INTRODUCTION

- Urinary tract infections, UTIs, are infections that can occur in all age groups.
- Manifestations of urinary tract infections vary depending on the site of infection, the age, sex and presence of underlying medical conditions. The major clinical syndromes seen in general practice are cystitis, pyelonephritis and prostatitis.
- The female population is predominantly affected by urinary tract infections as bacteria easily enter the bladder via the short urethra. Infection may be precipitated by sexual intercourse. Decreased oestrogen levels in post-menopausal women increases the susceptibility to urinary tract infections. It is recognised that up to one-third of women have at some stage in their life.
- UTIs in men is uncommon and may indicate the presence of an underlying problem ie prostatitis, urethral obstruction secondary to prostatic hypertrophy, sexually transmitted infection (STI) rather than UTI.
- Onset may be sudden with acute symptoms resulting in sufferers seeking medical treatment immediately.
- Urinary tract infection is the most common cause of septicaemia in people over the age of 65 and is associated with a mortality rate of over 50%. Diagnosis is made difficult due the absence of many clinical signs and symptoms of urinary tract infection in the elderly, therefore once a diagnosis has been made, treatment must be initiated as soon as possible.
- Residents of aged care facilities (RACF) are major reservoirs for pathogens resistant to antibiotics as this specific population has a high incidence of chronic illness and use of antibiotics. Decreased mobility, incomplete bladder emptying and faecal incontinence increases the chance of urinary tract infection.
- Urinary tract infections may symptomatic or non-symptomatic; a sudden deterioration of mental state in the elderly may be an indication of the presence of an infective process, a UTI.

EPIDEMIOLOGY

- Urinary tract infections generally arise from the ascending route, with *e.coli*, found in the gastrointestinal, being the most common in patients without catheters, urological abnormalities or calculi.
- Residual volumes of urine in the bladder and abnormalities to the structure of the urinary tract also increase the risk of infection.
- The incidence of female bacteriuria increases with age and disability due to incomplete bladder emptying and urinary stasis.
- Between 2-7% of patients with indwelling catheters (IDC) acquire bacteriuria each day even with the application of best practice for insertion and care of the catheter. All patients with long-term catheters are bacteriuric – with urine samples often positive for two or more organisms.

DEFINITIONS

- Recurrent UTI - Repeated (three or more/year) episodes of infection
- Relapse – Repeat UTI with the same strain of organism. Suggests treatment failure if infection re-occurs within two weeks.
- Asymptomatic bacteriuria is the presence of bacteria with no symptoms.
## Underlying causes of UTI in males.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Manifestation</th>
<th>Affected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Prostatitis</td>
<td>Dysuria&lt;br&gt;Urinary frequency&lt;br&gt;Difficulty voiding&lt;br&gt;Peripheral pain or pain radiating to groin or back&lt;br&gt;Enlarged and tender prostate on rectal examination</td>
<td>Prostate</td>
</tr>
<tr>
<td>Chronic prostatitis</td>
<td>Dysuria&lt;br&gt;Peripheral pain or pain radiating to groin or back&lt;br&gt;Post ejaculation perineal pain&lt;br&gt; +/- haematospermia&lt;br&gt; +/- relapsing or recurrent UTI</td>
<td>Prostate</td>
</tr>
<tr>
<td>Non-bacterial prostatitis</td>
<td>Dysuria&lt;br&gt;Peripheral pain or pain radiating to groin or back&lt;br&gt;Post ejaculation perineal pain&lt;br&gt; +/- haematospermia&lt;br&gt; Infection (increased leucocytes on prostatic secretions) with no identified pathogen</td>
<td>Prostate</td>
</tr>
<tr>
<td>Prostatodynia</td>
<td>Dysuria&lt;br&gt;Peripheral pain or pain radiating to groin or back&lt;br&gt;Post ejaculation perineal pain&lt;br&gt; +/- haematospermia&lt;br&gt; +/- relapsing or recurrent UTI&lt;br&gt; Absence of bacterial or viral infection</td>
<td>Prostate</td>
</tr>
</tbody>
</table>

