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Patient information: Acute diarrhea in children (Beyond the Basics)**Authors**

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DIARRHEA OVERVIEW — Diarrhea refers to the passage of loose or watery stools or an increased frequency of stools for the child and occurs at some point in the life of nearly every child. Diarrhea is not a disease, but is a symptom of a number of illnesses. Although diarrhea is common and rarely life-threatening, it is important to understand when to seek help. Diarrhea can lead to dehydration, which alters the child's natural balance of water, and to electrolyte (sodium, potassium, chloride) imbalance. It can be serious if not treated promptly.

This topic will review the major issues related to diarrhea in children. A brief summary is provided below. Diarrhea in adults is discussed separately. A topic that discusses nausea and vomiting in children is also available. (See ['Summary'](#) below and ["Patient information: Acute diarrhea in adults \(Beyond the Basics\)"](#) and ["Patient information: Nausea and vomiting in infants and children \(Beyond the Basics\)"](#).)

DIARRHEA DEFINITION — The normal frequency and consistency of bowel movements varies with a child's age and diet and the definition of diarrhea varies accordingly.

Frequency — It is normal for young infants to have up to 3 to 10 stools per day, although this varies depending upon the child's diet (breast milk versus formula; breastfed children usually have more frequent stools). Older infants, toddlers, and children normally have one to two bowel movements per day. Diarrhea can usually be defined as an increase in stool frequency to twice the usual number per day in infants, or three or more loose or watery stools per day in older children.

Consistency and color — The consistency and color of a child's stool normally changes with age, which highlights the importance of knowing what is normal for your child. Young infants, especially those who are breastfeeding, usually have soft stools. Their stools may be yellow, green, or brown, and/or appear to contain seeds or small curds.

All children's stools can vary as a result of their diet. Development of stools that are runny, watery, or contain mucus is a significant change that should be monitored. The presence of visible blood or black stools is never normal and always requires medical attention. (See ["Patient information: Bloody stools in children \(Beyond the Basics\)"](#).)

Duration — A prolonged history of diarrhea (one week or longer) is evaluated and treated differently than an acute case of diarrhea (lasting less than one week). The discussion below will focus on acute, rather than chronic, diarrhea.

DIARRHEA CAUSES — The most common cause of acute diarrhea is a viral infection. Other causes include bacterial infections, side effects of antibiotics, and infections not related to the gastrointestinal (GI) system. In addition, there are many less common causes of diarrhea.

Viral, bacterial, and parasitic infections are all contagious, and parents/caretakers can assist in preventing spread of the infection. Children are considered contagious for as long as they have diarrhea. However, depending on the microorganism, some children can spread diarrhea even if they have no symptoms and some children will continue to spread diarrhea pathogens for weeks, months, or years after their symptoms resolve. Microorganisms causing diarrhea are spread from hand to mouth; hand washing

and separating food-handling and feces disposal (eg, not changing diapers in the kitchen) are very important to preventing infection in family and other contacts. (See ['Hygiene measures'](#) below.)

Viral infection — Viral infection is the leading cause of diarrhea in children and is seen most commonly in the winter months in temperate climates. Symptoms of viral infection can include watery diarrhea, vomiting, fever (temperature higher than 100.4°F or 38.0°C), headache, abdominal cramps, lack of appetite, and muscle aches.

Viral infection usually begins 12 hours to 4 days after exposure, and resolves within three to seven days. No specific treatment is available for viral causes of diarrhea. Children with diarrhea from viral infections are best treated with supportive measures (oral rehydration solution, limited diet, and rest). Vomiting is the predominant feature of gastroenteritis caused by *Norovirus* and medicines to prevent vomiting may be prescribed to assist the child with oral rehydration. (See ['Home care of diarrhea'](#) below.)

Bacterial infection — Bacterial infection is sometimes hard to distinguish from viral infection. Bacterial infections are more common in locations where there is unsafe drinking water and poor handling of sewage. Persistent high fever (higher than 40°C or 104°F) and diarrhea that is bloody or contains mucus are more common with bacterial diarrhea. Most children with bacterial infection do not require antibiotics and will improve with time and supportive measures, however, treatment may be necessary in certain situations.

Parasitic infection — Parasitic infections are more common in locations where there is unsafe drinking water and poor handling of sewage. Infection with a parasite is uncommon in developed countries but may be seen in children who have recently ingested contaminated water or who have traveled to or lived in developing countries. Diarrhea from parasitic infections may last for weeks to months. (See ["Patient information: Giardia \(Beyond the Basics\)"](#) and ["Patient information: Food poisoning \(food-borne illness\) \(Beyond the Basics\)"](#).)

