Urinary Tract Infection (UTI)

Many of the children we work with have recurrent urinary tract infections. Often, children with recurrent urinary tract infections have issues with dysfunctional voiding and sometimes enuresis. This section will give you an overview on urinary tract infections.

What is the Urinary Tract?
The kidneys filter blood to produce urine. Urine travels from the kidneys down the ureters and into the urinary bladder. The urine is stored in the bladder until urination occurs. The tube through which urine then passes out of the bladder during urination is called the urethra.

What is a Urinary Tract Infection (UTI)?
A urinary tract infection is an inflammation of the bladder or of the bladder and the kidneys. It is usually caused by bacteria, from the skin outside the urethra, moving up the urethra and into the bladder. If the bacteria stay in the bladder, the infection is called cystitis. If the bacteria are in the kidneys, it is called pyelonephritis. These infections are not contagious. Please see Figure 1, below.
What are the signs and symptoms of Urinary Tract Infection?
The signs and symptoms of urinary tract infections in children depend on the child's age, and may include any or all of the following:

**Infants***
- Fever
- Irritability
- Inconsolable by mother or father
- Vomiting and diarrhea
- Poor feeding
• Failure to gain weight

*Since these are generalized symptoms in most infants, the diagnosis of urinary tract infections may be overlooked.

**Older Children**

• Burning or pain with urination
• Frequent or urgent urination
• Fever
• Lower abdominal pain
• New wetting episodes or more frequent occurrences
• Side or back pain
• Blood in urine (gross or seen on urinalysis)

As the child reaches toddler age, more classic symptoms appear, such as pain on urination, urinary frequency and urgency. It becomes easier to recognize urinary tract infections as the child becomes verbal and is toilet-trained.

Sometimes the above-listed symptoms result and/or can be aggravated by other causes of urethral irritation, such as bubble baths, poor hygiene, or constipation.

Regardless of age, bladder infection (cystitis) is not usually associated with fever, and generally does not produce any long-term damage to the bladder or kidneys.

However, kidney infection (pyelonephritis) is usually associated with a high fever and may produce permanent damage or scarring of the kidney even after only one infection. This is particularly true in the very young child.

How can you tell if my child has a Urinary Tract Infection? We will first talk with your child and yourself about her/his health
in general and then specifically regarding her/his symptoms. After collecting a good specimen, we look at your child's urine with a microscope (urinalysis). To be certain that there is an infection, we will also do a urine culture. Your doctor will have the results of the urine culture after 24 hours. If infection is present, an additional 24 hours is usually necessary to find out which antibiotic will kill all of the bacteria.

The method of urine collection will affect the accuracy of the urine culture. It is important to:

- Wash the skin around the urethra with the cleansing pad to get rid of the bacteria on the skin's surface.
- If the urine is collected at home, keep the urine sample cold by placing it in the refrigerator at home and packing it in ice while traveling to the doctor's office.

In small children, the urine sample is usually collected by placing a special bag over the genital area. Because bacteria from the skin may contaminate these samples, it may sometimes be necessary to pass a small plastic tube through the urethra into the bladder (bladder catheterization) to obtain a clean specimen.

When should my child be evaluated for Urinary Tract Infections?
Children who have a culture-proven urinary tract infection should have an x-ray evaluation. This is especially important for infants and small children, since most of them will develop another urinary tract infection. Waiting until a child has had two or more urinary tract infections before having him evaluated by x-ray increases the risk that permanent kidney damage or scarring may occur. Abnormalities of the urinary tract will be detected in 25% to 50% of children with documented urinary tract infection.

What does the evaluation consist of?
Naturally, we will discuss this procedure and any others that we believe would be important for you or your child. We will also provide you with some reading material, which explains each study in more detail. Here are some basic descriptions:

- **VCUG (voiding cystourethrogram):** This study gives us important information regarding the shape and size of the bladder, the bladder neck (or opening) and the tubes, called ureters, that drain the urine from the kidneys into the bladder.

  A small plastic tube is inserted into the urethra and a fluid (contrast media) flows into the bladder. While your child's bladder is filling, he or she can watch a video. We encourage the children to bring along their favorite one, and we always have a few favorites, like the Lion King, on hand. Pictures are taken while your child's bladder is filling. When your child's bladder is full, we remove the catheter and take a picture as he or she urinates (voids). After the study is done, we will review the films with you and your child. Together we will discuss a plan of care.

  The procedure is not painful per se, but some discomfort may occur when the tube is placed. Most of all, the experience may be perceived by your child as scary and certainly unusual. Your child will take his or her cues from you, feeling more comfortable if you are. It is most important that at last one parent remain with his or her child in the room at all times. We will explain everything as we go. The more detailed literature will discuss more strategies to help minimize your child's anxiety during this study. Usually the test takes 20-30 minutes.

  **What are you looking for?**

  **Vesicoureteral reflux**, the abnormal back flow of urine from the bladder into the ureter and up to the kidney, is the most common
problem found. Reflux is dangerous because it allows bacteria that might be in the bladder to reach the kidney. This can cause a kidney infection and lead to kidney damage.

