

# Urinary Incontinence in Children

*National Kidney and Urologic Diseases Information Clearinghouse*



U.S. Department  
of Health and  
Human Services

NATIONAL  
INSTITUTES  
OF HEALTH



## What is urinary incontinence (UI) in children?

Urinary incontinence is the loss of bladder control, which results in the accidental loss of urine. A child with UI may not stay dry during the day or night. Some UI is caused by a health problem such as

- a urinary tract infection (UTI)
- diabetes, a condition where blood glucose, also called blood sugar, is too high
- kidney problems
- nerve problems
- constipation, a condition in which a child has fewer than two bowel movements a week and stools can be hard, dry, small, and difficult to pass
- obstructive sleep apnea (OSA), a condition in which breathing is interrupted during sleep, often because of inflamed or enlarged tonsils
- a structural problem in the urinary tract

Most of the time, the exact cause of UI is not known, but it is often the result of more than one factor.

Although UI affects many children, it usually disappears naturally over time. UI after age 3—the age when most children achieve daytime dryness—may cause great distress and embarrassment. Many children experience

## Enuresis

Urinary incontinence is also called enuresis. Types of enuresis include the following:

- Primary enuresis is wetting in a child who has never been consistently dry.
- Secondary enuresis is wetting that begins after at least 6 months of dryness.
- Nocturnal enuresis is wetting that usually occurs during sleep, also called nighttime UI.
- Diurnal enuresis is wetting when awake, also called daytime UI.

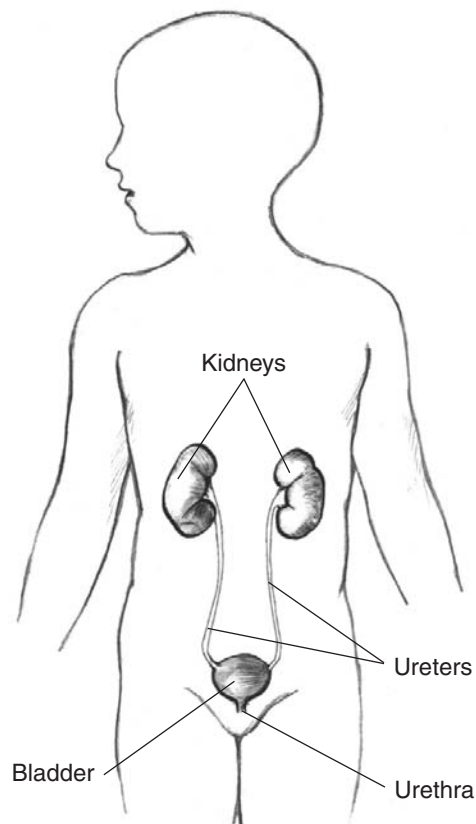
occasional UI, and treatment is available for most children who have a hard time controlling their bladder. Thus, caregivers of children who wet the bed or have accidents during the day should approach this problem with understanding and patience.

The age at which children achieve dryness varies. Wetting in younger children is common and not considered UI, so daytime UI is not usually diagnosed until age 5 or 6, and nighttime UI is not usually diagnosed until age 7.

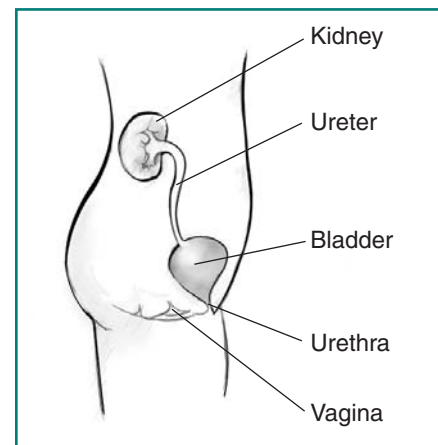
## How does the urinary tract work?

The urinary tract is the body's drainage system for removing wastes and extra water. The urinary tract includes two kidneys, two ureters, a bladder, and a urethra. The kidneys are two bean-shaped organs, each about the size of a fist. They are located near the middle of the back, just below the rib cage, one on each side of the spine. Every day,

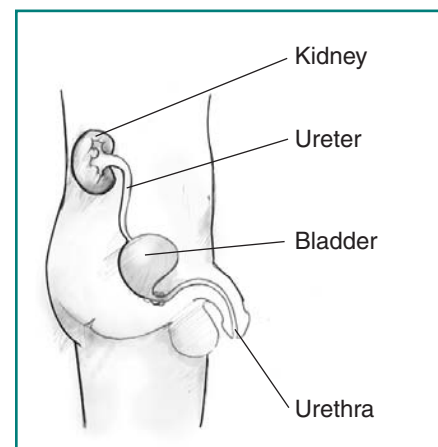
the two kidneys process about 200 quarts of blood to produce about 1 to 2 quarts of urine, composed of wastes and extra water. Children produce less urine than adults. The amount produced depends on their age. The urine flows from the kidneys to the bladder through tubes called ureters. The bladder stores urine until releasing it through urination. When the bladder empties, urine flows out of the body through a tube called the urethra at the bottom of the bladder.