Antibiotic-associated diarrhea — A number of antibiotics can cause diarrhea in both children and adults. The diarrhea is usually mild and typically does not cause dehydration or weight loss. In most cases, antibiotics should not be stopped and the child's diet does not need to be changed. The diarrhea usually resolves one to two days after antibiotics are finished. Contact a healthcare provider if a child on antibiotics has diarrhea that is severe (see ['Frequency'](#) above), contains blood, or does not resolve after the antibiotic is stopped. (See ["Patient information: Antibiotic-associated diarrhea caused by Clostridium difficile \(Beyond the Basics\)"](#).)

DIARRHEA EVALUATION — The evaluation of diarrhea in children requires a careful review of medical history, a physical examination, and, outside the infant age group infrequently, diagnostic testing. The clinician will perform a thorough examination because there are some infections unrelated to the bowels (such as an ear infection) that can cause diarrhea.

Many tests are available to diagnose the cause of diarrhea and to determine the severity of dehydration, although most children will not require testing.

HOME CARE OF DIARRHEA — The following are some simple recommendations to help care for children with diarrhea at home.

Dietary recommendations — There has been much confusion and folklore about optimal foods for children with diarrhea. Fortunately, a number of studies have examined recommendations that are proven to be effective.

Children who are not dehydrated should continue to eat a regular diet and infants who are breastfeeding should continue to do so unless the parent(s) is told otherwise by their clinician. Dehydrated children require rehydration (replacement of lost fluid) and suitable oral rehydration solutions are the most physiologic. After being rehydrated, severely affected children will be able to resume a normal diet. (See ['Oral rehydration therapy'](#) below.)

Specific suggestions for children who are tolerating a regular diet include the following:

- Most children with diarrhea tolerate full-strength cow's milk products. It is not necessary to dilute or avoid milk products, except in children with known allergies to cow's milk.
- Recommended foods include a combination of complex carbohydrates (rice, wheat, potatoes, bread), lean meats, yogurt, fruits, and vegetables. High-fat foods are more difficult to digest and should be avoided.
- The unnecessary restriction of a child's diet to clear liquids or the BRAT diet (bananas, rice, applesauce, toast) results in inadequate intake of nutrients (calories and/or protein). Giving only clear liquids for several days can actually prolong

diarrhea (called "starvation stools").

- Apple, pear, and cherry juice, and other beverages with high sugar content should be avoided. Sports drinks (sample brand name Gatorade) should also be avoided because they have too much sugar and have inappropriate electrolyte levels for the patient with diarrhea. When clear liquids are recommended, the best choices are the commercially prepared oral rehydration solutions for rehydration (sample brand name Pedialyte).

Monitoring for dehydration — Mild dehydration is common in children with diarrhea. Signs and symptoms of mild dehydration include a slightly dry mouth, increased thirst, and slightly decreased urine output (one wet diaper or void in six hours). Common features of moderate or severe dehydration include markedly decreased urination (less than one wet diaper or void in six hours), lack of tears when crying, dry mouth, and sunken eyes ([table 1](#)).

Oral rehydration therapy — Oral rehydration therapy (ORT) was developed as a safer, less expensive, and easier alternative to intravenous fluids. Oral rehydration solution (ORS) contains glucose (a sugar) and electrolytes (sodium, potassium, chloride) that are lost in children with vomiting and diarrhea. Various rehydration solutions are available. Parents should check with a healthcare provider to determine which solution is preferred. A child who is moderately or severely dehydrated needs to be evaluated by a healthcare provider. If a child refuses to accept ORS because of vomiting and/or becomes moderately to severely dehydrated, as indicated by decreased urination (>6 hours since passing most recent urine), lethargy, or other features, the child requires professional evaluation and treatment.

ORT does not cure diarrhea, but it does help to treat the dehydration that often accompanies it. ORS can be purchased at most grocery stores and pharmacies in the United States without a prescription. A few widely available brands include Pedialyte, Infalyte, and ReVital, although generic brands are equally effective ([table 2](#)). Gelatin, tea, rice water, fruit juice, and other beverages are not recommended for use as ORT in children with diarrhea. Parents should not try to prepare ORS recipes at home because the formulas must be exact.

ORS may be given at home to a child who is mildly dehydrated, refusing to eat a normal diet, or has vomiting and/or diarrhea. If needed, ORS can be given in frequent, small amounts by spoon, bottle, or cup over three to four hours. A pediatrician may provide specific instructions for oral rehydration to their patients. One method is described below:

- Parents should first measure out the total amount to be given with a standardized medicine syringe or measuring cup or spoon, rather than a regular cup or spoon.
- A total volume of 5 teaspoons per pound, or 50 milliliters per kilogram, should be given over four hours ([table 3](#)). For a 20 pound child, this would equal 100 teaspoons; for a 9 kg child, this would equal 450 milliliters.
- The fluid can be given by teaspoonfuls (approximately equal to 5 milliliters each) every one to two minutes, or as tolerated.
- After the total amount has been given, a normal diet can be resumed.