- **Kidney/Bladder Sonogram** (ultrasound): Otherwise known as "jelly-on-the-belly." This test is done to outline the kidneys, ureters and bladder. It looks for additional urinary tract defects that could be the cause of infection. The test does not require radiation and is painless.

- **Kidney (Renal) Scan**: This test may be done if the above tests are abnormal. It is used to better demonstrate the actual function and drainage of the kidneys. A kidney scan can also show if there is kidney damage and scarring.

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**Treatment of Urinary Tract Infection**

- All children with urinary tract infection are treated with a safe and well-tolerated antibiotic that the urine culture shows will be effective. Children with a bladder infection can usually be treated with a short course (7 days). Children with a kidney infection should be treated for 10-14 days. A child who is very ill or a child with a kidney infection will most likely require hospitalization for intravenous antibiotics until the fever goes away and the urine culture results are known.

- Another urine culture will be done while your child is taking the antibiotic or when the medication is finished to make sure the infection is gone.

- If your child has never been evaluated, the antibiotics should be continued until the appropriate x-rays are done and you have been instructed by our office that it is safe to stop the antibiotics.
- Children with urinary infections may have unhealthy voiding habits. These children are often helped by establishing a schedule and completely emptying their bladder every 2-3 hours. This problem usually disappears as the child enters puberty and, if no kidney damage was present at the time of initial evaluation, these children are not at greater risk for serious problems in the future.
- Some children who have repeated urinary tract infections for no obvious reason may require continuous low-dose medication for a period of time.
- Stretching the urethra (urethral dilation) is rarely indicated and is not a technique ascribed to by our urology team. In the past, it was assumed that many girls who got urinary tract infections had narrow or tight urethras. We now know that the size of the urethra is no different between those girls who have infections and those who do not.
- Treatment for children who are found to have vesicoureteral reflux will vary according to the child's age, number of urinary tract infections and the findings on the above described tests. Our urology team will discuss this further with you.

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**Vesico-Ureteral Reflux**

**Program Description**
Vesicoureteral reflux is defined as the abnormal retrograde flow of bladder urine into the upper urinary tract through an incompetent valve in the urinary bladder. Reflux and recurrent urinary tract infection are the most common cause of renal scarring in children which can lead to hypertension or renal failure requiring dialysis and kidney transplantation. In children without urologic symptoms or history of infection, the incidence of reflux is likely less than 1%. In children with a history of symptomatic urinary tract
infection, the incidence of reflux has been estimated to range from 20 - 50%.

Reflux should be suspected in all pediatric patients who have a documented urinary tract infection. Reflux is diagnosed by a bladder x-ray called a voiding cystourethrogram. More recently we have diagnosed reflux on prenatal ultrasound.

Fortunately, once the diagnosis of reflux is confirmed patients can be successfully managed without surgery. This requires treatment with prophylactic antibiotics until the child outgrows the disease. A minority of patients can be effectively treated with surgery. Indications for surgery include severe reflex that does not get better on its own or break-through infections even while on antibiotics.

**Components of Excellence**
Dr. Laurence Baskin is board-certified in all aspects of urology but limits his practice exclusively to pediatric patients. He is an active member of the American Academy of Pediatrics, Section of Urology, the Society of Pediatric Urology and the Society of Fetal Urology. Dr. Baskin is also fellowship-trained specifically in the field of pediatric urology and has extensive experience in all aspects of the urologic care of children.

**Volume and Outcome Measures**

**Clinical**
During the period from July 1,1995 until June 30,1996, 129 children were treated for vesico-ureteral reflux (31 were treated surgically and 98 were treated non-surgically.) There were no clinical complications in the care of any patient.

Follow-up radiographic studies have shown that the reflux was cured in 98% of patients seen by UCSF pediatric urologists. The
average length of inpatient hospital stay for the surgical repair of reflex was 3.0 days, 2 - 3 days shorter than the average length of hospital stay (ALOS) at other northern California hospitals.

**Patient (Parent) Satisfaction**
Satisfaction questionnaires were sent to the parents of the 129 children who were treated during this period. Fourteen questionnaires were returned as undeliverable (3 from the surgical group and 11 from the non-surgical group.) Responses were received from the parents of 51 children (12 [43%] of surgical patients and 39 [45%] of non-surgical patients), for an overall response rate of greater than 80%.

Over 90% of the parents of patients treated surgically and 100% of parents whose children were treated non-surgically were satisfied with the care their children received.

Of the children whose cystograms were performed at UCSF, 94% of the parents were satisfied with the way their child's cystogram was handled by the physician and staff. 92% of the parents were satisfied with the amount and kind of information they received from the physicians about their child's diagnosis and treatment, and 92% also felt that they received enough information so that they knew what to expect and how to take care of their child at home.

**Conclusion**
Vesicoureteral reflux is one of the most common urologic procedures treated by pediatric urologists. An increase in understanding of the pathologic mechanisms and natural history of reflux has led to improvements in both medical and surgical approaches to treating this disease. The effective treatment of patients with reflux depends greatly upon early detection of reflux and institution of antibiotic prophylaxis. Close follow-up and periodic reevaluation are necessary for all patients. When
indicated, surgical correction of reflux has been shown to be safe and effective in the hands of experienced pediatric urologists.

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