

**COVER SHEET**  
**COMPLICATED or RECURRENT UTI PATHWAY**

**6/03/2008**

**Patients to *include* on pathway:** (Patients must have all of these):

- Patients one month or older with fever, clinical signs **and** a urinalysis consistent with a urinary tract infection.
- Patients with stable vital signs and no clinical signs of sepsis
- Patients with a past history of UTI or patients with known GU anomalies (e.g. posterior urethral valves, UPJ obstruction, kidney stones, neurogenic bladder).

**Patients to *exclude* from pathway:** (Patients with any of these):

- Patients under one month of age
- Immunocompromised patients or patients with **significant** co-morbid conditions

**Patients should be considered for removal from the pathway if:**

(nursing staff should contact physician if any of the following apply)

- No significant improvement in clinical condition within 24 - 48 hours (persistent fever alone is not unexpected)
- Significant clinical deterioration
- Diagnosis of UTI becomes uncertain

**Criteria for admission:**

- All patients with UTIs who are 1-3 months old
- For patients 3 months of age or older, if any of the following apply:
  - Unable to take PO medications
  - Unable to maintain hydration by oral intake
  - General ill appearance

**Criteria for discharge** (Patients must have all of these):

- Significant improvement in fever and pain
- Taking PO fluids and medications without difficulty
- Safe and stable home situation

**Background information:**

- Urinary Tract Infections are the most common bacterial cause of unexplained fever in infants and young children.
- Most UTIs are caused by E. Coli and other enteric gram negative organisms.
- A large proportion of such organisms are resistant to ampicillin and sulfamethoxazole/trimethoprim (Bactrim, Septra) but sensitive to 1st generation cephalosporins. It is unusual for 1st time UTIs to be caused by organisms requiring a third generation cephalosporin. In children with GU anomalies or recurrent UTIs, broader spectrum antibiotics are warranted given a higher incidence of resistant organisms.
- In very young infants (under 2 months), group B streptococcus may also cause UTI.
- Most febrile UTIs are presumed to be pyelonephritis .
- Hypertension is the most common serious complication of pyelonephritis. All patients with suspected pyelonephritis should be screened for hypertension.
- Once patients are stable and are able to take oral medications, even pyelonephrities can be treated as an outpatient with oral antibiotics. There is no difference in efficacy between oral and IV antibiotics for treatment of UTIs in patients with normal urinary tracts.
- UTIs are 5-10 times more common in uncircumcised male infants than in circumcised male infants or female infants.
- UTIs are more common in infants and children with urologic anomalies or vesicoureteral reflux. For this reason, imaging studies (renal ultrasound and in many cases VCUG) are indicated in patients for UTI.

**Goals**

- Ensure appropriate choice of antibiotics for empiric treatment of UTI
- Reduce unnecessary use of monitors
- Screen all patients with UTI for hypertension
- Provide education for patients and families

Bauer R, Kogan B. 2008. "New Developments in the Diagnosis and Management of Pediatric UTIs" *Urologic Clinic North America* 35(1): 47-58; vi

Committee on Quality Improvement 1999. "The Diagnosis, Treatment, and Evaluation of the Initial Urinary Tract Infection in Febrile Infants and Young Children" *American Academy of Pediatrics* 103(4 Pt 1): 843-52

McDonald A, Scranton M, Gillespie R, Mahajan V, Edwards G. 2000. "Voiding Cystourethrograms and Urinary Tract Infections: How Long to Wait?" *Department of Pediatrics* 105(4)

Weight:

Allergies:

Time/  
Date:

**ORDERS**

**General:**

- Diagnosis: Recurrent or Complicated urinary tract infection
- Estimated length of stay = 2 days
- Condition: Stable
- Activity: As tolerated for age
- Vitals (including blood pressure) and Pain Assessment: every 4 hrs times 3, then routine. Notify physician of hypertension (if <15mm above normal, notification is non-urgent and MD should be notified during daytime hours).
- Initiate "Learning Assessment" and implement UTI education.
- On admit, assess discharge needs and make appropriate referrals (see pediatric admission database)
- If patient self-catheterizes, I/O catheterization per home regimen
- Latex precautions if patient has spina bifida

