

Urinary Tract Infections

Yes, it is a bacteriuria -
but is it a symptomatic UTI?



Residential Aged Care
UTI Clinical Pathway Project
2014
(Updated 2019)

GRICG

**GRAMPIANS REGION
INFECTION CONTROL GROUP**

promoting rural excellence

Terminology

- **Asymptomatic bacteriuria**

Presence of white blood cells; possibly smelly, turbid urine; organism counts $\geq 10^5$ of a single bacterial species BUT **the absence of symptoms**

- **Bacteriuria**

Presence of bacteria in the urine with or without symptoms

- **Dysuria**

Pain or difficulty in urinating

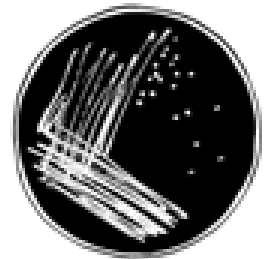
- **Pyuria**

Presence of/increased numbers of white blood cells in the urine; either alone or frequently associated with presence of bacteria

- **Symptomatic UTI**

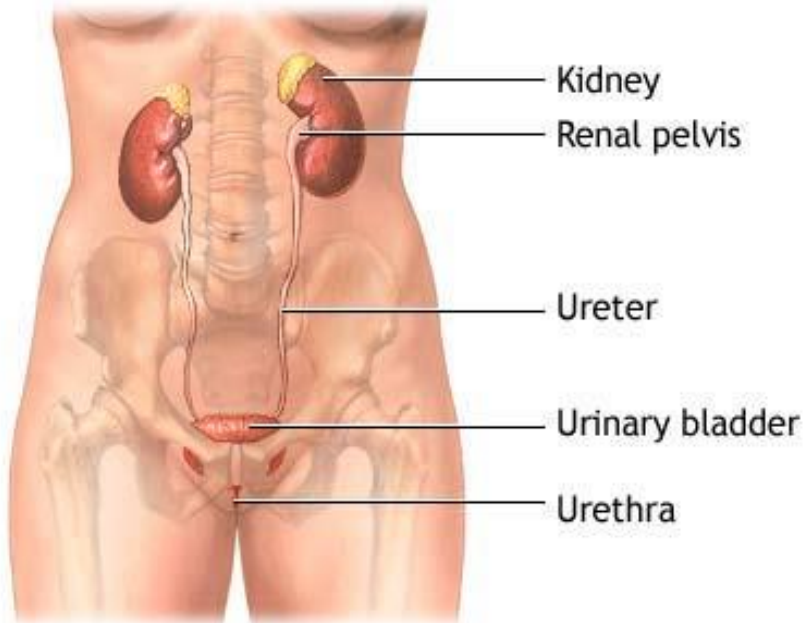
A UTI that relies for diagnosis on clinical features localising to the genitourinary tract

- onset or worsening urinary features
- positive urine culture



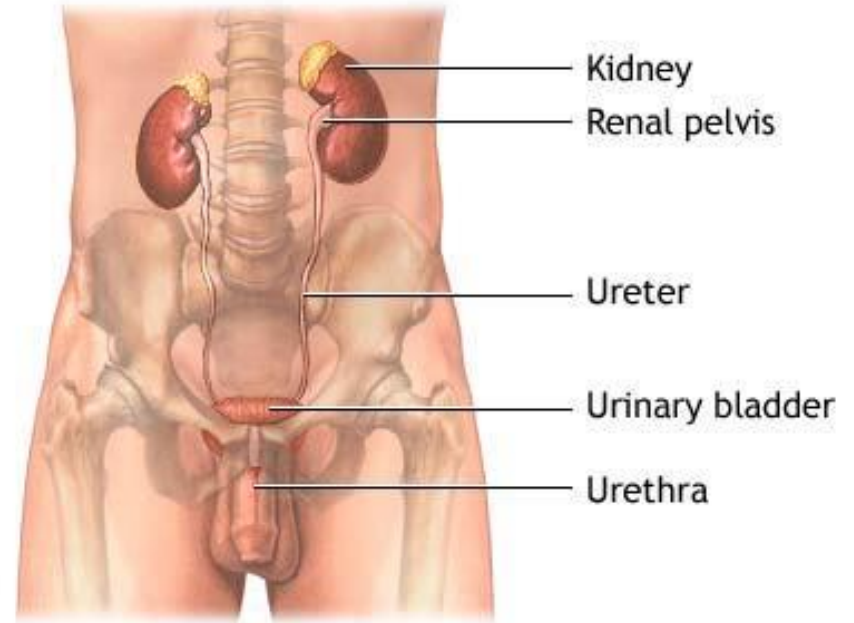
Urinary Tract

Female



ADAM.

