

# **Nutrition for Children with Special Health Care Needs**

## **Module 4: Fluid and Bowel Problems**

## Pre Test

This Pre Test contains 8 multiple-choice questions. It is intended to provide you with some information about material that might require particular attention.

### QUESTION 1

What is a reasonable fluid intake for a healthy 22 kg, 7-year old?

- a. 500-800 mL/day
- b. 1200-1500 mL/day
- c. 1700-2000 mL/day
- d. 2100-2400 mL/day

### QUESTION 2

In general, chronic diarrhea is:

- a. greater than 1 week in duration
- b. greater than 3 weeks in duration
- c. caused by a chronic condition
- d. secondarily associated with a chronic medical condition

### QUESTION 3

Which of the following symptoms does NOT require medical attention?

- a. preference for only 1 or 2 types of liquids.
- b. visible blood in stool
- c. diarrhea every 1 or 2 hours
- d. concentrated urine is reported

### QUESTION 4

The correct response to the previous question:

Which of the following symptoms does NOT require medical attention? was a preference for only 1 or 2 types of liquids.

When would the preference for only 1 or 2 types of liquids be a medical problem?

- a. when the type of liquid accepted does not include milk (or another significant source of calcium)
- b. when the child's food pattern is also low in fiber
- c. when only small amounts of these liquids are consumed.
- d. when intake of these fluids exceeds intake of foods



### QUESTION 5

Children with special health care needs may be at risk for diarrhea because of:

- a. medication-nutrient interactions
- b. increased fluid losses (e.g., because of excessive drooling)
- c. communication problems
- d. impaired mobility

### QUESTION 6

Children with impaired muscle tone may have problems with constipation because:

- a. problems with oral-motor skills and/or positioning may impair a child's ability to consume adequate amounts of fluid or fiber
- b. problems with hypertonia can increase energy needs
- c. gut muscles can be affected, impairing peristalsis
- d. A and C
- e. all of the above

### QUESTION 7

Nutrition management of constipation typically includes:

- a. decreased fiber intake, decreased fluid intake
- b. decreased fiber intake, increased fluid intake
- c. increased fiber intake, increased fluid intake
- d. increased fiber intake, decreased fluid intake

### QUESTION 8

Along with adequate rehydration, the best nutrition intervention for diarrhea is:

- a. the BRAT diet
- b. a full liquid diet
- c. gut rest
- d. the child's regular food pattern

## Introduction

After completing this module, you will have the skills and resources to:

- Understand normal bowel function and fluid status
- Elicit information about a child's fluid and bowel status
- Describe the potential effects of specific conditions, medications, and food patterns on fluid status and bowel function
- Identify intervention strategies for problems with fluid status and bowel function

Fluid and bowel problems are common among many children with special health care needs. The prevention of some problems, such as dehydration, is critical to a child's health. Other problems, such as constipation, may not have immediate health risks, but can compromise a child's nutritional status (for example, constipation often leads to a decreased intake of food).

Section 1, Fluid Status and Bowel Function, reviews normal fluid status and bowel function and discusses some contributors to fluid- and bowel-related problems. Section 2, Assessing Fluid and Bowel Status, describes assessment tools that are useful for identifying problems and potential problems. In Section 3, Influence of Special Health Care Needs, the effects that special health care needs can have on fluid and bowel status are examined.

Finally, in Section 4, Intervention Strategies, some intervention strategies for fluid and bowel problems are described, and you will develop intervention plans for some case examples.



## Section 1: Fluid Status and Bowel Function

### Fluid

#### Severe fluid imbalances

Severe imbalances in fluid status have serious health implications. Both dehydration and water intoxication can lead to lethargy, electrolyte imbalances, seizures and death.

Problems that can lead to severe fluid imbalances include:

- improper formula mixing (too much or too little water added to powder or formula concentrate)
- increased fluid needs (for example, because of fever, hot weather, or increased fluid excretion because of vomiting or diarrhea)
- inadequate fluid intake (for example, because of swallowing difficulties or decreased intake because of illness)

Severe fluid imbalances require immediate medical attention and will not be covered in this module.

#### Fluid status and bowel function

Fluid status and bowel function are very closely linked.

An individual's fluid status has a direct effect on bowel function...

Problems with constipation can result from an inadequate fluid intake, either because of problems consuming enough fluid, or because of increased fluid losses, such as with drooling. (There are other contributors to constipation, and these will be reviewed later in this section.)

...and an individual's bowel function can have a direct effect on fluid status.

For example, diarrhea increases a child's fluid needs.

#### Typical fluid needs

There are several methods used to estimate a child's fluid needs. Whichever method is used, it is critical to consider factors that might increase an individual's needs.

(Some factors common among children with specific conditions are listed in [Section 3, Influence of Special Health Care Needs.](#))

#### Healthy Infants

- 1.5 mL/kcal/day for healthy infants  
or
- 80 to 120 mL/kg/day (for infants up to 10 kg)

\* For premature infants, consult with specialty providers, especially for conditions such as bronchopulmonary dysplasia (BPD) or cardiac conditions, in which fluid needs may be increased or decreased.

