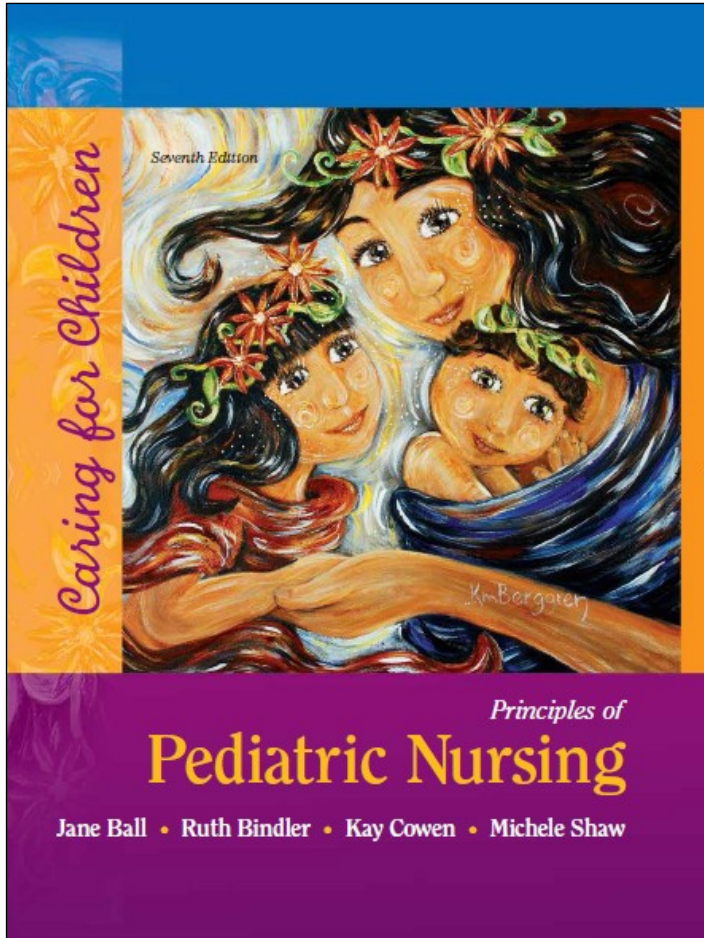


# Principles of Pediatric Nursing: Caring for Children

Seventh Edition



## Chapter 14

Infant, Child, and Adolescent  
Nutrition

Revised by  
Laurine Gajkowski, ND, RN, CPN  
August 31, 2021

# Learning Objectives

- 1. Discuss major nutritional **concepts**
- 2. Describe and plan nursing interventions to meet nutritional needs for all **age groups**
- 3. Integrate methods of nutritional **assessment** into nursing care
- 4. Identify and explain common **nutritional problems**
- 5. Develop **nursing interventions** for children with nutritional disorders.

# Learning Objective 14.1

Discuss major nutritional concepts pertaining to the growth and development of children.

# Updates from DGA 2020-2025

*Dietary Guidelines for Americans 9<sup>th</sup> edition*

By USDA, Department of Health & Human Services

DietaryGuidelines.gov

- The aim of the *Dietary Guidelines* is to promote health and prevent disease.
- **The 2020-2025 Dietary Guidelines carries forward this emphasis on the importance of a healthy dietary pattern as a whole— rather than on individual nutrients or foods in isolation.** Healthy dietary patterns support optimal growth and development.
- **The Science Underlying the Dietary Guidelines Demonstrates That Healthy Eating Across the Lifespan Can Promote Health and Reduce Risk of Chronic Disease**

# Nutrition

- Definition : Intake of food/nutrients and assimilation for metabolic use
- Types of nutrients
  - Macronutrients: Major building blocks for body
  - Micronutrients: Trace quantities required