Male



ADAM.

Urinary Tract Infections (UTI)

- UTI are the second most common infection occurring in residential aged care facilities (RACF)
- Inappropriate use of antimicrobials, particularly the treatment of asymptomatic bacteriuria is a common finding in studies of infections in aged care homes



Definition of UTI - Adults



A UTI can happen anywhere along the urinary tract. UTI have different names, depending on what part of the urinary tract is infected.

- Bladder -- an infection in the bladder is also called **cystitis** or a bladder infection
- Kidneys -- an infection of one or both kidneys is called **pyelonephritis** or a kidney infection
- Ureters -- the tubes that take urine from each kidney to the bladder are only rarely the site of infection
- Urethra -- an infection of the tube that empties urine from the bladder to the outside is called **urethritis**
- Prostate gland – an infection of the prostate gland is called **prostatitis**

Cause of UTI



- Urinary tract infections are caused by germs, usually bacteria that enter the urethra and then the bladder. This can lead to infection, most commonly in the bladder itself, which can spread to the kidneys
- Most of the time, your body can get rid of these bacteria. However, certain conditions increase the risk of having UTIs
- Women tend to get them more often because their urethra is shorter and closer to the anus than in men

Risk factors for UTI



- Diabetes
- Advanced age (especially people in nursing homes)
- Problems emptying your bladder completely (urinary retention)
- A urinary catheter
- Bowel incontinence, faecal impaction
- Enlarged prostate, narrowed urethra or anything that blocks the flow of urine – impaired bladder emptying
- Kidney stones
- Staying still (immobile) for a long period of time (for example, while you are recovering from a hip fracture)
- Surgery or other procedure involving the urinary tract

SYMPTOMATIC UTI - typical clinical presentation

NO indwelling catheter

For residents **without** an indwelling urinary catheter

At least ONE criterion must be present



1. Acute dysuria or acute pain, swelling or tenderness of the testes, epididymis or prostrate
2. *Fever* or *leucocytosis* & one localised urinary tract sub criteria
3. In the absence of fever or leucocytosis, two or more localised urinary tract sub criteria

SYMPTOMATIC UTI - typical clinical presentation

INDWELLING catheter

For residents **with** an indwelling urinary catheter

At least ONE criterion must be present



1. *Fever, rigors or new onset hypotension, with no alternate site of infection*
2. *Either acute change in mental status or acute functional decline, with no alternate diagnosis AND leucocytosis.*
3. *New onset supra-pubic pain or costo-vertebral angle pain or tenderness*
4. *Purulent discharge from around the catheter or acute pain, swelling or tenderness of the testes, epididymis or prostate*

DEFINITIONS - Clinical presentation

Fever

Single oral temperature $>37.8^{\circ}\text{C}$

Repeated oral temperatures $>37.2^{\circ}\text{C}$ or rectal temperatures $>37.5^{\circ}\text{C}$

Single temperature $>1.1^{\circ}\text{C}$ over baseline from any site

Leucocytosis *As according to full blood examination (FBE) results*

Neutrophilia ($>7.5 \times 10^9/\text{L}$) (Neutrophils are a common type of leucocyte)

Left shift ($>6\%$ bands or $>1,500$ bands/ mm^3)

(Left shift = increase in no. of immature leukocytes in the peripheral blood)

Localised urinary tract sub-criteria

Acute costovertebral angle pain or tenderness (no indwelling catheter only)

Supra-pubic pain

Gross haematuria

New or marked increase in incontinence

New or marked increase in urgency

New or marked increase in frequency

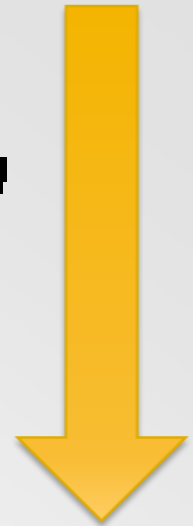


FLOW CHART FOR:

SYMPTOMATIC Urinary Tract Infection

Action:

- Increase fluid intake (unless on fluid restrictions)
- Perform urinary dipstick test—record results
- Notify GP with an immediacy dictated by the client's condition
- Obtain MSU/CSU as ordered by GP - BEFORE antibiotics are commenced
- Depending on severity of infection GP may order antibiotics while awaiting culture and sensitivity results
- Follow medical management plan
- Check culture results to ensure organism is susceptible to initial prescribed antibiotic.