#### Healthy Children

- 80 to 120 mL/kg/day (for children up to 10 kg)  
1000 mL/day + 50 mL/kg above 10 kg (for children 10-20 kg)  
1500 mL/day + 20 mL/kg above 20 kg (for children over 20 kg)  
or
- 50 to 60 mL/kg/day

## Bowel Function

### Normal bowel function

What is “normal”? “Normal” is probably different for every individual. When assessing a child’s bowel function, it can be helpful to compare the child’s pattern to a “normal” pattern. It is important, however, to recognize that patterns that do not fit the “normal” pattern may not indicate a problem. It can be helpful to ask parents if they have noticed any changes in their child’s stooling pattern. (This will be covered in more detail in Section 2, Assessing Fluid and Bowel Status.)

Sometimes, significant changes in formula and/or food patterns can affect the consistency and color of a child's stool.

### Typical Stool Frequency

Age	Mean number of bowel movements per day
0 to 3 months	
breastfed infants	2.9 per day
formula-fed infants	2 per day
6 to 12 months	1.8 per day
1 to 3 years	1.4 per day
older than 3 years	1.0 per day

## Constipation

Constipation is the accumulation of stool in the lower part of the bowel. Constipation can be marked by infrequent bowel movements or frequent, but incomplete bowel movements.

Complications of constipation can include discomfort and decreased appetite and intake, which can make the problem worse. Chronic constipation can lead to long-term problems such as obstipation, impaction, and megacolon.

Both nutrition-related and non-nutrition related issues can contribute to problems with constipation.

### Nutrition-related issues that can contribute to constipation

- Inadequate fluid intake (e.g., because of oral-motor problems or positioning difficulties; or because of excessive fluid losses)
- Inadequate fiber intake (e.g., because of oral-motor problems or positioning difficulties; or because dietary choices are low in fiber)
- Milk or other food allergy

### Non-nutrition-related issues that can contribute to constipation

- Decreased activity (e.g., related to problems with hyper- or hypotonia)
- Impaired intestinal tract function (e.g., related to problems with hypotonia or abnormal anatomy, such as anal stenosis or neurogenic bowel)
- Major changes in routine (e.g., starting school or vacation, toilet training)
- Medications (e.g., related to a medical condition or inappropriate use of laxatives)
- Encopresis
- Inability to communicate need (e.g., because of communication problems)
- Other medical disorders (e.g., Hirschprung's disease)

Issues that are common among children with specific conditions will be discussed in more detail in Section 3, Influence of Special Health Care Needs.

## Diarrhea

Diarrhea, an increase in the passage of loose, watery stools, can be chronic or acute.

- Acute diarrhea is generally less than 2 to 3 weeks in duration.
- Chronic diarrhea is usually defined as lasting longer than 3 weeks, or multiple episodes with only a few weeks or months between.

Dehydration is the primary complication associated with diarrhea. Chronic diarrhea can also lead to compromised nutritional status.

### Nutrition-related issues that can contribute to diarrhea

- Carbohydrate intolerance (e.g., because of excess juice intake, temporary lactase deficiency after illness, other enzyme deficiencies)
- Increase in dietary fiber intake
- Food poisoning
- Food allergy or intolerance
- "Dumping" because of excessive feeding rate or improper formula preparation (e.g., with oral or tube feedings)
- Micronutrient deficiency (e.g., zinc deficiency)

### Non-nutrition-related issues that can contribute to diarrhea

- Constipation/obstipation (e.g., with encopresis)
- Medical conditions (e.g., cystic fibrosis, celiac disease, short bowel syndrome, inflammatory bowel disease, immune deficiencies such as HIV/AIDS)
- Infection (e.g., gastroenteritis related to viral, bacterial, or parasitic infection or concurrent illness such as urinary tract infection)
- Major changes in routine (e.g., starting school or vacation, toilet training)
- Medications (e.g., related to a medical condition or inappropriate use of laxatives)

Issues that are common among children with specific conditions will be discussed in more detail in Section 3, Influence of Special Health Care Needs.

Which of the following can be contributors to problems with constipation? Select all that apply.

- a. Excessive juice intake
- b. Hypotonia
- c. Inadequate fluid intake
- d. Inadequate fiber intake
- e. Carbohydrate intolerance
- f. Major changes in routine (e.g., the start of school or vacation)
- g. Medications

The correct responses were hypotonia, inadequate fluid intake, inadequate fiber intake, major changes in routine and medications.

Which of the following can be contributors to problems with diarrhea? Select all that apply.

- a. Excessive juice intake
- b. Hypotonia
- c. Inadequate fluid intake
- d. Inadequate fiber intake
- e. Carbohydrate intolerance
- f. Major changes in routine (e.g., the start of school or vacation)
- g. Medications

The correct responses were excessive juice intake, carbohydrate intolerance, major changes in routine and medications.



