COVER SHEET
COMPLICATED or RECURRENT UTI PATHWAY 11/2009

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

- Patients 28 days 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 28 days of age, unless completed R/O Sepsis work up.
- 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
28 days 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). Wean IV fluids as tolerated to saline lock if PIV and heparin lock if patient has central line.
- 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

Physician's Signature/ID number : ______________________ **Date:** ____/____/____ **Time:** _________

Complicated UTI

Patient Label

0032

pathway 11/2009

Physician's Order Sheet

Time/ Date:

Monitoring:
- CR monitor for patients under 3 months of age
- Discontinue monitor if patient has been stable for 12 hours

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

Medications:

Antibiotic: Antibiotic choice should be based on last positive urine culture result of bacteria and minimal inhibitory concentrations (MICs). If no past urine culture at Children's Hospital Central California, then **notify physician** of need for antibiotic: Ampicillin and Gentamicin or ____________________ (patients with renal dysfunction may require dosage adjustment - **nurse to contact pharmacy**)

DOSING:

Ampicillin 100 mg/kg/day IV divided every 6 hrs (maximum dose 4 grams/day)
Gentamicin per pharmacy protocol.

Acetaminophen 15 mg/kg (max dose = 650 mg) PO/PR every 4 hrs PRN T > 38.4 C or for mild pain (max dose = 75mg/kg/day or 4gm/day whichever is less)

Contact Pharmacy to adjust and monitor dosing of all medications if :

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

Laboratory Studies

- Ensure that CBC, blood culture, basic metabolic panel have been sent prior to admission. Send any that have not.
- Urinalysis **and urine culture:**
  - ➢ Urine should be obtained by catheterization in most cases. If unable to catheterize, **CALL physician**. For children who can fully cooperate, urine sample may be obtained **under direct nursing supervision** by midstream clean catch. Bag samples are not acceptable. If urine was initially obtained by bag, obtain a repeat sample as soon as possible and before administering antibiotics.
- Send comprehensive metabolic panel, uric acid, and phosphorus if on admission potassium is over 5.5 OR creatinine is:

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

Imaging **(physician to specify which imaging tests to be ordered)**

Check appropriate:
- ☐ Renal ultrasound (notify MD of ultrasound results)
- ☐ VCUG
- ☐ DMSA (based on consult with Urology or Nephrology)

Follow-up:

- On day of discharge, consult physician about need for outpatient VCUG. If indicated, schedule VCUG for 2 weeks after discharge and enter appointment on discharge instruction sheet
- FAX discharge instructions (once signed by physician) to primary care physician.

Physician's Signature/ID number : ______________________________ **Date:** ____/____/____ **Time:** _________

Patient Label

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
Prior Knowledge of Plan of Care or care needs: ❑ Comprehensive ❑ Good ❑ Limited ❑ None ❑ Other__________	**Prior Knowledge of Plan of Care or care needs:** ❑ Comprehensive ❑ Good ❑ Limited ❑ None ❑ Other__________	**Prior Knowledge of Plan of Care or care needs:** ❑ Comprehensive ❑ Good ❑ Limited ❑ None ❑ Other__________	**Prior Knowledge of Plan of Care or care needs:** ❑ Comprehensive ❑ Good ❑ Limited ❑ None ❑ Other__________
Primary Language: check ❑ English ❑ Spanish ❑ Hmong Other_______ ❑ Writes ❑ Reads	**Primary Language:** check ❑ English ❑ Spanish ❑ Hmong Other______ ❑ Writes ❑ Reads	**Primary Language:** check ❑ English ❑ Spanish ❑ Hmong Other______ ❑ Writes ❑ Reads	**Primary Language:** check ❑ English ❑ Spanish ❑ Hmong Other_______ ❑ Writes ❑ Reads
Readiness to learn: check ❑ Asking pertinent questions ❑ Actively Listening ❑ Unreceptive ❑ No interest demonstrated ❑ Distracted	**Readiness to learn:** check ❑ Asking pertinent questions ❑ Actively Listening ❑ Unreceptive ❑ No interest demonstrated ❑ Distracted	**Readiness to learn:** check ❑ Asking pertinent questions ❑ Actively Listening ❑ Unreceptive ❑ No interest demonstrated ❑ Distracted	**Readiness to learn:** check ❑ Asking pertinent questions ❑ Actively Listening ❑ Unreceptive ❑ No interest demonstrated ❑ Distracted
Barriers to learning: check ❑ No barriers ❑ Low literacy or Edu level ❑ Cultural ❑ Language ❑ Visual, hearing, speaking ❑ Religious, spiritual ❑ Cognitive ❑ Emotional ❑ Motivation ❑ Pain or fatigue ❑ Other ______________ Accommodation: ❑ Interpreter ❑ Audio ❑ Visuals ❑ Handouts ❑ Explanations ❑ Demonstrations ❑ Other	**Barriers to learning:** check ❑ No barriers ❑ Low literacy or Edu level ❑ Cultural ❑ Language ❑ Visual, hearing, speaking ❑ Religious, spiritual ❑ Cognitive ❑ Emotional ❑ Motivation ❑ Pain or fatigue ❑ Other ______________ Accommodation: ❑ Interpreter ❑ Audio ❑ Visuals ❑ Handouts ❑ Explanations ❑ Demonstrations ❑ Other	**Barriers to learning:** check ❑ No barriers ❑ Low literacy or Edu level ❑ Cultural ❑ Language ❑ Visual, hearing, speaking ❑ Religious, spiritual ❑ Cognitive ❑ Emotional ❑ Motivation ❑ Pain or fatigue ❑ Other ______________ Accommodation: ❑ Interpreter ❑ Audio ❑ Visuals ❑ Handouts ❑ Explanations ❑ Demonstrations ❑ Other	**Barriers to learning:** check ❑ No barriers ❑ Low literacy or Edu level ❑ Cultural ❑ Language ❑ Visual, hearing, speaking ❑ Religious, spiritual ❑ Cognitive ❑ Emotional ❑ Motivation ❑ Pain or fatigue ❑ Other ______________ Accommodation: ❑ Interpreter ❑ Audio ❑ Visuals ❑ Handouts ❑ Explanations ❑ Demonstrations ❑ Other
Learning Preferences: ❑ Demonstration ❑ Written handouts ❑ Verbal or audio ❑ Video or TV ❑ Hands on ❑ Other __________	**Learning Preferences:** ❑ Demonstration ❑ Written handouts ❑ Verbal or audio ❑ Video or TV ❑ Hands on ❑ Other __________	**Learning Preferences:** ❑ Demonstration ❑ Written handouts ❑ Verbal or audio ❑ Video or TV ❑ Hands on ❑ Other __________	**Learning Preferences:** ❑ Demonstration ❑ Written handouts ❑ Verbal or audio ❑ Video or TV ❑ Hands on ❑ Other __________
Signature_______________ Date___________________	Signature_______________ Date___________________	Signature_______________ Date __________________	Signature_______________ Date __________________
Signature_______________ Date___________________	Signature_______________ Date___________________	Signature_______________ Date __________________	Signature_______________ Date __________________