# Macronutrients

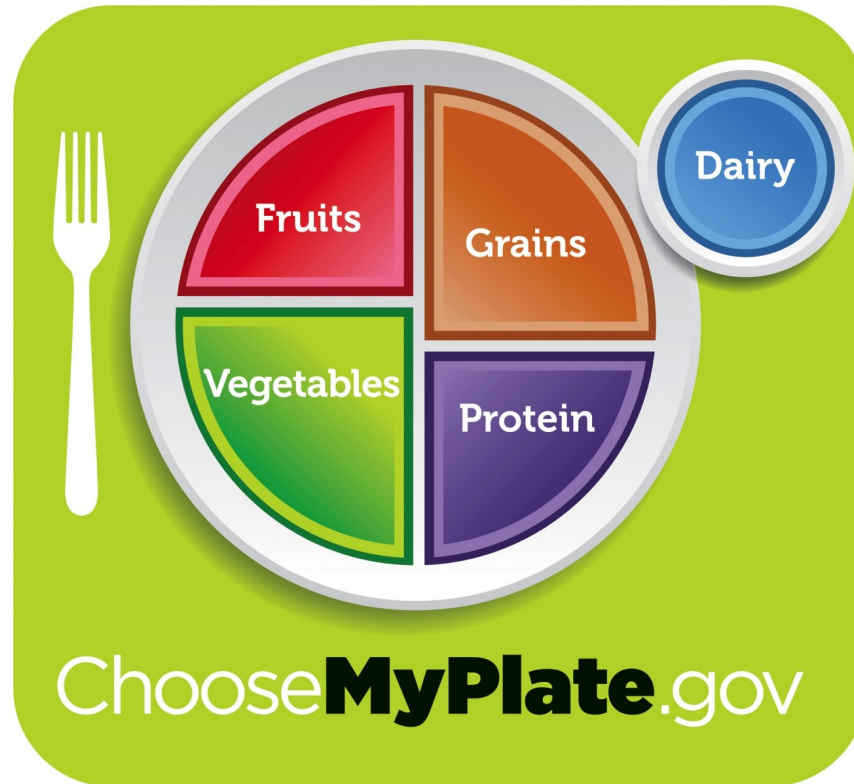
- Types
  - **Carbohydrates:** energy source
  - **Proteins:** role in immunity and signaling, building block for muscles/organs
  - **Fats:** energy source, blood clotting & cellular processing, \*brain development (myelin sheath, visual acuity, motor/cognitive function)

# Micronutrients

- Fat-soluble vitamins
  - ADEK
  - Toxicity can occur
- Water-soluble vitamins

Nutrient	Function	Sources
Vitamin A (and its precursor*, beta-carotene) *A precursor is converted by the body to the vitamin.	Needed for vision, healthy skin and mucous membranes, bone and tooth growth, immune system health	<b>Fat-soluble vitamins</b> Vitamin A from animal sources (retinol): fortified milk, cheese, cream, butter, fortified margarine, eggs, liver Beta-carotene (from plant sources): Leafy, dark green vegetables; dark orange fruits (apricots, cantaloupe) and vegetables (carrots, winter squash, sweet potatoes, pumpkin)
Vitamin D	Needed for proper absorption of <u>calcium</u> ; stored in bones	Egg yolks, liver, fatty fish, fortified milk, fortified margarine. When exposed to sunlight, the skin can make vitamin D.
Vitamin E	Antioxidant; protects cell walls	Polyunsaturated plant oils (soybean, corn, cottonseed, safflower); leafy green vegetables; wheat germ; whole-grain products; liver; egg yolks; nuts and seeds
Vitamin K	Needed for proper blood clotting	Leafy green vegetables such as kale, collard greens, and spinach; green vegetables such as broccoli, brussels sprouts, and asparagus; also produced in <u>intestinal</u> tract by bacteria

# Figure 14-1 The U.S. MyPlate Food Guide Is Used to Provide Teaching About Amounts of Foods Recommended for Daily Intake



**Source:** From U.S. Department of Agriculture and U.S. Department of Health and Human Services. (2011). Retrieved from <http://www.choosemyplate.gov/>



Make half your plate  
fruits & vegetables.

Move to low-fat or  
fat-free dairy milk or  
yogurt (or lactose-  
free dairy or fortified  
soy versions).

Focus  
on whole  
fruits.



Make half  
your grains  
whole grains.

Vary your  
veggies.



Vary your  
protein  
routine.



Choose foods and beverages with less  
added sugars, saturated fat, and sodium.

by eating add up over time, bite by bite.  
er. **Start Simple with MyPlate.**



Dietary  
Guidelines  
for Americans

**Start simple**  
with **MyPlate**

# Learning Objective 14.2

Describe and plan nursing interventions to meet nutritional needs for all age groups from infancy through adolescence

# <https://www.dietaryguidelines.gov/>



## **Follow a healthy dietary pattern at every life stage.**

At every life stage—infancy, toddlerhood, childhood, adolescence, adulthood, pregnancy, lactation, and older adulthood—it is never too early or too late to eat healthfully.