## Section 2: Assessing Fluid and Bowel Status

### Assessment of Fluid Intake

Medical attention is necessary if:

- Concentrated urine is reported
- The child experiences ongoing increased thirst, water craving, or excessive water intake

The following questions are useful for assessing a child's fluid intake:

- How much fluid does your child consume?  
(Include water, juice, formula, and other beverages)  
This can be compared to estimations of an individual's needs to determine whether or not a child's intake is adequate.
- Does your child "crave" water? (e.g., does she drink bath water or seek water from different sources)
- How many different types of fluid does your child drink?  
A restriction to one or two types of fluid may indicate a problem.
- Does your child have problems with choking when she drinks liquids?
- Are thicker liquids handled with less difficulty than thin liquids?

### Assessment of Bowel Status

Medical attention is necessary if:

- Blood is visible in stools
- Abdominal distension or pain is present
- Child has diarrhea every 1 or 2 hours; dehydration may be present
- Chronic diarrhea has not been evaluated
- Child refuses to eat or drink, has unexplained fever or unexplained vomiting

The following questions are useful for evaluating a child's bowel status:

#### Constipation/Diarrhea

- How often does your child have a bowel movement?
- Has the frequency of bowel movements changed recently?
- What does your child's stool look like?
- Has the consistency of your child's stool changed?
- Does your child have any physical symptoms before or after stooling?
- Does your child "strain" when having a bowel movement? Does your child complain of pain when having a bowel movement?
- Have changes in your child's stool pattern been accompanied by dietary changes?

Which of the following requires immediate medical attention:

- a. complaints of hard or infrequent stools
- b. complaints of pain with defecation
- c. visible blood in stool
- d. changes in stool consistency

The BEST response is c. visible blood in stool

## Section 3: Influence of Special Health Care Needs

Many children with special health care needs have problems with fluid status and bowel function. This section reviews some of the contributors to these problems related to specific conditions.

- Cerebral palsy
- Down syndrome (trisomy 21)
- Muscular dystrophy
- Myelomeningocele (spina bifida)

### Cerebral palsy

#### Description

Cerebral palsy (CP) involves chronic, nonprogressive central nervous system (CNS) dysfunction leading to problems with tone and movement. Children with CP make up a very heterogeneous group. Depending on the original insult, this diagnosis has many clinical manifestations, from very mild to very severe neurological involvement. Children with cerebral palsy may or may not be ambulatory and may or may not have mental retardation.

#### Possible effects on fluid status and bowel function

Fluid status may be affected because of issues related to CP:

- Communication problems preventing a child from indicating thirst
- Oral-motor problems making it difficult to take in adequate amounts of fluid
- Problems with drooling that increase fluid needs

Constipation is a problem for many children with CP for a number of reasons:

- Altered muscle tone (hyper- and/or hypotonia)
- Decreased mobility
- Medication-nutrient interactions
- Oral-motor problems that lead to low-fluid or low-fiber intakes (e.g., because of problems with certain textures or liquids)

Diarrhea can be a problem for children with cerebral palsy because of:

- Medication-nutrient interactions

### Down syndrome (trisomy 21)

#### Description

Down syndrome is caused by an "extra" 21<sup>st</sup> chromosome. Children with Down syndrome often have mental retardation, cardiac defects, and hypotonia (decreased muscle tone). Duodenal atresia (blockage of the intestine) may be present. Oral problems can include oral hypotonia, small oral cavity causing tongue protrusion, and delayed and/or abnormal tooth eruption.

#### Possible effects on fluid status and bowel function

Fluid status may be affected because of issues related to Down syndrome:

- Limited feeding skill development, preventing adequate fluid intake
- Cardiac problems sometimes making a fluid restriction necessary

Constipation is a problem for many children with Down syndrome for a number of reasons:

- Limited feeding skill development, preventing adequate fluid and fiber intake
- GI malformations
- Hypotonia

Diarrhea can be a problem for children with Down syndrome:

- Malabsorption because of GI malformations

## **Muscular dystrophy**

### **Description**

Muscular dystrophy is the progressive degeneration of muscle function. The most common is a genetic form called Duchenne muscular dystrophy. Other types include spinal muscular atrophy (SMA), myasthenia gravis, and myotonic dystrophy.

### **Possible effects on fluid status and bowel function**

Fluid status may be affected because of problems related to muscular dystrophy:

- Difficulty with feeding skills preventing an adequate intake of fluid

Constipation is a problem for many children with muscular dystrophy for a number of reasons:

- Limited mobility
- Difficulty with feeding skills preventing an adequate intake of fiber
- Medication-nutrient interactions
- Constipation is a problem for children with muscular dystrophy, especially when gut muscles are affected and peristalsis is impaired.

Diarrhea can be a problem for children with muscular dystrophy because of:

- Medication-nutrient interactions

## **Myelomeningocele (Spina bifida)**

### **Description**

Myelomeningocele is caused by failure of the neural tube to close completely during fetal development, resulting in a lesion along the spinal cord. The level of muscle weakness and paralysis depends on the level of the lesion (high or low along the spinal cord). Children with myelomeningocele may or may not be ambulatory.