Patient Label

Patient/Family Learner Assessment

Ongoing Interdisciplinary Patient/Family Education Documentation Form

Assessment Key ↓ **Complicated UTI**

Knowledge of Plan of Care or Plan of Treatment
1. Comprehensive, 2. Good, 3. Limited, 4. None, 5. 0ther (explain in comments)

Readiness to learn: 1. Asking pertinent questions, 2. Actively listening, 3. Unreceptive, 4. No interest demonstrated, 5. Distracted

Barriers to learning: 1. No barriers, 2. Low literacy or education level present as a barrier, 3. Cultural, 4. Language, 5. Visual, hearing, speaking, 6. Religious/spiritual, 7. Cognitive, 8. Emotional, 9. Motivation, 10. Pain or fatigue, 11. Other (identify below)

Accommodations for barriers or methods for teaching: 1. No accommodations needed, 2. Interpreter utilized, 3. Audio Visual Aids used, 4. Handouts in specific language (specify type of handout) 5. Explanation given, 6. Demonstration given, 7. Referred to class or session, 8. Other

Learning Outcomes: 1. Indicates understanding or performs successfully, 2. Needs reinforcement, 3. Refuses teaching, 4. Unable to complete teaching (describe in comments), 5. Unable to learn materials/concepts or give return demonstration, 6. No learner available, 7. Not an issue (not applicable)

Remember: An initial learning assessment must be completed on each learner. **Assessed Learning Needs**	Date	Time	Learner	Plan of Care or Tx	Readiness to learn	Barriers	Accommodations	Learning Outcomes	License	Comments	Initials
Immunizations											
Medications											
Nutritional Guidance											
Anticipatory Guidance (Growth and Development)											
Hygiene											
Signs of dehydration And inadequate PO intake											
Who to call for problems And reasons to see MD or go to ER											
Review Patient Education Sheet											

Date________ Signature_____________________ Initial________	Date________ Signature_____________________ Initial________
Date________ Signature_____________________ Initial________	Date________ Signature_____________________ Initial________
Date________ Signature_____________________ Initial________	Date________ Signature_____________________ Initial________

Ongoing entries are dated, timed, and initialed for each entry.
Date, sign, and place your initial at the bottom of each page.

Children's Hospital
Central California

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:

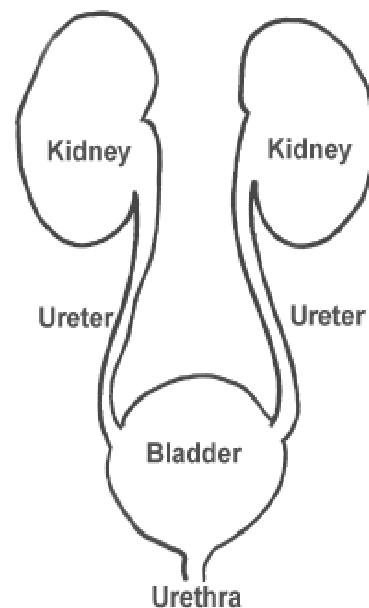
- Baby boys and baby girls

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 though 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?

Germs (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 block-age 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

0083

pathway 11/2009

Discharge Instructions