- **For about the first 6 months of life**, exclusively feed infants human milk. Continue to feed infants human milk through at least the first year of life, and longer if desired. Feed infants iron-fortified infant formula during the first year of life when human milk is unavailable. Provide infants with supplemental vitamin D beginning soon after birth.
- **At about 6 months**, introduce infants to nutrient-dense complementary foods. Introduce infants to potentially allergenic foods along with other complementary foods. Encourage infants and toddlers to consume a variety of foods from all food groups. Include foods rich in iron and zinc, particularly for infants fed human milk.
- **From 12 months through older adulthood**, follow a healthy dietary pattern across the lifespan to meet nutrient needs, help achieve a healthy body weight, and reduce the risk of chronic disease.

# Nursing Strategies to Support Nutritional Needs

1. Preterm and small-for-gestational-age (SGA) infants
2. Infancy
  - a. 0 – 6 months
  - b. 6 – 12 months (1<sup>st</sup> birthday)
3. Toddlers
4. Preschoolers
5. School-age children
6. Adolescents



# 1. Preterm and Small-for-Gestational-Age (SGA) Infants

- Immature body systems and medical problems
- High calorie/kg needs
- Eating disorders more common

## 2 a. Infants Age Newborn to 6 Months

- High metabolic rate and growth
  - At 1 month, need 100-115 kcal/kg/day
- Receive about 50% of calories from fat
- Double birth weight by 5 – 6 months

## 2a. Breastfeeding

### Infants Age 0 to 6 Months

- Exclusive feeding for 6 months
- Continue through at least 12 months
- Advantages
  - Excellent nutritional balance
  - Promotion of gastrointestinal function fosters immune defense
  - Psychologic and economic advantages

## 2a. Formula Feeding

### Infants 0 to 6 Months

- Types of formulas
  - Milk or soy based
  - All contain Fe<sup>+</sup>
- Specialized formulas for variety of specific needs
  - High calorie
  - Metabolic disorders found through newborn screening  
Phenylketonuria (PKU)
  - Hydrolyzed protein
  - Allergies
  - Renal failure



## 2a. Formula Feeding

### 0 to 6 Months

- Nursing strategies
  - Education
    - Risk for overfeeding
  - Formula preparation and use
  - Parent–infant relationship
  - Prevention of early childhood caries



## Proper Handling and Storage of Human Milk and Infant Formula

- Wash hands thoroughly before expressing human milk or preparing to feed human milk or infant formula.
- If expressing human milk, ensure pump parts are thoroughly cleaned before use.
- If preparing powdered infant formula, use a safe water source and follow instructions on the label.
- Refrigerate freshly expressed human milk within 4 hours for up to 4 days. Previously frozen and thawed human milk should be used within 24 hours. Thawed human milk should never be refrozen. Refrigerate prepared infant formula for up to 24 hours.
- Do not use a microwave to warm human milk or infant formula. Warm safely by placing the sealed container of human milk or infant formula in a bowl of warm water or under warm, running tap water.
- Once it has been offered to the infant, use or discard leftovers quickly (within 2 hours for human milk or 1 hour for infant formula).
- Thoroughly wash all infant feeding items, such as bottles and nipples. Consider sanitizing feeding items for infants younger than 3 months of age, infants born prematurely, or infants with a compromised immune system.

More information on storing and handling human milk is available at [cdc.gov/breastfeeding/recommendations/handling\\_breastmilk.htm](https://www.cdc.gov/breastfeeding/recommendations/handling_breastmilk.htm). More information on storing and preparing powdered infant formula is available at [cdc.gov/nutrition/downloads/prepare-store-powered-infant-formula-508.pdf](https://www.cdc.gov/nutrition/downloads/prepare-store-powered-infant-formula-508.pdf).

## 2 b. Infants Ages 6 to 12 Months

- Readiness for complementary foods
  - Extrusion reflex is fading
  - Sitting skills
- Gradual introduction of additional solids

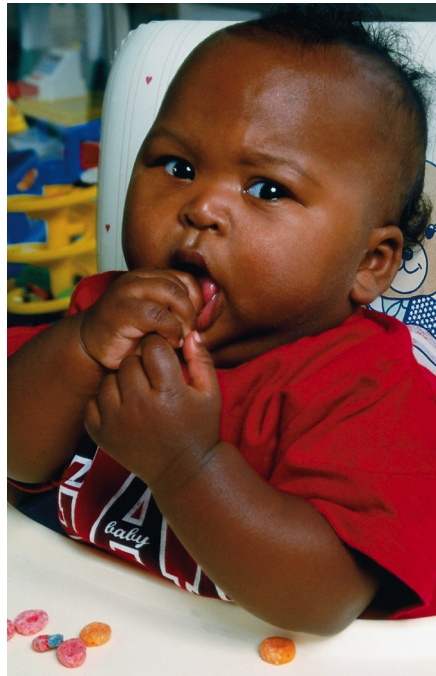
- **At about 6 months**, introduce infants to nutrient-dense complementary foods.
- Introduce infants to potentially allergenic foods along with other complementary foods.
- Encourage infants and toddlers to consume a variety of foods from all food groups. Include foods rich in iron and zinc, particularly for infants fed human milk.
- Avoid foods and beverages with added sugars.
- Limit foods and beverages higher in sodium.
- As infants wean from human milk or infant formula, transition to a healthy dietary pattern.