### **Possible effects on fluid status and bowel function**

Fluid status may be affected because of issues related to myelomeningocele:

- Problems with feeding (e.g., positioning and postural difficulties) can lead to an inadequate fluid intake
- Neurogenic (inactive) bladder is a result of paralysis and can be common among children with myelomeningocele. An adequate fluid intake and frequent bladder emptying helps to prevent frequent urinary tract infections

Constipation is a problem for many children with myelomeningocele for a number of reasons:

- Neurogenic (inactive) bowel

- Decreased mobility
- Medication-nutrient interactions (e.g., medications used for neurogenic bladder)
- Problems with feeding (e.g., positioning and postural difficulties) can lead to an inadequate fiber intake

Most children with myelomeningocele require a regular bowel program, and families should receive education about management and prevention of constipation.

For a child with myelomeningocele (or another type of spinal cord injury), constipation can be life-threatening. Autonomic dysreflexia caused by pain due to constipation can lead to elevated blood pressure and cardiac arrest.

Diarrhea can be a problem for children with myelomeningocele because of:

- Medication-nutrient interactions

### **Children with special health care needs...what to consider**

When evaluating the intake of a child with a special health care need, consider the effect(s) that the specific condition may have on fluid status and bowel function:

- Does the child have any anatomical abnormalities or medical conditions that might have a primary effect on bowel function?

for example, constipation because of anal stenosis or fissures, encopresis, Hirschsprung's disease; diarrhea because of untreated celiac disease, cystic fibrosis, inflammatory bowel disease

- Is the child's chronic condition often associated with bowel or bladder problems because of neurologic problems or hypo- or hypertonia?

for example, myelomeningocele, spastic quadriplegia, Down syndrome, static encephalopathy, spinal cord injury

- Does the child receive medications that could cause constipation or diarrhea or that might influence fluid needs? Or slow peristalsis? For example medications that might:

- cause constipation or diarrhea (anesthetics, analgesics, anticholinergics, antipsychotics, anticonvulsants, antidepressants, barium, ferrous sulfates and other hematinics)
- influence intestinal flora (antibiotics)
- influence fluid status (diuretics prescribed for cardiac conditions or bronchopulmonary dysplasia)

- Does the child have a condition that increases fluid losses?

for example, drooling, vomiting, fever

- Does the child have a concurrent, acute illness that could have an impact on fluid status?

- Are laxatives used on a regular basis?

- Do problems with communication affect a child's ability to indicate thirst? To indicate a need to defecate?
- Does the child have oral-motor problems that interfere with consuming an adequate amount of fluid? Of fiber?
- Does the child's feeding position limit fluid or fiber intake?
- Does the rate or volume of a child's gastrostomy feeding limit fluid intake?

Which of the following problems is often associated with myelomeningocele and can cause diarrhea?

- a. medication-nutrient interactions
- b. problems with feeding (for example, an impaired gag reflex)
- c. malabsorption
- d. neurogenic bowel

The BEST response is a. medication-nutrient interactions. Children with myelomeningocele can be taking a medication (or more likely, medications) that can cause diarrhea.

Children with myelomeningocele CAN have problems with feeding, however these problems do not typically lead to diarrhea. Although malabsorption often causes diarrhea, malabsorption is not generally associated with myelomeningocele. Neurogenic bowel is common among children with myelomeningocele, but generally does not lead to problems with diarrhea.

## Section 4: Intervention Strategies

Acute problems with fluid status or bowel function require immediate medical attention. Nutrition intervention is useful for preventing (or minimizing) problems:

- Acute fluid imbalances such as dehydration or water intoxication require immediate medical attention. Nutrition interventions can be developed to prevent crises related to fluid imbalances.
- Problems with constipation can often be prevented with nutrition intervention, however, a medical approach is often necessary once a child is constipated. Bowel impactions can be life-threatening for some children, and require immediate medical attention.

Although diarrhea, especially chronic diarrhea, has nutritional implications, treatment is a medical concern. Diarrhea that causes dehydration should be immediately addressed from a medical perspective. Nutrition interventions that focus on minimizing complications and preventing future problems are helpful.

### Preventing or Managing Constipation

Prevention and management of problems with constipation often include a combination of the following approaches:

- adequate fiber intake
- adequate fluid intake
- increased level of physical activity, as possible
- implementation of a regular bowel program or toileting routine
- appropriate use of laxatives

### Constipation Management: Adequate fiber intake

One of the primary approaches to preventing problems with constipation is ensuring an adequate fiber intake. Fiber adds the bulk to stool, which helps it move through the gastrointestinal tract.

#### Some practical ways to increase a child's fiber intake:

- Unprocessed bran (add 1-3 Tbsp per day to foods. Provide adequate fluid.)
- Whole grain cereals, breads, and crackers
- Raw, cooked, or dried fruits (especially prunes and prune juice)
- Raw or cooked vegetables, with skin
- Legumes (beans, split peas, lentils)
- Consider use of supplemental fiber products (for example, Unifiber<sup>®</sup>, Benefiber<sup>®</sup>, and Metamucil<sup>®</sup>)

When increasing a child's fiber intake, ensure that his fluid intake is adequate as well. Increased fiber without adequate fluid can exacerbate problems with constipation.