Urine Specimen



MSU for microscopy and culture

(Before antibiotics are commenced)

- Obtain the “cleanest catch” specimen possible
- Transfer to specimen container within a few minutes
- Transfer to pathology within 30 minutes
- If transfer to pathology delayed refrigerate at 4°C
- Microscopy results (without culture) should be available within 2 hours

Significant urine culture results



NO indwelling catheter

- At least 10^5 cfu/**mL** or 10^8 cfu/**L** of no more than two species of microorganism in a voided urine sample
- At least 10^2 cfu/**mL** or 10^5 cfu/**L** of any number of organisms in a specimen collected by in & out catheter

Indwelling catheter

- Urinary catheter specimen culture with at least 10^5 cfu/**mL** or 10^8 cfu/**L** of any organism(s)

Possible actions following receipt of results

Antibiotic therapy should be guided by susceptibility results.

Early treatment failure can be due to a resistant organism.

ACTIONS:

- Not a significant result - *antibiotics stopped or not initiated*
- Significant result & organism is susceptible to initial prescribed antibiotic(s) – *finish course of ABs*
- Significant result & organism is not susceptible to initial prescribed antibiotic(s) - *appropriate antibiotic(s) commenced*
- UTI classified as a recurrent infection

See TGA for different recommendations re recurrent infection



Definitions

- *Recurrent UTI (women):*

(with the same or different organisms)

- ❖ Two or more infections within 6 months or

- ❖ Three or more infections within 12 months

(This does not include episodes of asymptomatic bacteriuria)

- ❖ For men it is > 1 UTI

- *Relapse UTI*

Repeat infection with the same infecting organism,
usually occurring within 4 weeks of previous UTI

(Within 2 weeks is often suggestive of failure of initial treatment)

See TGA for different recommendations re recurrent infection

Treatment -Uncomplicated UTI

Female – acute cystitis

For **empirical therapy** of acute uncomplicated cystitis in **non-pregnant women**, use:

1. Trimethoprim* 300 mg orally, daily for 3 days (first line therapy) **or**
2. Nitrofurantoin**^ 100 mg orally, 6-hourly for 5 days (second line therapy)

If Trimethoprim and Nitrofurantoin cannot be used, use Cefalexin 500 mg orally, 12-hourly for 5 days

Reference

Antibiotic Expert Group. *Therapeutic Guidelines: Antibiotic* Version 16. Melbourne: Therapeutic Guidelines Limited: 2019

Treatment -Uncomplicated UTI

Male – acute cystitis

For **empirical therapy** of acute cystitis in **men** in whom prostatitis is unlikely use:

1. Trimethoprim* 300 mg orally, daily for 7 days(first line therapy),

or

2. Nitrofurantoin**^ 100 mg orally, 6-hourly for 7 days (second line therapy)

If Trimethoprim and Nitrofurantoin cannot be used, use Cefalexin 500 mg orally, 12-hourly for 7 days.

Reference

Antibiotic Expert Group. *Therapeutic Guidelines: Antibiotic* Version 16. Melbourne: Therapeutic Guidelines Limited: 2019

NOTES:

*If the patient has been treated with trimethoprim in the previous 3 months, or had a trimethoprim-resistant *Escherichia coli* isolate during this time, use an alternative antibiotic for empirical therapy.

** Do not use nitrofurantoin unless the patient is afebrile and prostatitis is considered unlikely, because therapeutic concentrations of nitrofurantoin are not reached in the prostate.

^ An alternative regimen is 100 mg 12-hourly for 5 days. This is from a study using Macrobid[®], a formulation unavailable in Australia. The Macrobid product information states that urine concentrations from this product are similar to those obtained with formulations available in Australia, however no data are available to confirm this claim. .

Reference: Antibiotic Expert Group. *Therapeutic Guidelines: Antibiotic* Version 16. Melbourne: Therapeutic Guidelines Limited: 2019

Always Review Antimicrobial Therapy

Recommended review period:

- Empirical therapy at 48 to 72 hours
- ALL antimicrobial prescriptions at 7 days
- All ongoing antimicrobial prescriptions at least monthly
- For antimicrobial prescriptions exceeding 6 months enlist expert advice

DOCUMENTATION – very important



All key prescribing elements to be documented:

- Dose *including* route
- Duration *including* start date, end date and planned days therapy
- Indication *including* rationale (i.e., prophylaxis vs. therapeutic) and treatment site (i.e. urinary tract, respiratory tract etc.)