## Classification and clinical syndromes of urinary tract infection

<table>
<thead>
<tr>
<th>Classification</th>
<th>Manifestation</th>
<th>Affected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptomatic bacteriuria</td>
<td>Dysuria&lt;br&gt;Urinary frequency&lt;br&gt;Urinary urgency&lt;br&gt;Feeling of incomplete bladder emptying post void&lt;br&gt;Suprapubic discomfort&lt;br&gt;Loin pain</td>
<td>Infection present in urine only</td>
</tr>
<tr>
<td>Acute cystitis</td>
<td>Inflammation of the bladder mucosa&lt;br&gt;Dysuria&lt;br&gt;Urinary frequency&lt;br&gt;Haematuria&lt;br&gt;Offensive smelling urine&lt;br&gt; +/- Nocturia</td>
<td>Bladder and / or urethra</td>
</tr>
<tr>
<td>Acute pyelonephritis&lt;br&gt; can lead to septicaemia</td>
<td>Loin (+/- abdominal) pain&lt;br&gt;Fever&lt;br&gt;Rigors&lt;br&gt;Nausea with loss of appetite&lt;br&gt;Malaise&lt;br&gt;Vomiting (may not be present)&lt;br&gt;Purulent urine&lt;br&gt;Symptoms of acute cystitis may be present</td>
<td>Kidney</td>
</tr>
<tr>
<td>Non-bacterial cystitis</td>
<td>Dysuria&lt;br&gt;Frequency&lt;br&gt;Absence of infection</td>
<td>Bladder</td>
</tr>
</tbody>
</table>
### Nurse Practitioner

**CLINICAL PRACTICE GUIDELINE**

**Urinary Tract Infections in the Adult Person**

---

<table>
<thead>
<tr>
<th>Scope</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse Practitioner</td>
<td></td>
</tr>
<tr>
<td>• Symptoms suggestive of uncomplicated UTI</td>
<td>Identify patients suitable for NP CPG</td>
</tr>
<tr>
<td>Medical Practitioner +/- Nurse Practitioner</td>
<td></td>
</tr>
<tr>
<td>• Previously treated UTI not responsive to antibiotics</td>
<td>Identify patients not suitable for NP CPG and redirect to GP +/- NP in team</td>
</tr>
<tr>
<td>• UUTI with nausea, vomiting, tachycardia, pronounced tenderness</td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Initial Assessment and Interventions</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritative voiding symptoms</td>
<td>UTI will be recognised and diagnosed promptly</td>
</tr>
<tr>
<td>• Dysuria</td>
<td></td>
</tr>
<tr>
<td>• Frequency</td>
<td></td>
</tr>
<tr>
<td>• Urgency</td>
<td></td>
</tr>
<tr>
<td>• Urinary incontinence</td>
<td></td>
</tr>
<tr>
<td>• Suprapubic discomfort</td>
<td></td>
</tr>
<tr>
<td>• Sensation of incomplete bladder emptying post void</td>
<td></td>
</tr>
<tr>
<td>In patients with catheters</td>
<td>Antibiotic therapy is considered in the presence of at least one of these symptoms</td>
</tr>
<tr>
<td>• New suprapubic or loin tenderness</td>
<td></td>
</tr>
<tr>
<td>• Rigors</td>
<td></td>
</tr>
<tr>
<td>• New onset of delirium</td>
<td></td>
</tr>
<tr>
<td>• Fever &gt;37.9</td>
<td></td>
</tr>
<tr>
<td>Vital Signs</td>
<td>UTI will be considered in the presence of fever</td>
</tr>
<tr>
<td>• Fever</td>
<td></td>
</tr>
<tr>
<td>• Tachycardia</td>
<td></td>
</tr>
<tr>
<td>Pain Assessment</td>
<td>Determine need for and type of analgesia</td>
</tr>
<tr>
<td>• Burning on micturition</td>
<td>UUTI will be considered in the presence of flank pain</td>
</tr>
<tr>
<td>• Flank pain</td>
<td></td>
</tr>
<tr>
<td>• Back pain</td>
<td></td>
</tr>
<tr>
<td>• Suprapubic discomfort on abdominal palpation</td>
<td></td>
</tr>
<tr>
<td>Cognitive State</td>
<td>A diagnosis of UTI will be considered in an elderly confused patient</td>
</tr>
<tr>
<td>• Reports of sudden deterioration in the mental state of the elderly person</td>
<td></td>
</tr>
<tr>
<td>Other symptoms</td>
<td>Alternative diagnosis will be explored</td>
</tr>
<tr>
<td>• Vaginal discharge</td>
<td></td>
</tr>
<tr>
<td>• Haematuria</td>
<td></td>
</tr>
<tr>
<td>• Offensive smelling urine +/- purulent</td>
<td></td>
</tr>
<tr>
<td>• Nocturia</td>
<td></td>
</tr>
<tr>
<td>Patient History</td>
<td>Predisposing and associated conditions will be detected and considered when determining diagnosis</td>
</tr>
<tr>
<td>• Onset and duration of symptoms</td>
<td></td>
</tr>
<tr>
<td>• History of previous UTIs</td>
<td></td>
</tr>
<tr>
<td>• Recent or present instrumentation – catheters, cystoscopy, urodynamics</td>
<td></td>
</tr>
<tr>
<td>• Co-morbidities</td>
<td></td>
</tr>
<tr>
<td>• Medication/known allergies</td>
<td></td>
</tr>
<tr>
<td>• Sexual history</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>Visual examination of external genitalia and vaginal examination if vaginal itch or discharge present</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Males  | Visual examination of external genitalia
Digital rectal examination (DRE) if an enlarged prostate is suspected | Prostatic hypertrophy will be excluded as a cause of presenting symptoms in males at risk
Patients with BPH → GP |