Consider a child's oral-motor skills and ability to handle textures. Some of the above suggestions are not appropriate for children who have problems chewing or swallowing.

For children who are tube-fed, formulas with added fiber may help with constipation.

Coordination with a child's occupational or physical therapist can ensure that recommendations to increase fiber are also safe for a child with impaired feeding skills.

### **How much fiber?**

The Dietary Reference Intakes (DRIs) include recommendations for fiber to promote optimal health, including preventing constipation. The AI (Adequate Intake) is based on the energy intakes of typically developing children:

- Children ages 1-3 years: 19 grams total fiber per day
- Children ages 4-8 years: 25 grams total fiber per day
- Boys ages 9-13 years: 31 grams total fiber per day
- Boys ages 14-18 years: 38 grams total fiber per day
- Girls ages 9-13 years: 26 grams total fiber per day
- Girls ages 14-18 years: 26 grams total fiber per day

American Academy of Pediatrics:

- 0.5 grams of fiber per kilogram body weight; maximum 35 grams per day

American Health Foundation (for children older than 2 years):

- "age + 5 grams"; e.g., a child who is 3 years old: 3 + 5 g = 8 g fiber per day
- Children with chronic constipation may require more than the usual recommendations, however, avoid levels greater than "age + 10 g."

### **Concerns about increasing fiber intake**

Fiber intake should be increased gradually. A sudden increase in dietary fiber could cause gas and bloating.

### **Constipation Management: Adequate fluid intake**

Along with an adequate fiber intake, ensuring an adequate intake of fluid is part of constipation prevention and management. Fiber absorbs water, which helps produce a soft stool that moves easily through the intestine. When stool is hard and dry, more water may be needed.

### **Some practical ways to increase a child's fluid intake:**

- Add liquid snacks between meals
- Increase intake of foods with high water content (for example, fruits and vegetables are about 90% water...and are also high in fiber)
- For the child who cannot safely swallow thin liquids, try: juices thickened with pureed fruit, infant cereal, or a commercial food thickener
- Fruit juices, because of fructose and sorbitol contents, are sometimes useful as stool softeners.

### **How much fluid?**

#### **Healthy Infants**

1.5 mL/kcal/day for healthy infants

or

80 to 120 mL/kg/day (for infants up to 10 kg)

### **Healthy Children**

80 to 120 mL/kg/day (for children up to 10 kg)

1000 mL/day + 50 mL/kg above 10 kg (for children 10-20 kg)

1500 mL/day + 20 mL/kg above 20 kg (for children over 20 kg)

or

50 to 60 mL/kg/day

Some children with special health care needs may have fluid needs that are greater than the above recommendations.

### **Constipation Management: Increased level of physical activity**

Increasing a child's level of physical activity (if safe or possible) may help with problems with constipation.

If it is not possible to increase a child's level of physical activity, massage may help with problems with constipation. A referral to an occupational or physical therapist is appropriate.

### **Constipation Management: Implementation of a regular bowel program**

Many children with special health care needs, especially children with neurologic problems that affect bowel function require regular bowel programs to prevent or minimize problems with constipation. Ideally, these programs are part of the overall medical plan.

### **Constipation Management: Appropriate use of laxatives**

For many children with special health care needs, problems with constipation require long-term use of laxative medications and specialized bowel programs, in addition to nutrition intervention. Some medications that are commonly used are reviewed below.

#### **Irritant/Stimulants**

- **Examples** cascara, danthron, senna, phenolphthalein, casanthranol; bisacodyl tablets; bisacodyl suppository, castor oil
- **Brand name or common name** cascara, Senokot , Ex-Lax ; Dulcolax , Fletcher's, Castoria
- **Action** Direct action in intestinal mucosa; stimulates myenteric plexus; alters water and electrolytes
- **Comments**
  - Cascara and senna may cause yellow-brown urine; alkaline urine may turn pink-red or violet red
  - Bile must be present for phenolphthalein to have effect
  - Do not give bisacodyl tablets within 1 hour of antacids or milk products

#### **Bulk-Producing or Bulk-Forming**

- **Examples** methylcellulose, psyllium, poly carbophil
- **Brand name or common name** Citrucel, Hyrocil, Metamucil, Chroulac, Malt Supex
- **Action** Holds water in stool; mechanical distension; malt soup extract reduces fecal pH
- **Comments**



- Do not give with salicylates, digitalis, or cardiac glycosides
- May cause obstruction if passage is stopped

#### **Lubricants**

- **Examples** mineral oil, oil enema
- **Action** Lubricates intestine, retards colonic absorption of fecal water; softens stool and decreases water absorption
- **Comments**
  - Not recommended for children under 1 year of age or children who are at risk for aspiration