A child who refuses to drink or vomits immediately after drinking ORT should be monitored closely for worsening dehydration. Children who are not dehydrated may drink ORS after every episode of vomiting to prevent dehydration. (See '[Monitoring for dehydration](#)' above.)

Medications — Medications such as antibiotics and antidiarrheal agents are generally not necessary and could be harmful for infants or children with diarrhea. Rarely, antibiotics may be used in cases of bacterial infection when a specific cause of the diarrhea has been found or is strongly suspected, particularly after recent travel. Inappropriate use of antibiotics will not improve diarrhea. Furthermore, antibiotics can cause side effects and lead to development of antibiotic resistance.

Antidiarrheal agents (including Imodium, Pepto-Bismol, and Kaopectate) are not recommended for infants or children, since the benefits do not outweigh the risks. One risk of using an antidiarrheal agent is that it could mask worsening symptoms and delay treatment.

Probiotics — There are "healthy" bacteria (called probiotics) that may help reduce the duration of diarrhea (by about 12 to 30 hours). Some of these are available in drug stores without a prescription. While it is not unreasonable to use them, their overall benefit is small and they can be expensive.

Preventing spread — Parents with children who have diarrhea should be cautious to avoid spreading infection to themselves, their family, and friends. Care with hand washing, diapering, and keeping sick children out of school or day care until the diarrhea

is gone are a few ways to limit the number of people exposed to the infection.

Hygiene measures — Hand washing is an essential and very effective way to prevent the spread of infection. Hands should ideally be wet with water and plain or antimicrobial soap, and rubbed together for 15 to 30 seconds. Special attention should be paid to the fingernails, between the fingers, and the wrists. Hands should be rinsed thoroughly and dried with a single-use towel.

Alcohol-based hand rubs are a good alternative for disinfecting hands if a sink is not available, however, alcohol-based hand rubs do not prevent all types of diarrhea (eg, *Norovirus*, *Clostridium difficile*). Hand rubs should be spread over the entire surface of hands, fingers, and wrists until dry, and may be used several times. Hand rubs are available as a liquid or wipe in small, portable sizes that are easy to carry in a pocket or handbag. When a sink is available, visibly soiled hands should be washed with soap and water.

Hands should be cleaned after changing a diaper or touching any soiled item. They should also be washed before and after preparing food and eating, after going to the bathroom, after handling garbage or dirty laundry, after touching animals or pets, and after blowing the nose or sneezing.

WHEN TO SEEK HELP FOR DIARRHEA — The following is a list of signs and symptoms that are worrisome and require **immediate** medical attention:

- Bloody diarrhea
- If an infant refuses to eat or drink anything for more than a few hours
- Moderate to severe dehydration
- Abdominal pain that comes and goes or is severe
- Behavior changes, including lethargy or decreased responsiveness

SUMMARY

- Most episodes of acute diarrhea resolve on their own, however, immediate medical attention should be sought for children who have any of the following: bloody diarrhea; signs of moderate to severe dehydration; refusing to eat or drink anything; abdominal pain that comes and goes or is severe; behavior changes, including lethargy or decreased responsiveness. (See '[When to seek help for diarrhea](#)' above.)
- The most common cause of acute diarrhea is a viral infection. Other causes include bacterial infections, side effects of antibiotics, and bodywide infections not related to the gastrointestinal (GI) system. In addition, there are many less common causes of diarrhea. (See '[Diarrhea causes](#)' above.)
- Children who are not dehydrated should continue to eat their regular diet. Children who are dehydrated should be rehydrated, after which they can resume their normal diet (possibly with some modifications). Children who are breastfeeding should continue to do so unless told otherwise by their clinician. (See '[Dietary recommendations](#)' above.)
- Oral rehydration therapy (ORT) should initially be given to children who are dehydrated. Common signs and symptoms of dehydration include decreased urination (less than one wet diaper or void in six hours), lack of tears when crying, dry mouth, sunken eyes, and weight loss. ORT can be purchased at most grocery stores and pharmacies in the United States without a prescription. (See '[Oral rehydration therapy](#)' above.)
- Medications such as antibiotics and antidiarrheal agents are generally not recommended for infants or children with diarrhea. (See '[Medications](#)' above.)
- Parents with children who have diarrhea should be cautious to avoid spreading infection to themselves, their family, friends, and others. Care with hand washing, diapering, and keeping sick children out of school or day care are a few ways to limit the number of persons exposed to infectious microorganisms. (See '[Preventing spread](#)' above.)