## 2 b. Infants Ages 6 to 12 Months

- Discuss
  - Commercial vs. homemade foods
  - Timing and approach
  - Do NOT put thinned solids into a bottle with enlarged nipple (unless prescribed for GI reflux or swallowing pathology)
  - Precautions and contraindicated foods
    - choking hazard
    - Honey

## Figure 14-3 Introducing Finger Foods

The baby who has developed the ability to grasp with thumb and forefinger should receive some foods that can be held in the hand.



Palmer grasp

## 2b. Infants Ages 6 to 12 Months

- Weaning
  - Giving up breastfeeding or bottle
  - Introduction of drinking cup about 8 or 9 months
    - Breastmilk or formula
  - Gradual process
    - Should be off bottle by 12 months, never at 18 months
  - Family and infant preferences, cultural patterns



## 2 b. Infants Ages 6 to 12 Months

- Dental care
  - Early childhood caries (ECC)
  - Prevention strategies
  - Factors in ECC
    - Bottle use
    - Prolonged nursing
    - Juice
    - Lack of Tooth care



## Figure 14-2 Early Childhood Caries

This child has had major tooth decay related to sleeping as an infant and toddler while sucking bottles of juice and milk.



**Source:** Everst/Alamy.



### 3. Toddlers

- High metabolic demands of infancy slow down.
  - “Physiologic anorexia”
    - Appears toddler does not eat enough
  - Nutritional needs
    - One tablespoon of each food per year of age
  - Intake patterns
    - Healthy meals and snacks
    - Self-feeding preference
    - Let toddler make choices

### 3. Toddlers

Liquids offered in a cup

Limit fruit juice to 4 oz/day

Give whole milk until age 2 years

- Then switch to 2% milk

Milk intake decreases

- Limit intake of milk to

**16 to 24 ounces milk/day**



# Figure 14-4 Fostering Healthy Eating Habits

Toddlers should sit at a table or in a highchair to eat to minimize the chance of choking and to foster positive eating patterns.



## 4. Preschoolers

- Diet like that of toddlers
- Socialization at mealtime
- Enjoy helping with food preparation
- Food jags common
  - Eating only a few foods for several days or weeks
- Three meals and two snacks per day
- Encourage good dental care.

# Figure 14-5 Preschoolers Learn Food Habits by Eating with Others



## 5. School-Age Children

- Nutritional needs increase secondary to growth spurts.
  - Girls by 10 or 11 years
  - Boys about a year later
- May be resistant to new food items
- Encourage appropriate food choices.
- School involvement in nutrition



## 5. School-Age Children

- Dental care
  - Tooth hygiene (flossing and brushing)
  - Fluoride intake
  - Loss of deciduous teeth
  - Eruption of permanent teeth

## 6. Adolescents

- Growth rate
- Calorie needs
  - Some males may need nearly 3000 cal/day.
  - Females 2000 cal/day
- Mineral and vitamin needs
- Provide food choices acceptable to teens.



# Learning Objective 14.3

Integrate methods of nutritional assessment into nursing care of infants, children, and adolescents.

# Analysis of Growth Measures

- Measurement of weight, length, head circumference, body mass index (BMI)
- Use of gender- and age-specific growth charts
- Analysis of growth plots, proportionality, and patterns

# Physical Assessment and Laboratory Findings

- Body systems affected by nutrition
- Hematocrit (Hct), hemoglobin (Hgb)
- Serum glucose
- Lipid profile

# Table 14–3 Clinical Manifestations of Dietary Deficiencies/Excesses (1 of 2)

Nutrient	Deficiency Manifestation	Excess Manifestation
Vitamin A	Night blindness Skin dryness and scaling	Headache Drowsiness Hepatomegaly Vomiting and diarrhea
Vitamin C	Abnormal hair (coiled shape) Skin abnormalities (dermatitis and lesions) Purpura Bleeding gums Joint tenderness Sudden heart failure	Usually none—excess is excreted in urine
Vitamin D	Rib deformity Bowed legs Bone and joint pain Muscle weakness Periodontal disease Increased rates of respiratory and skin infections/irritation	Drowsiness