#### **Surfactants or Stool Softeners**

- **Examples** docusate sodium (Colace; Doss)
- **Action** Detergent activity; allows stool to retain water, making stool softer and easier to pass
- **Comments**
  - Beneficial when feces are hard or dry, or in anorectal conditions where passage of a firm stool is painful
  - Do not give if mineral oil given

#### **Osmotic**

- **Examples** Lactulose, sorbitol, barley malt extract, magnesium hydroxide, magnesium citrate; osmotic enemas
- **Brand name or common name** Lactulose, Cephulac, Chronulac, Epsom salts, Milk of magnesia, Fleets enema
- **Action** Attract/retain water in the intestinal lumen, increasing intraluminal pressure
- **Comments**
  - May alter fluid and electrolyte balance

#### **Miscellaneous**

##### **Glycerin**

- **Action** Local irritation caused by sodium stearate in preparation; hyperosmotic action

##### **Polyethylene glycol (Miralax)**

- **Action** Osmotic agent, causes stool to retain water

#### **Appropriate Use of Laxatives: Mineral oil**

The use of mineral oil to treat constipation has been controversial. Mineral oil softens the stool and provides lubrication for easier elimination.

Concerns that mineral oil may bind fat-soluble vitamins arose after a 1939 study that showed a decrease in serum carotene after six months of a high-dose mineral oil use. More recent studies have demonstrated no adverse effects of mineral oil use on fat-soluble vitamin status.

Mineral oil is not recommended for infants or for children with swallowing difficulties who are at risk for aspiration. Aspiration of mineral oil can lead to lipid pneumonia.

More information about mineral oil and constipation, including references to the studies around mineral oil and fat-soluble vitamin status, is found in the For More Information section.

### **Appropriate Use of Laxatives: Corn syrup**

Constipation is sometimes treated with corn syrup. The theory behind its use is that the high osmolarity of corn syrup will draw more water into the intestinal tract. Research studies have not shown that liquids with high osmolarities are effective in treating constipation.

Depending on the amount of corn syrup used, it could contribute a significant amount of energy to a child's food pattern. This should be included in a nutritional assessment.

### **Appropriate Use of Laxatives: Alternative remedies**

Some remedies for constipation (e.g., bryonia, graphites, silica, nux vom, and sulfur) have been promoted. The safety of these for children has not been evaluated.

## **Managing Diarrhea**

### **Acute Diarrhea**

Primary treatment of acute diarrhea is a medical issue and will depend on the degree of the illness and dehydration. After hydration issues are addressed, nutrition interventions focus on maintaining good nutritional status.

### **Address dehydration**

For mild or moderate dehydration, rehydration solutions with 75-90 mEq/L sodium are recommended. Juice, broth, carbonated beverages, and sports drinks can lead to increased problems with diarrhea because of high osmolarities. Severe dehydration often requires intravenous rehydration.

### **As possible, continue with usual eating pattern**

In addition to promoting healthy weight gain and overall improved nutritional status, continuing to feed during acute diarrhea can decrease the duration of the illness and prevent atrophy of the gastrointestinal mucosa.

### **Chronic Diarrhea**

Management of chronic diarrhea requires a medical approach as well. Nutrition interventions focus on promoting good nutritional status and providing adequate energy, fluid, protein, and micronutrients for growth. If gastrointestinal function is severely compromised, or if a child is unable to obtain an adequate amount of energy enterally, parenteral nutrition may be necessary.

This rest of this section "walks" you through the decision-making process. The first scenario describes a case and one way to approach the fluid and bowel problems. In the second scenario, you will be asked to make clinical decisions based on the information presented.

## **Scenario 1**

Wilfred is a 3 ½-year old who comes to your clinic because of concerns about growth. You have limited information about his growth history, but do have data from about 5 months ago.

- Weight-for-age and stature-for-age are below the 5th percentile
- BMI-for-age was at the 10th percentile and is now between the 5th and 10th percentiles

Wilfred has developmental delay, but there is no medical diagnosis. He receives physical and speech therapy at a local clinic.

Wilfred's father said he is surprised that Wilfred is having problems with growth. Wilfred eats more food than his older siblings, dad says, and drinks plenty of milk.

He has no problems with eating, except that he sometimes "stuffs" his mouth with food and then has trouble swallowing.

Wilfred's father adds that Wilfred has had problems with diarrhea for about a year. He has many loose bowel movements each day.

You collect information about Wilfred's food pattern and estimate that he is taking in about 1 ½ times the DRI's Estimated Energy Requirement for boys his age. His intake of vitamins and minerals is at or above the DRI for age. You also ask about his fluid intake. Wilfred drinks about 16-20 ounces of milk per day.

You explain your concerns to Wilfred's father:

- Wilfred is losing fluid and is at risk for dehydration. For boys his age, the recommended fluid intake is 50-60 mL/kg/day. Because of Wilfred's diarrhea, you suspect that he needs more fluid than this.

You provide suggestions for increasing Wilfred's fluid intake:

- offer water between meals
- include foods with high water content at meals and snacks, for example: fruits, vegetables, gelatin squares, popsicles
- Wilfred's growth pattern indicates that he is not taking in enough energy to grow.
- You suspect that Wilfred's diarrhea is leading to nutrient losses.