Example: Recommended prescription documentation for female UTI

- Trimethoprim 300mg oral nocte
- Indication: treatment urinary tract infection, acute cystitis
- Commenced 1/3/2017
- To be ceased 3/3/2017 (Plan 3 days treatment)

Is it a UTI?

- For residents without indwelling catheters, up to 40% of women and 20% of men have asymptomatic bacteriuria at any time
- Residents managed with long-term indwelling catheters are universally bacteriuric because of biofilm formation along the catheter
- The presence of asymptomatic bacteriuria is **NOT** an indication for antibiotic administration in the absence of localising clinical features in the genitourinary tract
- Urine odour or turbidity alone is not indicative of symptomatic UTI and is no reason to test urine
- Cloudy urine is expected in all residents with a urinary catheter

Asymptomatic Bacteriuria

Asymptomatic bacteriuria should **NOT** be treated with antibiotics, as:

- Affected residents suffer no increased mortality
- Rapid re-establishment of bacteria occurs following course of antibiotics
- Unnecessary antibiotic use promotes the emergence of resistant bacteria

FLOW CHART FOR:

ASYMPTOMATIC Bacteriuria

Action:

- Increase fluid intake (unless on fluid restrictions)
- Perform urinary dipstick test
- Report to GP (only take MSU if directed by GP)
- If GP diagnoses asymptomatic bacteriuria ensure this is recorded in medical record as asymptomatic bacteriuria are not counted in infection surveillance records
- Follow medical management plan
- No further urinary dipstick tests are required if the smelly or turbid urine state becomes chronic.



Urine Dipstick



- Immerse the dipstick completely in the specimen of fresh urine
- Withdraw immediately, drawing or gently tapping edge along rim of container to remove excess urine
- Take your time - some of the reactions can take up to 2 minutes to cook
- Many simply dip, pause, read; potentially missing abnormal results
- If positive results discuss with doctor
- Where ordered, obtain a urine specimen and send to the lab to confirm infection

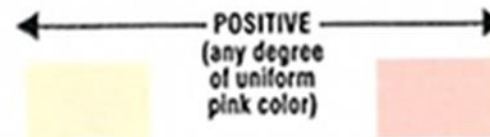
Interpreting Urine Dipstick Results

Nitrites

- Nitrites are formed by the breakdown of urinary nitrates. This is usually caused by Gram-negative and some Gram-positive bacteria
- So the presence of nitrites suggests bacterial infection such as E.coli, Staphylococcus and Klebsiella. Commonly found during a urinary tract infection

NITRITE
60 seconds

NEGATIVE



Interpreting Urine Dipstick Results

Leukocytes

- Detects white cells in the urine (pyuria) which can be associated with urinary tract infection
- The absence of leukocytes virtually eliminates infection as a cause

LEUKOCYTES NEGATIVE

2 minutes



TRACE



SMALL
+



MODERATE
++



LARGE
+++



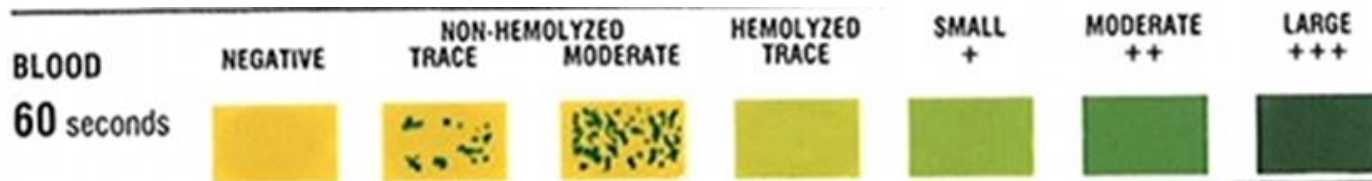
Interpreting Urine Dipstick Results

Blood (Haematuria)

- Classified as microscopic or macroscopic. Microscopic means that the blood is not visible with the naked eye
- Blood may be present with a UTI

It may also be present with:

- Acute tubular necrosis.
- Traumatic catheterization.
- Damage caused by the passage of kidney stones.
- Contamination from the vagina during menstruation.
- Damage to the glomerulas or tumours which erode the urinary tract.