Front view of the urinary tract



Side view of the female urinary tract



Side view of the male urinary tract

Circular muscles called sphincters help keep urine from leaking out of the bladder. The sphincters close tightly like rubber bands around the urethra. As the bladder fills with urine, the need to urinate becomes stronger and stronger, until the bladder reaches its limit. Urination is the process of emptying the bladder. To urinate, the brain signals the bladder muscles to tighten, squeezing urine out of the bladder. At the same time, the brain signals the sphincters to relax. As the sphincters relax, urine exits the bladder through the urethra. When all the signals occur in the correct order, normal urination occurs.

Babies' bladders fill to a set point, then automatically contract and empty. As children get older, their nervous system matures. The brain begins to get messages from the filling bladder and begins to send messages to the bladder to keep it from automatically emptying until children can reach a toilet. UI results when communication problems occur between the brain and bladder; these problems can range from simple to complex.

## How common is UI in children?

By 5 years of age, more than 90 percent of children can control urination during the day. Nighttime wetting is more common than daytime wetting in children, affecting 30 percent of 4-year-olds. The condition resolves itself in about 15 percent of children each year; about 10 percent of 7-year-olds, 3 percent of 12-year-olds, and 1 percent of 18-year-olds continue to experience nighttime wetting.<sup>1</sup>

---

<sup>1</sup>Urinary Incontinence in Children (Enuresis). The Merck Manuals Online Medical Library. [http://www.merckmanuals.com/professional/pediatrics/incontinence\\_in\\_children/urinary\\_incontinence\\_in\\_children.html](http://www.merckmanuals.com/professional/pediatrics/incontinence_in_children/urinary_incontinence_in_children.html). Updated August 2009. Accessed April 13, 2012.

## What causes nighttime UI?

The exact cause of most cases of nighttime UI is not known. Though a few cases are caused by structural problems in the urinary tract, most cases probably result from a mix of factors including slower physical development, an overproduction of urine at night, and the inability to recognize bladder filling when asleep. Nighttime UI has also been associated with attention deficit hyperactivity disorder (ADHD), OSA, and anxiety. Children also may inherit genes from one or both parents that make them more likely to have nighttime UI.

### Slower Physical Development

Between the ages of 5 and 10, bedwetting may be the result of a small bladder capacity, long sleeping periods, and underdevelopment of the body's alarms that signal a full or emptying bladder. This form of UI fades away as the bladder grows and the natural alarms become operational.

### Overproduction of Urine at Night

The body produces antidiuretic hormone (ADH), a natural chemical that slows down the production of urine. More ADH is produced at night so the need to urinate lessens. If the body does not produce enough ADH at night, the production of urine may not slow down, leading to bladder overfilling. If a child does not sense the bladder filling and awoken to urinate, wetting will occur.

## Structural Problems

A small number of UI cases are caused by physical problems in the urinary tract. Rarely, a blocked bladder or urethra may cause the bladder to overfill and leak. Nerve damage associated with the birth defect spina bifida can cause UI. In these cases, UI can appear as a constant dribbling of urine.

## Attention Deficit Hyperactivity Disorder

Children with ADHD are three times more likely to have nighttime UI than children without ADHD.<sup>2</sup> The connection between ADHD and bedwetting has not been explained, but some experts theorize that both conditions are related to delays in central nervous system development.

## Obstructive Sleep Apnea

Nighttime UI may be one sign of OSA. Other symptoms of OSA include snoring, mouth breathing, frequent ear and sinus infections, sore throat, choking, and daytime drowsiness. Experts believe that when the airway in people with OSA closes, a chemical may be released in the body that increases water production and inhibits the systems that regulate fluid volume. Successful treatment of OSA often resolves the associated nighttime UI.

## Anxiety

Anxiety-causing events that occur between 2 and 4 years of age—before total bladder control is achieved—might lead to primary enuresis. Anxiety experienced after age 4 might lead to secondary enuresis in children who have been dry for at least 6 months. Events that cause anxiety in children include physical or sexual abuse; unfamiliar social situations, such as moving or starting at a new school; and major family events such as the birth of a sibling, a death, or divorce.

UI itself is an anxiety-causing event. Strong bladder contractions resulting in daytime leakage can cause embarrassment and anxiety that lead to nighttime wetting.