**Investigations**

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| Dipstick urinalysis of mid-stream urine
- Leucocytes – detects oestreases contained in granulocytic leucocytes
- Nitrites – nitrates turned into nitrites in the presence of Gram-negative bacteria
- Blood – indicates bacterial peroxidase
Mid-stream urine
- Microscopic examination for presence of pyuria – a calculated number of white bloods cells/mL of urine
- Culture – identifies nature and number of organisms present in the urine
- Sensitivity – identifies antibiotic sensitive and resistant to the identified bacteria
NB: in patients with catheters, cultures are often unreliable unless taken through a newly inserted catheter → refer to appropriate allied health for replacement of catheter secondary to UTI | Urine which is positive for nitrites &/or leucocytes will be sent for MC&S
Pyuria (>100 WBC/μL) is a sensitive sign of UTI
UTI indicated if >10⁶ cfu/mL
Treatment with correct antibiotic |

| Imaging | Bladder scan | Detection of residual urine +/- retention of urine |

**Patient Education / Follow-up**

| Follow up appointment | Verbal instruction to patient:
- Review appointment may be indicated by pathology results; NP to contact patient to schedule follow-up appointment
- Follow-up MSU at completion of antibiotic therapy | Ensure patient understands problem, treatment and follow up
Referral to GP will be determined on result of MSU |
|----------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Patient Education    | Verbal instruction and patient information handout:
- Hygiene and prevention strategies | Patient understanding of the problem, treatment and measures which may reduce the risk of UTI |
| Medication instructions | Verbal/written instructions from NP/GP | Ensure patient understands problem, treatment & followup |
| Referrals            | Unresolved UTI
Other problems outside of NP scope of practice | Patients with problems outside the NPs scope of practice are referred to appropriate health care providers |
### Certificate
- Absence from work certificates
- Certificate of attendance
Ensure appropriate documentation completed

### Letter
- Copy of notes to GP / Specialist or acute care facility
Ensure continuity of care and referral to health care team

<table>
<thead>
<tr>
<th>Interpretation of results and management decisions</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| All medications will be stored, labelled and dispensed in accordance with hospital policy and relevant legislation | Relief of symptoms
Eradication of infection
Prevention of recurrence
Prevention of complications |

### Antibiotics S4
- The use and appropriateness of antibiotic therapy in the treatment of urinary tract infections depends on the symptoms and likely microbial organisms to be treated.
- Refer to the Antibiotic Therapeutic Guidelines for appropriate antibiotic drug administration.

#### HEALTHY NON-PREGNANT FEMALE:
Two or less symptoms present

**Positive** dipstick urinalysis:
- Trimethoprim
or
- Amoxicillin/Clavulanic acid
or
- Cephalexin for patients with penicillin hypersensitivity
or
- Nitrofurantoin
If symptoms unresolved after 1st course refer to GP

**Negative** dipstick urinalysis:
- Offer antibiotics – discuss risks/benefits
If symptoms unresolved after 1st course refer to GP for investigation of other possible cause of symptoms

**Multiple symptoms including fever and back pain**
Consider UUTI
Commence
- Trimethoprim
OR
- Amoxicillin/Clavulanic acid
If symptoms unresolved after 1st course refer to GP for investigation/identification of other possible cause of symptoms

- Nausea, vomiting, tachycardia, pronounced tenderness
**No →** Commence
- Trimethoprim
OR
• Amoxycillin/Clavulanic acid
  If symptoms unresolved after 1st course refer to GP for investigation/identification of other possible cause of symptoms
Yes → Renal tract ultrasound and specialist referral for investigation/identification of other possible cause of symptoms

