly produced as infant feeds

• Oxytocin: other hormone essential to lactation
  ➢ As nipple is stimulated by suckling infant, posterior pituitary prompted by hypothalamus produces oxytocin
    • Responsible for milk-ejection reflex (MER), or let-down reflex
  ➢ Nipple-erection reflex is integral to lactation

Maternal Breastfeeding Reflexes
A. Milk production. B. Let-down.
Uniqueness of human milk
- Human milk contains antimicrobial factors
  - Antibodies that provide some protection against broad spectrum of bacterial, viral, and protozoal infections
  - Secretory immunoglobulin A (IgA) is the major antibody in human milk

Colostrum, a clear yellowish fluid
- More concentrated than mature milk
- Extremely rich in immunoglobulins
- Higher concentration of protein and minerals
- Less fat than mature milk

Composition changes during each feeding
- Fat content of breast milk increases
- Initially, foremilk is released that:
  - Is part skim milk: about 60% of volume
  - Is part whole milk: about 35% of volume
  - Provides primarily lactose, protein, and water-soluble vitamins
Overview of Lactation

● Uniqueness of human milk (cont’d)
  ➢ Composition changes during each feeding
    • Hindmilk, or cream (about 5%), usually let down 10 to 20 minutes into feeding
      ➢ Contains denser calories from fat for ensuring optimal growth and contentment
    • Changing composition of human milk during each feeding requires breastfeeding long enough to supply balanced feeding

Breastfeeding: Mother and Infant

● Assessment
  ➢ Infant
  ➢ Mother

Feeding Cues….

● The newborn should breastfeed 8 to 12 times within 24 hours.
● Tune in to cues… nuzzling and open mouth movements
● Tense appearance
● Grunting or other sounds
● Kicking and waving of arms
● Hand-to-mouth activity
● Crying
Breastfeeding: Mother and Infant

- Plan of care and implementation
  - Positioning
  - Latch-on
  - Milk ejection or let-down
  - Frequency of feedings
  - Duration of feedings
  - Supplements, bottles, and pacifiers

Correct Attachment (Latch-on) of Infant at Breast

Milk Ejection

- Newborn sucking stimulates the milk ejection, or let-down, reflex.
- Oxytocin causes milk to be sent forward from the milk ducts to the nipple.
- Mother may feel a tingling or crampy feeling in their breast, even the opposite one as well.
Chapter 26: Newborn Nutrition and Feeding

Frequency/Duration of Feedings

- Newborns require 8-12 feedings in a 24 hour period.
- In first 24-48 hours, most do not awaken this often to feed.
- Average duration of a feeding is 30 min. Best to teach moms how to know when an infant has finished – suck/swallow slowed, breast is softened, newborn is content and may fall asleep or release the nipple.

What if...

- Infant is sucking adequately, feeding well, having wet diapers, but not gaining weight?
- If infant receives more foremilk than hindmilk what can happen?

Mom asks...

- If it doesn’t seem like my baby is getting enough milk, can I give him a bottle??
- What a pacifier? There are such cute little pacifiers and ribbons!
Breastfeeding: Mother and Infant

- Plan of care and implementation (cont'd)
  - Special considerations
    - Sleepy baby
    - Fussy baby
    - Slow weight gain
    - Jaundice
    - Preterm infants
    - Breastfeeding twins

- Expressing and storing breast milk
  - Hand expressing
  - Pumping
  - Types of pumps
  - Storage of breast milk

- Being away from baby
- Weaning

A. Hospital-grade electric breast pump
B. Manual breast pumps
Breastfeeding: Mother and Infant

- Plan of care and implementation (cont’d)
  - Milk banking
  - Care of mother
    - Diet
    - Weight loss
    - Exercise
    - Rest
    - Breast care

Breastfeeding: Mother and Infant

- Plan of care and implementation (cont’d)
  - Care of mother (cont’d)
    - Effect of menstruation
    - Sexual sensations
    - Breastfeeding and contraception
    - Breastfeeding during pregnancy
    - The mother with diabetes
    - Medications and breastfeeding

Common Problems

- Plan of care and implementation
  - Care of mother (cont’d)
    - Environmental contaminants
    - Engorgement
    - Sore nipples
    - Monilial infections
    - Plugged milk ducts
    - Mastitis
    - Hepatitis C
Formula-Feeding

- Rationale for formula-feeding
  - Personal preference
  - Influence of other significant family members
  - Lack of familiarity with breastfeeding
  - Contraindications present
  - Infant formula may supplement breastfeeding if mother’s milk supply is inadequate

Formula-Feeding

- Parent education
  - Readiness for feeding
  - Feeding patterns
  - Feeding techniques
  - Bottles and nipples

Formula-Feeding

- Parent education (cont’d)
  - Infant formulas
    - Commercial formulas
      - Cow’s milk-based formulas
      - Soy-based formulas
      - Casein- or whey-hydrolysate formulas
      - Amino acid formulas
**Formula-Feeding**

- Parent education (cont’d)
  - Formula preparation
  - Vitamin and mineral supplementation
  - Weaning

**Key Points**

- Human milk is the recommended form of nutrition for infants
  - Provides immunologic protection against many infections and diseases
- Breast milk changes in composition:
  - With each stage of lactation
  - During each feeding
  - As the infant grows

**Key Points**

- During prenatal period, parents should be informed of benefits of breastfeeding for infants, mothers, families, and society
- Infants should be breastfed as soon as possible after birth and at least 8 to 12 times per day thereafter
- Objective, measurable indicators that infant is breastfeeding effectively
Key Points

- Breast milk production is based on a “supply-meets-demand” principle
  - The more the infant nurses, the greater the milk supply
- Commercial infant formulas provide satisfactory nutrition for most infants
- All infants should be held for feedings

Key Points

- Parents should be instructed about types of commercial infant formulas, proper preparation for feeding, and correct feeding technique
- Unmodified (whole) cow’s milk is not appropriate for feeding during first year of life