# Table 14–3 Clinical Manifestations of Dietary Deficiencies/Excesses (2 of 2)

Nutrient	Deficiency Manifestation	Excess Manifestation
B vitamins	Weakness Decreased deep tendon reflexes Dermatitis	Usually none—excess is excreted in urine
Protein	Hepatomegaly Edema Scant, depigmented hair	Kidney failure
Carbohydrate	Emaciation Decreased energy Retarded growth and development	Overweight
Iron	Lethargy Slowed growth and developmental progression Pallor	Vomiting, diarrhea, abdominal pain Pallor Cyanosis Drowsiness Shock

# Learning Objective 14.4

Identify and explain common nutritional problems of children.

Food Insecurity, Obesity, Foodborne Illness, Contamination, Nutritional Deficiencies, Celiac,

# Food Security and Insecurity

- Food security
  - Access at all times to enough nourishment for a healthy, active life
- Food insecurity
  - Inability to acquire or consume adequate quality or quantity of foods in socially acceptable ways
  - Childhood hunger

# Overweight and Obesity

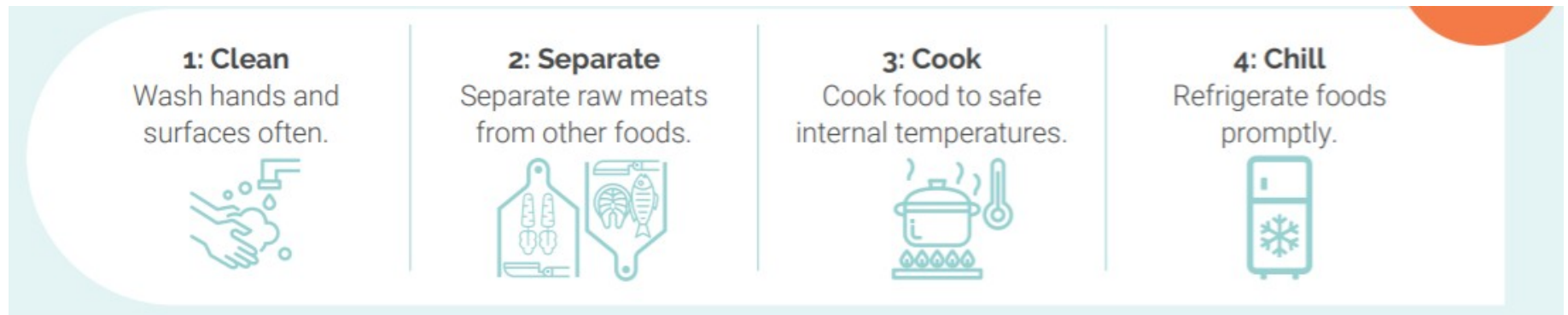
<https://www.cdc.gov/healthyweight/children/>

- A historic and alarming percentage of children are obese and overweight
- Definitions
  - Obese is BMI > 95<sup>th</sup> percentile
  - Overweight is BMI of 85<sup>th</sup> to 94<sup>th</sup> percentile
- Influencing factors
  - Decreased exercise patterns
  - Television and other screen-based activities
  - Percentage of calories as fat
  - Snacking and fast food



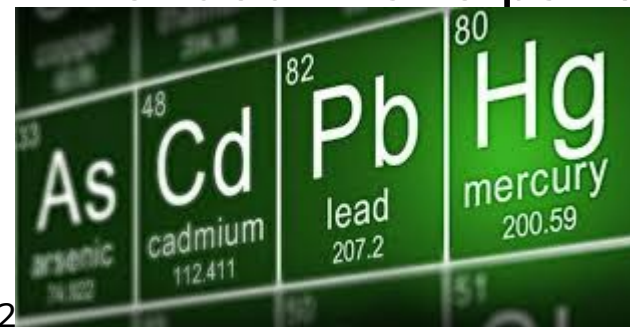
# Food Safety

- Foodborne illnesses range from mild to severe.
- Children are at risk due to immature gastrointestinal (GI) and immune systems.
- Children who are immunocompromised are at even greater risk.