The reason for his diarrhea should be addressed by Wilfred's physician and you suggest that the family schedule an appointment as soon as possible.

You will help find ways for Wilfred to meet his nutrient needs, but ultimately the chronic diarrhea needs to be addressed.

Finally, you ask about any problems other family members have with diarrhea or constipation. His father remembers that Wilfred's mother (who does not live with the family) "had problems" with milk.



You explain that some people cannot digest the sugar in milk, and this leads to diarrhea. You tell the family that it is possible that Wilfred's diarrhea is caused by lactose intolerance.

Wilfred's father is willing to purchase Lactaid-treated milk and offer it to Wilfred, and you agree that this is safe change to make.

You explain that lactose intolerance may not be the cause of Wilfred's diarrhea, and that evaluation by their pediatrician is still warranted.

Three weeks later, you receive a phone call from Wilfred's father.

Wilfred's diarrhea has resolved since introduction of the Lactaid-treated milk. Several tests have been done, which have ruled out other causes.

Wilfred's father tells you that the family is able to use WIC vouchers to obtain Lactaid-treated milk and the dietitian at the WIC office will provide follow-up monitoring and intervention.

## **Scenario 2**

Roger is a 7-year, 11-month old with autism. His current measurements appear to be within normal limits, and his family reports that his growth pattern has not changed.

You ask about Roger's intake. His mother rolls her eyes. Roger is very picky, choosing mostly starches, like crackers, breads, French fries and chips.

He fixes his own chocolate milk each day, and he refuses to eat most green foods, including many vegetables. He also eats chicken nuggets and meatloaf.

Roger gets distracted at mealtimes, so the family uses a 10 minute timer to keep Roger focused.

Roger has problems with constipation, his mother says.

What contributes to Roger's problems with constipation? (Choose the BEST response.)

- a. he has autism
- b. he drinks chocolate milk daily
- c. he refuses to eat green foods, including vegetables
- d. medication-nutrient interactions

The correct response is c. he refuses to eat green foods, including vegetables. Selective eating is common among children with autism, and some children are "picky" about color, taste, or texture. Because many vegetables are green (and also high in fiber), this avoidance of green foods may be limiting Roger's intake.

Constipation is not a problem necessarily associated with autism. Chocolate milk is probably not contributing to Roger's problems with constipation. Medication-nutrient interactions CAN contribute to problems with constipation, however, it is not evident



that Roger takes any medications. (This is a good question to ask during your assessment.)

After collecting data about Roger's usual intake you tell his mother the following:

- Roger's growth pattern is fine. It shows that he is getting enough energy and protein to grow.
- Roger's intake looks adequate for energy, protein, vitamins and minerals. He takes a children's chewable multiple vitamin each day, and you suggest that the family continue this.
- You suspect that Roger's limited intake of high fiber foods may be contributing to problems with constipation. Picky eating is common among children with autism, and you have some ideas that might help with Roger's constipation problems.

How much fiber would you suggest that Roger get in one day?

- a. about 8 grams per day
- b. about 25 grams per day
- c. about 30 grams per day
- d. about 38 grams per day

The correct response is b. about 25 grams per day. This is based on the AI for boys Roger's age.

You provide Roger's mother with a list of the approximate fiber content of some foods and suggest that they aim for a fiber intake of 25 grams per day.

You make the following suggestions:

- Introduce new fruits and vegetables slowly. Pair them with foods Roger already likes. For example, carrot sticks with ranch dip or sliced fruit with yogurt dip
- Offer whole grain versions of foods Roger already eats. For example, whole wheat bread and crackers or homemade French fries with the skins on.
- Include beans and legumes in soups and stews.
- Sprinkle small amounts of unprocessed bran into soft foods like meatloaf.

What is one other recommendation that you should make (related to constipation)?

- a. If an increase in fiber does not help, Roger's family should give him an over-the-counter laxative
- b. Roger should continue to take a children's chewable multiple vitamin
- c. Roger's family should ensure that his level of physical activity is adequate
- d. Roger's family should ensure that his intake of fluid is adequate

The BEST response is d. ensure that Roger's fluid intake is adequate. An adequate fluid intake is necessary for preventing or managing constipation. When adding fiber to a child's food pattern, it is critical to ensure an adequate fluid intake, or problems with constipation can be exacerbated.

It may be true that Roger will need a laxative medication, and the suggestions to take a multiple vitamin and to increase physical activity are good suggestions, however the best response is d.

What is an appropriate recommendation for fluid intake for Roger?

- a. at least 800-900 mL/day
- b. at least 1200-1300 mL/day
- c. at least 1500-1600 mL/day
- d. at least 2000-2100 mL/day

The correct response is c. at least 1500-1600 mL/day. One recommendation for children is 50-60 mL/kg/day. Roger weighs 26 kg.  $26 \times 60 = 1560$ .

## Post Test

### QUESTION 1

What is a reasonable fluid intake for a healthy 35 kg 10-year old?