Definition of Hypertension:	BP greater than values below on 3 measurements	
Age	Systolic BP	Diastolic BP
1 month to 6 months	100	55
6 mos - 1 yr	105	60
1 -3 years	110	65
3 - 10 years	115	75
10 - 18 years	120	80

**Education:**

- 1) **BEGIN EDUCATION ON ADMISSION**
- 2) Review educational materials regarding UTI with the family
  - Review reasons to call physician or return to ER
  - If patient self-catheterizes at home, review clean self-catheterizing techniques with patient and parent.

If initiated in ER for ER use only	
initial	date/time

**Diet and Fluids:**

- Diet: Age-appropriate, encourage fluids.
- IV fluids at 1 times maintenance (see chart below).
- Continue IV fluids until patient is taking PO fluids well and has good urine output (>1ml/kg/hr averaged over shift). Then wean IV fluids as tolerated to heplock
- If patient appears dehydrated, discuss with physician need for additional fluid orders
- Do not add potassium to IV fluids and **notify physician** if **serum potassium > 5.5** or **serum creatinine is:**

serum creatinine	age	sex
> 0.6	< 12	boys & girls
> 0.7	≥ 12	girls
> 0.9	≥ 12	boys

\* Definition of Maintenance IV Fluids:

0-10	Kg	4ml/kg/hr
11-20	Kg	40 ml/hr + (2ml/kg/hr for each kg > 10)
>20	Kg	60 ml/hr + (1ml/kg/hr for each kg > 20)

for children ≤15 Kg, use D5 ¼ NS; add 20 mEq KCl/L  
 for children >15 Kg, use D5 ½ NS; add 20 mEq KCl/L

**Complicated UTI**

Patient Label







## Recurrent or Complicated UTI Pathway

DATE	PROCEDURE AND TREATMENTS	DONE	DATE	X-RAY	DONE	DATE	LABORATORY	DONE																														
	<ul style="list-style-type: none"> <li>Notify PHYSICIAN of hypertension (if &lt;15mm above normal, notification is non-urgent and physician should be notified during daytime hours)</li> </ul> <p style="text-align: center;">Definition of hypertension: BP greater than values below on 3 measurements</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Age</th> <th style="text-align: center; padding: 2px;">Systolic BP</th> <th style="text-align: center; padding: 2px;">Diastolic BP</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">1 - 6 mos</td> <td style="text-align: center; padding: 2px;">100</td> <td style="text-align: center; padding: 2px;">55</td> </tr> <tr> <td style="padding: 2px;">6 mos - 1 yr</td> <td style="text-align: center; padding: 2px;">105</td> <td style="text-align: center; padding: 2px;">60</td> </tr> <tr> <td style="padding: 2px;">1 - 3 yrs</td> <td style="text-align: center; padding: 2px;">110</td> <td style="text-align: center; padding: 2px;">65</td> </tr> <tr> <td style="padding: 2px;">3 - 10 yrs</td> <td style="text-align: center; padding: 2px;">115</td> <td style="text-align: center; padding: 2px;">75</td> </tr> <tr> <td style="padding: 2px;">10 - 18 yrs</td> <td style="text-align: center; padding: 2px;">120</td> <td style="text-align: center; padding: 2px;">80</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>CR monitor for patients &lt; 3mos of age (discontinue if patient stable for 12 hours)</li> <li>If patient self-catheterizes - I/O catheterization as per home regimen</li> </ul>	Age	Systolic BP	Diastolic BP	1 - 6 mos	100	55	6 mos - 1 yr	105	60	1 - 3 yrs	110	65	3 - 10 yrs	115	75	10 - 18 yrs	120	80			<b>PHYSICIAN TO SPECIFY WHICH IMAGING TEST TO BE ORDERED:</b> <input type="checkbox"/> Renal U/S (notify physician of results)  <input type="checkbox"/> VCUG  <input type="checkbox"/> DMSA (based on consult with Urology or Nephrology)			<ul style="list-style-type: none"> <li>Insure that CBC, blood culture, basic metabolic panel obtained prior to admit, send any that have not.</li> <li>UA and <b>urine culture:</b> Urine should be obtained by cath in most cases. If unable to cath, <u>call physician</u>. For children who can fully cooperate, urine may be obtained by mid stream catch with <u>direct nursing supervision</u>. No bagged samples - if urine obtained initially by bag, obtain repeat sample by catheterization/clean catch as soon as possible and before administering antibiotics.</li> <li>If patient receives gentamicin for &gt;48 hrs., <b>call physician</b> to determine whether to get peak and trough levels</li> <li>Send comprehensive metabolic panel, uric acid, and phosphorus if on admission potassium is over 5.5 OR  <table style="font-size: small; margin-left: 20px;"> <tr> <td><u>creatinine</u></td> <td><u>age</u></td> <td><u>sex</u></td> </tr> <tr> <td>&gt; 0.6</td> <td>&lt; 12</td> <td>boys &amp; girls</td> </tr> <tr> <td>&gt; 0.7</td> <td>≥ 12</td> <td>girls</td> </tr> <tr> <td>&gt; 0.9</td> <td>≥ 12</td> <td>boys</td> </tr> </table> </li> </ul>	<u>creatinine</u>	<u>age</u>	<u>sex</u>	> 0.6	< 12	boys & girls	> 0.7	≥ 12	girls	> 0.9	≥ 12	boys	
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## Interdisciplinary Patient/Family Learning Evaluation