# Heavy Metals Contamination (Mercury, Arsenic, Lead, Cadmium)

- At-risk populations
  - Pregnant women (fetuses)
  - Infants and young children
- Strategies to minimize risks
- <https://oversight.house.gov/sites/democrats.oversight.house.gov/files/2021-02-04%20ECP%20Baby%20Food%20Staff%20Report.pdf>
  - Eliminate high-risk fish from diet
  - Food and Drug (FDA)–recommended intake patterns



# Nutritional Deficiencies

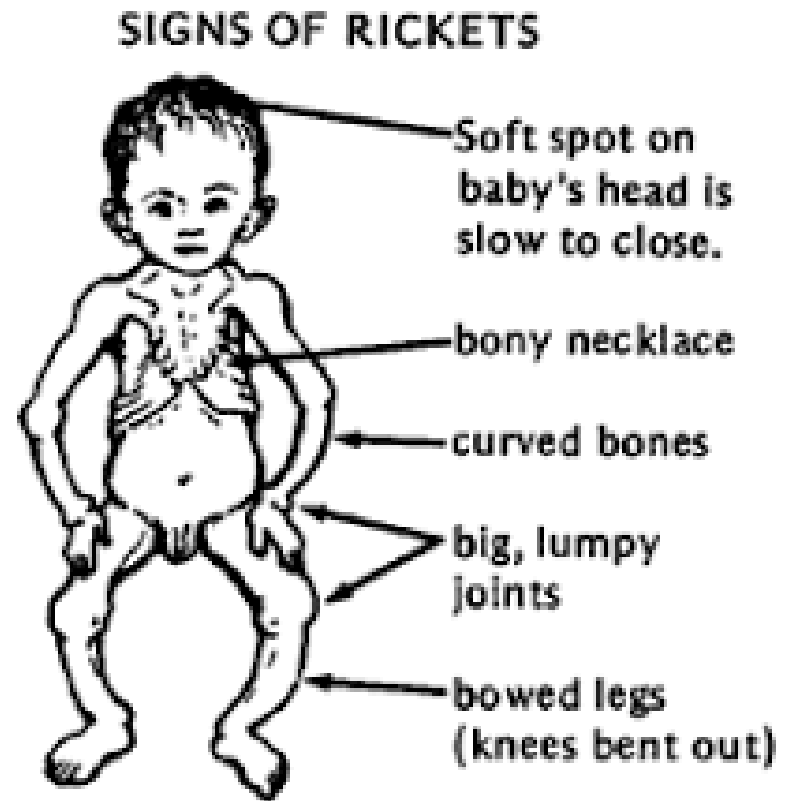
- 1. Iron
- 2. Vitamin D
- 3. Folic acid
- 4. Protein-energy malnutrition

# Iron Deficiency

- Iron sources
  - Rice cereal
  - Iron-fortified foods
  - Meats
- Risk groups
  - Infants
  - Adolescents
- Inadequate iron consumption can result in iron deficiency anemia.

# Vitamin D Deficiency

- Risks
  - Breastfeeding
- Decreased sunlight exposure
- Health risks
  - Calcium deficiency
  - Rickets
- Supplementation recommendation
  - Vitamin D 400 International Units from birth to 6 months

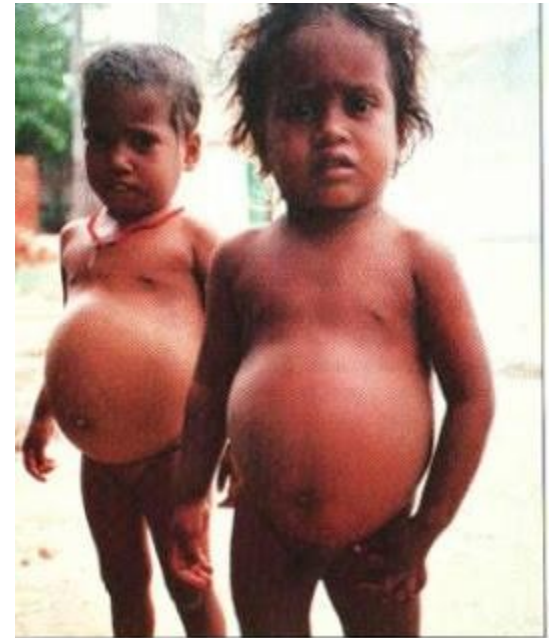


# Folic Acid Deficiency

- Folic acid intake prevents neural tube defects and cleft palate/lip defects.
- At-risk populations
  - Childbearing women
  - Adolescents
- Supplementation
  - 0.4 mg daily
  - Fortified cereals and bread

# Protein-Energy Malnutrition

- Both a protein and calorie deficiency
- Protein deficiency
  - Kwashiorkor
  - Associated findings
    - Edema
    - Round face
    - Large abdomen



# Learning Objective 14.5

Develop nursing interventions for children with nutritional disorders.