- a. 500-800 mL per day
- b. 1000-1300 mL per day
- c. 1400-1700 mL/day
- d. 1800-2100 mL/day

### QUESTION 2

Which of the following is a nutrition-related issue that can contribute to problems with diarrhea?

- a. inadequate fluid intake
- b. carbohydrate intolerance
- c. medications
- d. major changes in routine (e.g., starting school or vacation)

### QUESTION 3

A mother describes her son's food pattern and remarks that she is worried that he is underweight, so she has begun to add powdered milk to the 2% milk he drinks with meals. She has also decreased the amount of fruit juice and water he is offered, to encourage him to eat more nutritious foods (e.g., peanut butter sandwiches, bagels with cream cheese) at meal and snack times.

What concerns do you have?

- a. this food pattern may be too high in fat
- b. this food pattern may be too low in fluid
- c. This food pattern may be too low in fiber
- d. this food pattern may be too high in fiber

### QUESTION 4

Methylcellulose is a \_\_\_\_\_ laxative.

- a. bulk-forming
- b. lubricating
- c. irritant
- d. hyperosmotic

### QUESTION 5

Which of the following are is a common contributor to problems with constipation for children with special health care needs:

- a. hypertonia
- b. hypotonia
- c. oral-motor problems
- d. all of the above

### QUESTION 6

Cardiac problems can make a fluid restriction necessary, increasing an infant's risk for problems with constipation. Which of the following disorders is most likely to be associated with a cardiac defect?

- a. cerebral palsy
- b. Down syndrome
- c. myelomeningocele
- d. muscular dystrophy

### QUESTION 7

Why is the use of mineral oil inappropriate for a 7-month old with constipation?

- a. because of the risk of aspiration
- b. because mineral oil can cause deficiencies of fat-soluble vitamins
- c. because a dietary approach should be tried before medication
- d. because mineral oil can cause deficiencies of water-soluble vitamins

### QUESTION 8

Which of the following is a recommendation for the management of acute diarrhea?

- a. address dehydration by offering juice and broth
- b. address dehydration by offering a full liquid diet
- c. continue with usual eating pattern as possible
- d. encourage gut rest



## For More Information about Fluid and Bowel problems

**Fluid and Bowel Problems.** Fluid and bowel problems. In: Isaacs JS, et al. *Children with Special Health Care Needs: A community pocket guide*. Dietetics in Developmental and Psychiatric Disorders and the Pediatric Nutrition Practice Group of The American Dietetic Association and Ross Products Division. 1997. This chapter describes normal bowel function, as well as some problems with fluid status and bowel functions that may occur among children with special needs. This publication is currently unavailable. A 2nd edition is under development.

**Nutrition and Constipation.** Ogata B. Nutrition and Constipation. *Nutrition Focus*. 1998. 13(3). This article describes some causes of constipation and some nutrition-related strategies for preventing constipation. To order, visit [http://depts.washington.edu/chdd/ucedd/CO/co\\_NutriFocus.html](http://depts.washington.edu/chdd/ucedd/CO/co_NutriFocus.html).

**Nutrition Concerns in Acute and Chronic Diarrhea.** Katsh N. Nutrition concerns in acute and chronic diarrhea. *Nutrition Focus*. 2000. 15(6). This article includes a discussion of causes and treatments for chronic and acute diarrhea in infants and children. To order, visit [http://depts.washington.edu/chdd/ucedd/CO/co\\_NutriFocus.html](http://depts.washington.edu/chdd/ucedd/CO/co_NutriFocus.html).

**Constipation: Position Statement.** Baker SS, Liptak GS, Colletti RB, et al. Constipation in infants and children: evaluation and treatment. A medical position statement of the North American Society for Pediatric Gastroenterology and Nutrition. *J Pediatr Gastroenterol Nutr* 1999; 29(5): 612-26. This position statement includes algorithms for evaluation and treatment of constipation. It is available online at: <http://www.naspgn.org/pdf/constipation.pdf>.

**Serum b-carotene, retinal and a-tocopherol levels during mineral oil therapy for constipation.** Clark JH et al. Serum b-carotene, retinal and a-tocopherol levels during mineral oil therapy for constipation. *AJDC*. 1987; 141:1210-2.

**The Management of Acute Gastroenteritis in Young Children: Practice Parameter.** Provisional Committee on Quality Improvement, Subcommittee on Acute Gastroenteritis. Practice Parameter: the management of acute gastroenteritis in young children. *Pediatrics*. 97(3): 424-436. 1996. This article provides recommendation for the management of gastroenteritis in young children. Available online: <http://www.aap.org/policy/gastro.htm>

**Dietary Reference Intakes for Energy, Carbohydrates, Fiber, Fat, Protein and Amino Acids (Macronutrients).** Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrates, Fiber, Fat, Protein and Amino Acids (Macronutrients)*. Food and Nutrition Board. Washington, DC: National Academy Press. 2002. This report is available online: <http://www.nap.edu/books/0309085373/html/>.