## Genetics

Certain genes have been found to contribute to UI. Children have a 30 percent chance of having nighttime UI if one parent was affected as a child. If both parents were affected, there is a 70 percent chance of bedwetting.<sup>1</sup>

## What causes daytime UI?

Daytime UI can be caused by a UTI or structural problems in the urinary tract. Daytime UI that is not associated with UTI or structural problems is less common and tends to disappear much earlier than nighttime UI. Overactive bladder and infrequent or incomplete voiding, or urination, are common causes of daytime UI.

---

<sup>2</sup>Shreeram S, He JP, Kalaydjian A, Brothers S, Merikangas KR. Prevalence of enuresis and its association with attention-deficit/hyperactivity disorder among U.S. children: results from a nationally representative study. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2009 Jan;48(1):35–41.

## Overactive Bladder

Overactive bladder is a condition in which a child experiences at least two of the following conditions:

- urinary urgency—inability to delay urination
- urge urinary incontinence—urinary leakage when the bladder contracts unexpectedly
- urinary frequency—urination eight or more times a day or more than twice at night

## Infrequent or Incomplete Voiding

Infrequent voiding is when children voluntarily hold urine for prolonged periods of time. For example, children may not want to use the toilets at school or may not want to interrupt enjoyable activities, so they ignore the body's signal of a full bladder. In these cases, the bladder can overflow and leak urine. In addition, these children often develop UTIs, leading to an irritated or overactive bladder.

Factors that may combine with infrequent voiding to produce daytime UI include

- small bladder capacity
- structural problems
- anxiety-causing events
- pressure from constipation
- drinks or foods that contain caffeine

Sometimes, overly demanding toilet training may make children unable to relax the sphincters enough to completely empty the bladder. Incomplete voiding may also lead to UTIs.

## How is UI in children treated?

Most UI fades away naturally as a child grows and develops and does not require treatment. When treatment is needed, options include bladder training and related strategies, moisture alarms, and medications.

## Growth and Development

As children mature

- bladder capacity increases
- natural body alarms become activated
- an overactive bladder settles down
- production of ADH becomes normal
- response to the body's signal that it is time to void improves

## Bladder Training and Related Strategies

Bladder training consists of exercises to strengthen the bladder muscles to better control urination. Gradually lengthening the time between trips to the bathroom can also help by stretching the bladder so it can hold more urine. Additional techniques that may help control daytime UI include

- urinating on a schedule—timed voiding—such as every 2 hours
- avoiding food or drinks with caffeine
- following suggestions for healthy urination, such as relaxing muscles and taking enough time to allow the bladder to empty completely

Waking children up to urinate can help decrease nighttime UI. Ensuring children drink enough fluids throughout the day so they do not drink a lot of fluids close to bedtime may also help. A health care provider can give guidance about how much a child needs to drink each day, as the amount depends on a child's age, physical activity, and other factors.

## Moisture Alarms

At night, moisture alarms can wake children when they begin to urinate. These devices use a water-sensitive pad connected to an alarm that sounds when moisture is first detected. A small pad can clip to the pajamas, or a larger pad can be placed on the bed. For the alarm to be effective, children must awaken as soon as the alarm goes off, stop the urine stream, and go to the bathroom. Children using moisture alarms may need to have someone sleep in the same room to help wake them up.

## Medications

Nighttime UI may be treated by increasing ADH levels. The hormone can be boosted by a synthetic version known as desmopressin (DDAVP), which is available in pill form, nasal spray, and nose drops. DDAVP is approved for use in children. Another medication, called imipramine (Tofranil), is also used to treat nighttime UI, though the way this medication prevents bedwetting is not known. Although both of these medications may help children achieve short-term success, relapse is common once the medication is withdrawn.

UI resulting from an overactive bladder may be treated with oxybutynin (Ditropan), a medication that helps calm the bladder muscle and control muscle spasms.

## Eating, Diet, and Nutrition

Eating, diet, and nutrition have not been shown to play a role in causing or preventing UI in children, though ensuring sufficient fluid intake throughout the day and avoiding caffeine intake may be helpful.

## Points to Remember

- Urinary incontinence (UI) is the loss of bladder control, which results in the accidental loss of urine. A child with UI may not stay dry during the day or night. Although UI affects many children, it usually disappears naturally over time.
- By 5 years of age, more than 98 percent of children can control urination during the day. Nighttime wetting is more common than daytime wetting in children, affecting 30 percent of 4-year-olds.
- The exact cause of most cases of nighttime UI is not known. Though a few cases are caused by structural problems in the urinary tract, most cases result from more than one factor including slower physical development, an overproduction of urine at night, and the inability to recognize bladder filling when asleep.
- Nighttime UI has also been associated with attention deficit hyperactivity disorder (ADHD), obstructive sleep apnea (OSA), and anxiety. Certain genes have been found to contribute to UI.
- Daytime UI that is not associated with urinary tract infection (UTI) or structural problems in the urinary tract may be due to an overactive bladder or infrequent or incomplete voiding problems.
- Most UI fades away naturally as a child grows and develops and does not require treatment. When treatment is needed, options include bladder training and related strategies, moisture alarms, and medications.