# Conditions of Imbalanced Nutritional Intake

- Avoidant/restrictive food intake
  - Failure to thrive (FTT) or feeding disorder
  - Document intake and growth pattern, provide teaching

# Conditions of Imbalanced Nutritional Intake (2 of 3)

- Anorexia nervosa
  - Preoccupation with weight, weight loss, and exercise
  - Often involves psychologic aspect, need for control
  - Extreme thinness, emaciation
  - Resulting imbalances may lead to arrhythmias, death
  - Psychologic treatment, nutrition, medication

# Conditions of Imbalanced Nutritional Intake (3 of 3)

- Bulimia nervosa
  - Binge eating and purging
  - “Silent” disorder, easily concealed
  - Eroded tooth enamel
  - Gum recession and caries
  - Calluses on back of hand
  - Abdominal distention
  - Provide cognitive-behavior therapy along with physiologic care.

# Address Nutritional Needs for Children With Health Conditions

- Increased nutritional needs
- Assess factors affecting meeting of nutritional needs.
- Examples of specific conditions

# Conditions That Influence Nutritional Needs

Cerebral palsy or other brain damage can influence the child's ability to chew and swallow food.

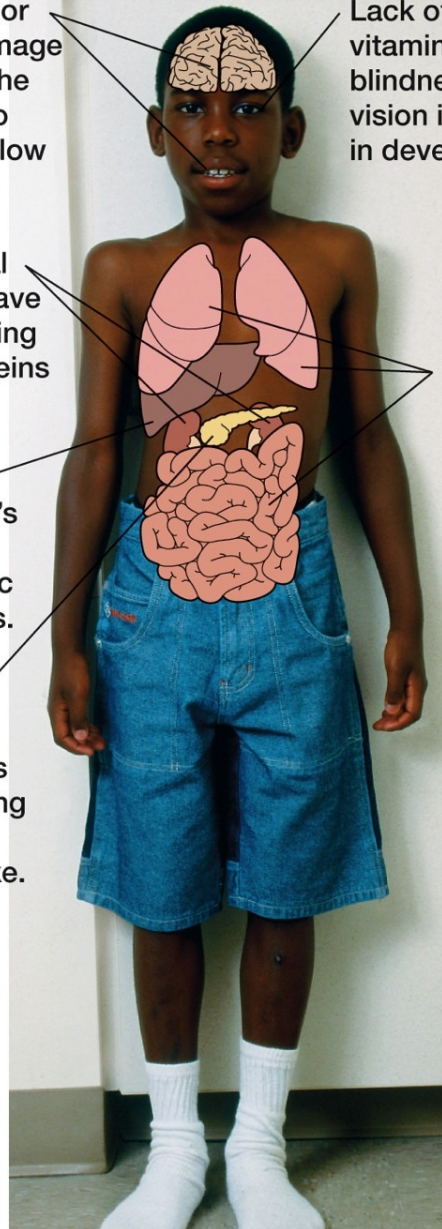
Lack of sufficient vitamin A intake causes blindness or impaired vision in many children in developing countries.

Child with renal disease may have trouble regulating fluids and proteins in the body.

Cystic fibrosis influences the child's ability to absorb nutrients.

Liver disease alters the child's ability to break down metabolic waste products.

Child with diabetes needs close monitoring and regulation of dietary intake.