Interpreting Urine Dipstick Results

Specific Gravity (SG)

SG signifies the concentration of dissolved solutes and reflects the effectiveness of the renal tubules to concentrate it (when the body needs to conserve fluid)

The SG of urine is around 1.010 but can vary greatly:

Decreased SG may be due to:

- Excessive fluid intake (oral or IV fluids)

- Renal failure

- Acute glomerulonephritis, pyelonephritis, acute tubular necrosis

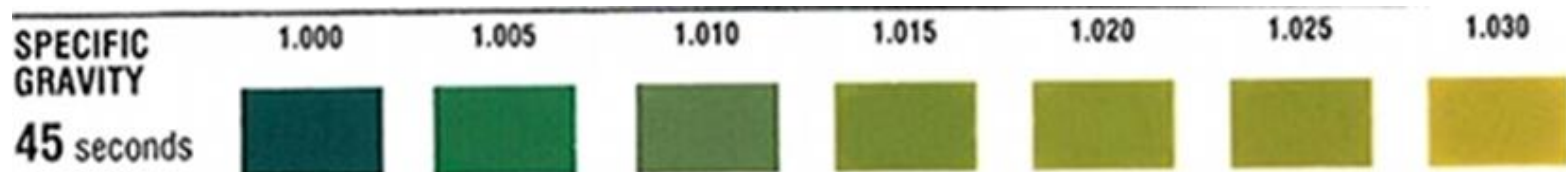
- Diabetes insipidus

Increased SG may be due to:

- Dehydration due to poor fluid intake, vomiting or diarrhoea

- Heart failure

- Liver failure



Interpreting Urine Dipstick Results

Urinary pH

- The range is 4.5 to 8, but urine is commonly acidic (ie 5.5-6.5) due to metabolic activity.
- pH may be increased (more alkaline) if urea-splitting organisms e.g. *Proteus mirabilis* is present, but there are many causes of alkaline urine.

Low pH (acidic):

Foods such as acidic fruits can lower the pH, as can a high protein diet.

As urine generally reflects the blood pH, metabolic or respiratory acidosis can make it more acidic.

Other causes of acidic urine include diabetes, diarrhoea and starvation.

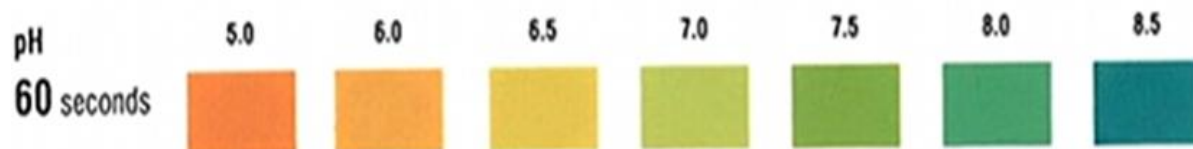
High pH (alkaline):

Low carb or vegetarian diet

May be associated with renal calculi.

Respiratory or metabolic alkalosis

Urinary tract infection



Interpreting Urine Dipstick Results

A **negative** dipstick test makes UTI unlikely but does not definitely exclude it

A **positive** dipstick test does not indicate a symptomatic UTI nor the need for antibiotic therapy in the absence of localising features in the genitourinary tract





ROUTINE DIPSTICK TESTS ARE NOT NECESSARY

Because residents often have a high background rate of asymptomatic bacteriuria/pyuria there no place for routine dipstick screening.



Cloudy, Smelly Urine – is it a UTI?

- Urine odour or turbidity alone is not indicative of symptomatic UTI and is no reason to test urine
- A strong odour may be the result of a concentrated specimen rather than a urinary tract infection
- Cloudy urine is expected in all residents with a urinary catheter

**DO NOT INVESTIGATE OR TREAT CLOUDY OR
MALODOROUS URINE IN RESIDENTS WHO DO NOT
HAVE OTHER SYMPTOMS OR SIGNS OF UTI**

Over treatment of UTI leads to -



- Higher health care costs
- Increased antibiotic exposure
- A greater number of adverse reactions
- Antimicrobial resistance and
- Other unintended outcomes such as *Clostridium difficile* infection

Documentation, documentation, documentation

**DO NOT FORGET TO DOCUMENT
ALL CLINICAL
FEATURES, OBSERVATIONS,
TREATMENT AND TEST RESULTS
IN RESIDENTS NOTES**

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Urinary Tract Infections in Aged Care Homes

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