**SUSPECTED UTI MALE**
*Consider differential diagnosis*
  • Prostatitis
  • Epididymitis
  • Chlamydia
MSU → MC&S cc results to GP
  • Colonisation >100,000/mL or >1000cfu/mL if 80% growth is single organism
Commence
  • Trimethoprim
or
• Amoxycillin/Clavulanic acid
Review in 2 days
Check MSU
Recurrent UTI → further investigations (renal ultrasound, cystoscopy, urology referral)

**History of fever and flank pain**
• Consider UUTI
Commence
  • Trimethoprim
or
• Amoxycillin/ Clavulanic acid
Review in 2 days
Check MSU
Recurrent UTI → refer to GP further investigations (renal ultrasound, cystoscopy, urology referral)
Algorithms to Interpret Findings

HEALTHY NON PREGNANT FEMALE

Goals of Treatment
- Relief of symptoms
- Eradication of infection
- Prevention of recurrence
- Prevention of complications

Vaginal itch reported
- Explore alternative Dx
  - Symptom unresolved after 1st course
    - KUB ultrasound
      - Urology referral
        - Symptoms unresolved after 1st course
          - Investigate other causes for symptoms

Vaginal itch reported
- Explore alternative Dx
  - Symptom unresolved after 1st course
    - KUB ultrasound
      - Urology referral
        - Symptoms unresolved after 1st course
          - Investigate other causes for symptoms

Multiple symptoms including fever and back pain
- Consider UUTI
  - Symptom unresolved after 1st course
    - KUB ultrasound
      - Urology referral
        - Symptoms unresolved after 1st course
          - Investigate other causes for symptoms

Symptoms unresolved after 1st course
- Commence Trimethoprim or Amoxycillin/Clavulanic acid
  - Nausea, vomiting
    - Tachycardia
      - Pronounced tenderness
        - Symptom unresolved after 1st course
          - KUB ultrasound
            - Urology referral
              - Symptoms unresolved after 1st course
                - Investigate other causes for symptoms

Symptoms unresolved after 1st course
- Commence Trimethoprim or Amoxycillin/Clavulanic acid
  - Dipstick positive
    - Symptom unresolved after 1st course
      - KUB ultrasound
        - Urology referral
          - Symptoms unresolved after 1st course
            - Investigate other causes for symptoms

Symptoms unresolved after 1st course
- Commence Trimethoprim or Amoxycillin/Clavulanic acid
  - Dipstick negative
    - Symptom unresolved after 1st course
      - KUB ultrasound
        - Urology referral
          - Symptoms unresolved after 1st course
            - Investigate other causes for symptoms

Symptoms unresolved after 1st course
- Offer antibiotics
  - Discuss risks/benefits
    - Symptom unresolved after 1st course
      - KUB ultrasound
        - Urology referral
          - Symptoms unresolved after 1st course
            - Investigate other causes for symptoms

Symptoms unresolved after 1st course
- Refer for investigation of other causes for symptoms

Symptoms unresolved after 1st course
- Refer for investigation of other causes for symptoms
SUSPECTED URINARY TRACT INFECTION – MALE

Goals of Treatment
- Relief of symptoms
- Eradication of infection
- Prevention of recurrence
- Prevention of complications

Patient history
Physical assessment

Consider differential diagnosis
Prostitis, epididymitis
Chlamydial infection

MSU for MC & S

History of fever and flank pain
Consider UUTI

KUB ultrasound
Urology review

Commence Trimethoprim or Amoxycillin/Clavulanic acid

Review in 2 days
Check MSU result
cc results to GP

Retention of urine or Colonisation >1,000,000/mL or >1000 cfu/mL if 80% growth is a single organism

Commence Trimethoprim or Amoxycillin/Clavulanic acid

Review in 2 days
Check MSU result
cc results to GP

Recurrent UTI
Further investigations
KUB, Cystoscopy
Urology referral

Healthscope Medical Centres acknowledges the Naturaliste Medical Group for the utilisation of this Clinical Practice Guideline.
Choice of antibiotic

Uncomplicated UTI

UTI

Non-pregnant Women

Men

Trimethoprim

(Seprin/Bactrim)

Amoxycillin with Clavulanic acid

(Augmentin Duo)

Nitrofurantoin

(Furadantin)