### Initial Patient/Family Learner Assessment

A learning evaluation is done with each initial teaching intervention for each learner. Teaching interventions should be documented in an ongoing manner with ongoing assessment and evaluation of readiness to learn, barriers to learning, and learning outcomes. Use your department or topic specific Interdisciplinary Patient/Family Education Documentation forms for ongoing patient/parent/family education documentation. Use this form for the initial assessment of a learner and keep this form with the ongoing patient/family education documentation forms.

Initial Learner Evaluation (assess one or multiple learners)			
1. _____ Date _____ (Pt./Primary care giver)	2. _____ Date _____ learner	3. _____ Date _____ learner	4. _____ Date _____ learner
<b>Prior Knowledge of Plan of Care or care needs:</b> <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____	<b>Prior Knowledge of Plan of Care or care needs:</b> <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____	<b>Prior Knowledge of Plan of Care or care needs:</b> <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____	<b>Prior Knowledge of Plan of Care or care needs:</b> <input type="checkbox"/> Comprehensive <input type="checkbox"/> Good <input type="checkbox"/> Limited <input type="checkbox"/> None <input type="checkbox"/> Other _____
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<b>Readiness to learn:</b> check <input type="checkbox"/> Asking pertinent questions <input type="checkbox"/> Actively Listening <input type="checkbox"/> Unreceptive <input type="checkbox"/> No interest demonstrated <input type="checkbox"/> Distracted	<b>Readiness to learn:</b> check <input type="checkbox"/> Asking pertinent questions <input type="checkbox"/> Actively Listening <input type="checkbox"/> Unreceptive <input type="checkbox"/> No interest demonstrated <input type="checkbox"/> Distracted	<b>Readiness to learn:</b> check <input type="checkbox"/> Asking pertinent questions <input type="checkbox"/> Actively Listening <input type="checkbox"/> Unreceptive <input type="checkbox"/> No interest demonstrated <input type="checkbox"/> Distracted	<b>Readiness to learn:</b> check <input type="checkbox"/> Asking pertinent questions <input type="checkbox"/> Actively Listening <input type="checkbox"/> Unreceptive <input type="checkbox"/> No interest demonstrated <input type="checkbox"/> Distracted
<b>Barriers to learning:</b> check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other	<b>Barriers to learning:</b> check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other	<b>Barriers to learning:</b> check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other	<b>Barriers to learning:</b> check <input type="checkbox"/> No barriers <input type="checkbox"/> Low literacy or Edu level <input type="checkbox"/> Cultural <input type="checkbox"/> Language <input type="checkbox"/> Visual, hearing, speaking <input type="checkbox"/> Religious, spiritual <input type="checkbox"/> Cognitive <input type="checkbox"/> Emotional <input type="checkbox"/> Motivation <input type="checkbox"/> Pain or fatigue <input type="checkbox"/> Other _____ Accommodation: <input type="checkbox"/> Interpreter <input type="checkbox"/> Audio <input type="checkbox"/> Visuals <input type="checkbox"/> Handouts <input type="checkbox"/> Explanations <input type="checkbox"/> Demonstrations <input type="checkbox"/> Other
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Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____
Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____	Signature _____ Date _____