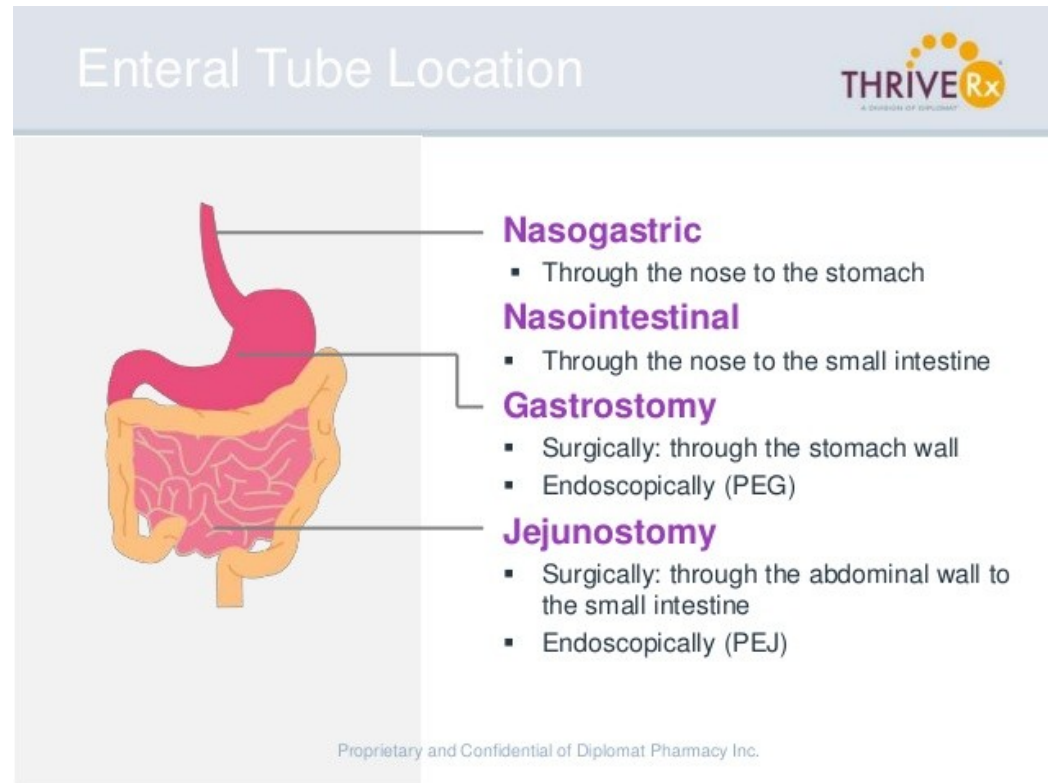


# Celiac Disease

- Gluten sensitivity of chronic malabsorption
- Immunologic disorder
  - Intolerance to gluten (in wheat, barley, rye, oats)
- Affects intestinal absorption of fat, protein, carbohydrates, calcium, iron, folate, vitamin A, D, E, K,
- Usually presents 6 months to 2 years
- Dietary exclusion allows return to normal growth.

# Enteral Therapy

- Uses
- Types
  - Nasogastric
  - Gastrostomy
  - Jejunostomy
- Nursing responsibilities
  - Assessment
  - Monitoring and maintenance of tube and insertion site
  - Administration of feedings



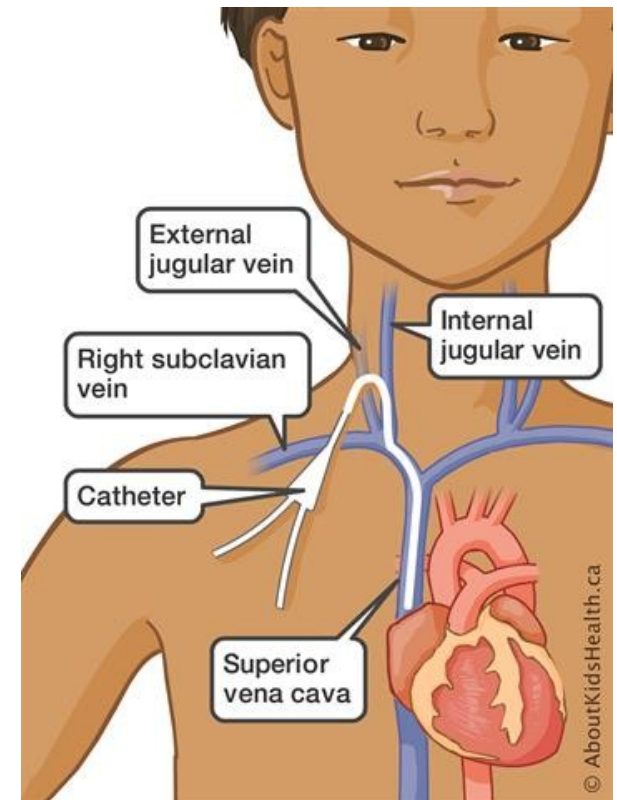
**Figure 14-11 Enteral Therapy. This Child Has Returned to School Following Surgery. He Has Difficulty Chewing and Swallowing Food Due to Cerebral Palsy. The School Nurse Has Taught His Teacher How to Safely Administer Some Enteral Feedings During School Hours**





# Total Parenteral Nutrition

- Uses (examples: congenital GI malformation, support after bone marrow transplant)
- Solution components
- Lipid emulsions
- Nursing responsibilities
  - Assessment
  - Administration
  - Prevention of complications



# Copyright



**This work is protected by United States copyright laws and is provided solely for the use of instructors in teaching their courses and assessing student learning. Dissemination or sale of any part of this work (including on the World Wide Web) will destroy the integrity of the work and is not permitted. The work and materials from it should never be made available to students except by instructors using the accompanying text in their classes. All recipients of this work are expected to abide by these restrictions and to honor the intended pedagogical purposes and the needs of other instructors who rely on these materials.**