WHERE TO GET MORE INFORMATION — Your child's healthcare provider is the best source of information for questions and concerns related to your child's medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient information: Diarrhea in children \(The Basics\)](#)

[Patient information: Diarrhea in adults \(The Basics\)](#)

[Patient information: Food poisoning \(The Basics\)](#)

[Patient information: Lactose intolerance \(The Basics\)](#)

[Patient information: Antibiotic-associated diarrhea \(C. difficile infection\) \(The Basics\)](#)

[Patient information: Giving your child over-the-counter medicines \(The Basics\)](#)

[Patient information: Dehydration \(The Basics\)](#)

[Patient information: Cryptosporidiosis \(The Basics\)](#)

[Patient information: Salmonellosis \(Salmonella\) \(The Basics\)](#)

[Patient information: E. coli \(The Basics\)](#)

[Patient information: Campylobacter infection \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient information: Acute diarrhea in adults \(Beyond the Basics\)](#)

[Patient information: Nausea and vomiting in infants and children \(Beyond the Basics\)](#)

[Patient information: Bloody stools in children \(Beyond the Basics\)](#)

[Patient information: Giardia \(Beyond the Basics\)](#)

[Patient information: Food poisoning \(food-borne illness\) \(Beyond the Basics\)](#)

[Patient information: Antibiotic-associated diarrhea caused by Clostridium difficile \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Approach to the diagnosis of chronic diarrhea in children in developed countries](#)

[Clinical manifestations, diagnosis and treatment of enterohemorrhagic Escherichia coli \(EHEC\) infection](#)

[Clinical manifestations and diagnosis of rotavirus infection](#)

[Clinical manifestations and diagnosis of noroviruses and related viruses](#)

[Viral gastroenteritis in children: Epidemiology, clinical presentation, and diagnosis](#)

[Evaluation of diarrhea in children](#)

[Lactose intolerance](#)

[Oral rehydration therapy](#)

[Pathogenesis of acute diarrhea in children](#)

[Persistent diarrhea in children in developing countries](#)

[Viral gastroenteritis in children: Prevention and treatment](#)

[Probiotics for gastrointestinal diseases](#)

[Shigella infection: Clinical manifestations and diagnosis](#)

[Differential diagnosis of microbial foodborne disease](#)

The following organizations also provide reliable health information.

- National Library of Medicine

(www.nlm.nih.gov/medlineplus/healthtopics.html)

- The Centers for Disease Control and Prevention

(www.cdc.gov/)

- National Institute of Diabetes and Digestive and Kidney Diseases

(www.niddk.nih.gov)

- The American Academy of Pediatrics

(www.aap.org)

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Topic 1202 Version 15.0

GRAPHICS**Signs and symptoms of dehydration in infants and children**

Finding	Mild (3-5 percent)	Moderate (6-9 percent)	Severe (≥10 percent)
Pulse	Full, normal rate	Rapid	Rapid and weak
Systolic pressure	Normal	Normal to low	Very low
Respirations	Normal	Deep, rate may be increased	Deep, rapid rate
Oral tissues	Tacky or slightly dry	Dry	Parched
Infant fontanelle (soft spot in skull)	Normal	Sunken	Markedly sunken
Eyes	Normal	Sunken	Markedly sunken
Skin	Normal	Cool	Cool, mottled, blue-tinged hands/feet
Urine output	Mildly reduced	Markedly reduced	Absent
Systemic signs	Increased thirst	Listlessness, irritability	Grunting, lethargy, coma

Graphic 52953 Version 3.0

Comparison of oral rehydration solutions (ORS) to other beverages

	Carbohydrate (g/L)	Sodium (mEq/L)	Potassium (mEq/L)
ORT			
CeraLyte	40	70	20
Enfalyte	30	50	25
Pedialyte	25	45	20
Rehydralyte	25	75	20
Other beverages (not appropriate for rehydration)			
Apple juice	100 to 150	3	20
Chicken broth	0	250	5
Colas	100 to 150	2	0.1
Gatorade	45	20	3
Ginger Ale	90	3.5	0.1
Tea	0	0	0

Adapted from: King CK, Glass R, Bresee JS, et al. Managing acute gastroenteritis among children: oral rehydration, maintenance, and nutritional therapy. *MMWR Recomm Rep* 2003; 52: 1.

Graphic 70752 Version 5.0

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Amount of oral rehydration solution to give child (over 4 hours) for mild dehydration, based on weight

English system		Metric system	
Weight, lbs	Volume, ounces	Weight, kilograms	Volume, milliliters
10	7.5	4	200
15	11.5	6	300
20	15	8	400
25	19	10	500
30	22.5	12	600
35	26.5	14	700
40	30	16	800
		18	900

Graphic 62163 Version 1.0

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