Drug Formulary

Trimethoprim: S4
Indications: treatment of uncomplicated lower UTIs in non-pregnant women/men
Actions: competitively inhibits bacterial folate production essential for bacterial growth
Relative contraindications: Moderate renal impairment may increase serum creatinine concentration → reduce dose
Dosage: 300mg orally
Duration: Females - 3 days; Males – 14 days
Special considerations:
• elderly persons prone to nutritional folate deficiency may be more susceptible to side effects
• avoid if pregnant
• advise patient to take night time dose
Drug interactions:
• Warfarin – trimethoprim may potentiate the anticoagulation effect of warfarin
• Other folate inhibitors eg methotrexate
Unwanted effects:
• fever, itch, rash, nausea, vomiting most common
• other adverse effects concern gastrointestinal tract and haematopoietic

Amoxycillin with Clavulanic Acid: S4
Indications: treatment of UTI
Action: Interferes with bacterial wall peptidoglycan synthesis
Dosage: 500/125mg orally 12hrly for 5 days
Duration: Non-pregnant females – 5 days; Pregnant females – 10 days ; Males – 14 days
Special considerations:
• Reduce dose for moderate to severe renal impairment, cholestatic hepatitis
• Increased risk of hepatitis in people >55
Unwanted effects:
• transient increases in liver enzymes and bilirubin
Nitrofurantoin: S4

*Indication:* Acute lower UTI  
*Action:* Inhibits bacterial protein, DNA, RNA and cell wall synthesis  
*Contraindication:*  
- moderate to severe renal impairment; creatinine clearance <60mL/min may increase the risk of peripheral neuropathy  
- oral sachets may increase excretion rate of nitrofurantoin  
*Dose:* 50mg orally 6hrly  
*Duration:* Females – 5 days; Pregnant females – 10 days; Males – 14 days  
*Unwanted effects:*  
- nausea and vomiting, anorexia, dyspepsia, allergic skin reaction, headache, drowsiness, vertigo

Cephalexin: S4

*Indication:* UTI due to Gram-negative bacteria  
*Action:* Interferes with bacterial cell wall peptidoglycan synthesis  
*Dose:* 500mg orally 12hrly  
*Duration:* Females - 5 days; Pregnant females – 10 days; Males – 14 days  
*Special considerations:*  
- renal impairment requires dose reduction  
*Unwanted effects:*  
- nausea, diarrhoea, rash, electrolye disturbances

Norfloxacin: S4

*Indications for use:* Complicated UTI where alternative agents are ineffective or contraindicated  
*Actions:* Inhibits bacterial DNA synthesis by blocking DNA gyrase and topoisomerase IV  
*Dosage:* 400mg orally 12hrly 1 hour before or 2 hours after food for 5 days  
*Duration:* Females – 3 days; relapsing UTI 10-14 days  
*Special considerations:*  
- caffeine – reduce intake  
*Unwanted effects:*  
- rash, itch, nausea, vomiting, diarrhoea, abdominal pain, dyspepsia
### Evaluative strategies

<table>
<thead>
<tr>
<th>Unexpected representation</th>
<th>Review Patient Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP Clinical Practice</td>
<td>NP Clinical Practice/Medical Report Audit</td>
</tr>
</tbody>
</table>

### Key Terms

<table>
<thead>
<tr>
<th>NP – Nurse Practitioner</th>
<th>CPG – Clinical Practice Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP – General Practitioner</td>
<td>UTI – Urinary Tract Infection</td>
</tr>
<tr>
<td>S4 – Schedule of the drug administration act</td>
<td>UUTI – Upper Urinary Tract Infection</td>
</tr>
</tbody>
</table>

### References and existing CPG’s

- Brightwater Nurse Practitioner Clinical Protocol: Managing Urinary Tract infections
- Naturaliste Medical Group Nurse Practitioner Clinical Practice Guideline: Urinary Tract Infections in the Adult Person

### Authorship and Endorsement

**This guideline was written by:**
Lisa Scholes - Nurse Practitioner
Broadwater Medical Practice & Dunsborough Medical Practice

Signature: ____________________

**Reviewed and authorised by:**

Dr Andrew Lill - General Practitioner
Broadwater Medical Practice & Dunsborough Medical Practice

Signature: ____________________

Dr Mostyn Hamdorf - General Practitioner
Broadwater Medical Practice & Dunsborough Medical Practice
GP Down South: Chair

Signature: ____________________

Dr Scott McGregor - General Practitioner
Broadwater Medical Practice & Dunsborough Medical Practice

Signature: ____________________

Jarred Smith - Pharmacist
West Busselton Pharmacy

Signature: ____________________

**Date written:** June 2010
**Review Date:** June 2011