## Hope through Research

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) conducts and supports research to help people with urologic diseases, including children. The NIDDK's Division of Kidney, Urologic, and Hematologic Diseases maintains the Pediatric Urology Program, which supports research into the early development of the urinary tract.

Participants in clinical trials can play a more active role in their own health care, gain access to new research treatments before they are widely available, and help others by contributing to medical research. For information about current studies, visit [www.ClinicalTrials.gov](http://www.ClinicalTrials.gov).

## For More Information

### **American Academy of Pediatrics**

National Headquarters  
141 Northwest Point Boulevard  
Elk Grove Village, IL 60007-1098  
Phone: 1-800-433-9016 or 847-434-4000  
Fax: 847-434-8000  
Internet: [www.aap.org](http://www.aap.org)

### **American Urological Association Foundation**

1000 Corporate Boulevard  
Linthicum, MD 21090  
Phone: 1-800-828-7866 or 410-689-3700  
Fax: 410-689-3998  
Email: [auafoundation@auafoundation.org](mailto:auafoundation@auafoundation.org)  
Internet: [www.UrologyHealth.org](http://www.UrologyHealth.org)

### **National Association for Continence**

P.O. Box 1019  
Charleston, SC 29402-1019  
Phone: 1-800-BLADDER (1-800-252-3337)  
or 843-377-0900  
Fax: 843-377-0905  
Email: [memberservices@nafc.org](mailto:memberservices@nafc.org)  
Internet: [www.nafc.org](http://www.nafc.org)

### **National Kidney Foundation**

30 East 33rd Street  
New York, NY 10016  
Phone: 1-800-622-9010 or 212-889-2210  
Fax: 212-689-9261  
Internet: [www.kidney.org](http://www.kidney.org)

### **The Simon Foundation for Continence**

P.O. Box 815  
Wilmette, IL 60091  
Phone: 1-800-23-SIMON (1-800-237-4666)  
or 847-864-3913  
Fax: 847-864-9758  
Internet: [www.simonfoundation.org](http://www.simonfoundation.org)

### **Society of Urologic Nurses and Associates**

East Holly Avenue, Box 56  
Pitman, NJ 08071-0056  
Phone: 1-888-827-7862 or 856-256-2335  
Fax: 856-589-7463  
Email: [suna@ajj.com](mailto:suna@ajj.com)  
Internet: [www.suna.org](http://www.suna.org)

## Acknowledgments

Publications produced by the Clearinghouse are carefully reviewed by both NIDDK scientists and outside experts. This publication was originally reviewed by Stuart B. Bauer, M.D., Harvard Medical School and Children's Hospital, Boston.

You may also find additional information about this topic by visiting MedlinePlus at [www.medlineplus.gov](http://www.medlineplus.gov).

This publication may contain information about medications. When prepared, this publication included the most current information available. For updates or for questions about any medications, contact the U.S. Food and Drug Administration toll-free at 1-888-INFO-FDA (1-888-463-6332) or visit [www.fda.gov](http://www.fda.gov). Consult your health care provider for more information.

The U.S. Government does not endorse or favor any specific commercial product or company. Trade, proprietary, or company names appearing in this document are used only because they are considered necessary in the context of the information provided. If a product is not mentioned, the omission does not mean or imply that the product is unsatisfactory.

## National Kidney and Urologic Diseases Information Clearinghouse

3 Information Way  
Bethesda, MD 20892-3580  
Phone: 1-800-891-5390  
TTY: 1-866-569-1162  
Fax: 703-738-4929  
Email: [nkudic@info.niddk.nih.gov](mailto:nkudic@info.niddk.nih.gov)  
Internet: [www.urologic.niddk.nih.gov](http://www.urologic.niddk.nih.gov)

The National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIDDK is part of the National Institutes of Health of the U.S. Department of Health and Human Services. Established in 1987, the Clearinghouse provides information about diseases of the kidneys and urologic system to people with kidney and urologic disorders and to their families, health care professionals, and the public. The NKUDIC answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and Government agencies to coordinate resources about kidney and urologic diseases.

This publication is not copyrighted. The Clearinghouse encourages users of this publication to duplicate and distribute as many copies as desired.

This publication is available at [www.urologic.niddk.nih.gov](http://www.urologic.niddk.nih.gov).



U.S. DEPARTMENT OF HEALTH  
AND HUMAN SERVICES  
National Institutes of Health

NIH Publication No. 12-4095  
June 2012



The NIDDK prints on recycled paper with bio-based ink.