Patient Label

0006



pathway



**Patient/Family Learner Assessment**





## Urinary Tract Infection

Pathway Education Sheet

### What is a Urinary Tract Infection ?

When germs (bacteria) get into the urinary tract, they can cause a urinary tract infection (UTI). "Pyelonephritis" is what we call the infection when the kidneys are involved.

UTI's are common in:

- Baby boys and baby girls

UTI's are more common in:

- Girls over two years of age than with boys in this age group
- Uncircumcised baby boys than in circumcised baby boys.
- Children with neurogenic bladders, renal stones and abnormal anatomy of the genitourinary (GU) system

### What is the Urinary Tract?

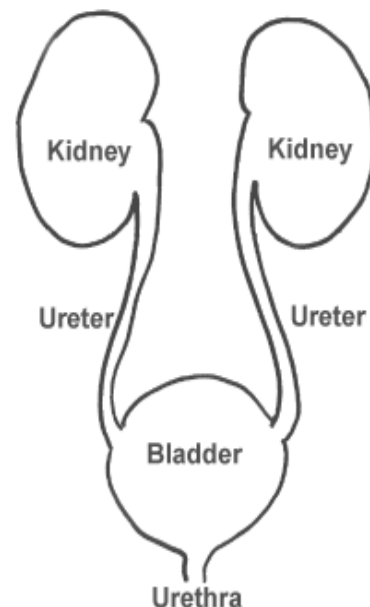
The urinary tract includes two kidneys, two ureters, the bladder and the urethra. (**Normal anatomy**)

**Kidneys** - Make urine (pee). They clean the blood and remove waste products. These waste products leave the body in the urine.

**Ureters** - Are long tubes attached to the kidneys. The urine moves down these tubes into the bladder.

**Bladder** - Collects and holds the urine until it leaves the body. It is connected to another tube called the urethra.

**Urethra** - The urine moves from the bladder through the urethra, and leaves the body. In boys, the urethra ends at the tip of the penis, and in girls it is the opening above the vagina.



### **How did my child get a UTI?**

Germ (bacteria) enter the urinary tract from the urethral opening. Although it is not certain, good hygiene may help decrease the chance of infection.

### **How will I know if my child has a UTI?**

Some children will have many signs, some may only have one. With young children, it won't always be obvious to parents. Look for one or more of the signs listed below:

- Fever
- Pain or burning when urinating
- Needing to urinate more often than usual
- Having the urge to urinate even after urinating
- Bad smelling urine
- Pain to back, side, lower belly, inner thigh or genital (vagina or penis) area
- Vomiting (throwing up)
- Inability to control urination
- Not wanting to eat
- Diarrhea (watery stools)
- Failure to grow
- Dehydration (not enough liquids for your child)

### **How will the doctor know if a child has a urinary tract infection?**

A urine sample will be taken and sent for laboratory testing (urinalysis). The test looks for white blood cells and bacteria in the urine. An ultrasound, x-ray, or other tests may also be ordered because sometimes there are changes in the normal anatomy of the urinary tract that makes it easier to get an infection. It is very important for your doctor to check for such problems with the first urinary tract infection.

### **What can I do to help prevent a UTI? What can I do at home?**

- Have your child urinate frequently. This allows the urine, along with any germs, to leave the body before they have a chance to start growing.
- Treat constipation if this is a problem for your child, as it may cause pressure or blockage and the bladder may not be emptying properly.
- Practice good hygiene. Girls should wipe from front to back after using the toilet. With infants there should be frequent diaper changes and cleansing. For boys, cleaning around the foreskin is important.
- Buy cotton underwear for your child. Cotton allows better air circulation which reduces the growth of bacteria.
- Avoid tight clothing.
- Bubble baths and oils should not be used. The ingredients can irritate the urethra of boys and girls. Do not allow the child to sit in a bathtub that is full of soap and shampoo.

- Rinse the child's bottom area well.
- Give your child plenty of water to drink.
  - Treat pinworms as they can travel to the urethra and carry bacteria from the stool up the urinary tract.
  - Delay potty training if necessary, as children tend to hold their urine longer when out of diapers.

**What is the treatment?**

The infection is treated with antibiotics. As with all infections being treated with antibiotics, your child must take the medicine until it is **all gone**. It is expected that your child will feel better within a couple of days, but all of the germs won't be killed unless all of the medicine is taken.

**Why is it important to treat UTI's early and completely?**

Unless treated right away and completely, urinary tract infections can cause kidney damage and high blood pressure. This is why it is important to have your child checked for any abnormal anatomy of the GU system that might make it easy to get urinary tract infections in the future. If not treated, a urinary tract infection can spread to other parts of the body such as the blood.

**When should I call my doctor?**

Contact your doctor if any of the signs listed above happen again.

# Discharge Sheet

## For Hospital Use Only

Dictation: 1-800-411-1001 (#963)

D/S Job #: \_\_\_\_\_

Discharge sheet FAXed to PCP \_\_\_\_\_  
initial/date

Follow-up appointment SCHEDULED with PCP \_\_\_\_\_  
initial/date

**Patient's Name:** \_\_\_\_\_ **Discharge Date:** \_\_\_\_\_

**Dx:** 1) UTI (Recurrent or Complicated) 2) \_\_\_\_\_ 3) \_\_\_\_\_

### Hospital Course

Patient was evaluated for fever and found to have a urinary tract infection. Patient was treated with IV fluids and IV antibiotics. The patient's symptoms improved.

**Treated with:**  Ampicillin and Gentamicin or  \_\_\_\_\_

**Imaging:**  renal ultrasound  VCUG  DMSA Results: \_\_\_\_\_

**Urine culture results:** organism: \_\_\_\_\_  
sensitivities: \_\_\_\_\_

**Consults:** \_\_\_\_\_

**Complications during hospitalization:** \_\_\_\_\_

**Discharge Condition:** \_\_\_\_\_

**Discharge Weight:** \_\_\_\_\_

### Instruction to Patient

**Activity:** As tolerated

**Diet:** Regular for age. Encourage liquids.

**Medications:** See Medication Reconciliation Form

**Follow-up:** 1) Additional studies needed: \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

**Additional instructions:** Contact primary doctor if your child's fever persists or returns.

**Reference:** Patient Education Sheet

Signed: \_\_\_\_\_ M.D.

\_\_\_\_\_  
Signature of Parent or Guardian

\_\_\_\_\_  
Attending Physician

\_\_\_\_\_  
Attending Resident

\_\_\_\_\_  
Primary Care Physician

\_\_\_\_\_  
City

### Complicated UTI



Patient Label

### Discharge Instructions