URINARY TRACT INFECTIONS

Beryl Navti
SEPT Pharmacy Department

24/06/2013
The Genitourinary System

- The organs system of the reproductive organs and urinary system
- Grouped together because of their proximity to each other
- The genitourinary system is the third of the body’s systems open to the outside world
- Pathogens use this as a portal for entry into the body
- Healthcare professionals see many infections in this area
- This presentation deals specifically with urinary tract infections as they are commonly seen in mental health hospital wards
Urinary system infections

• Urine is sterile
• Presence of inflammatory cells or pathogens in urine indicate a urinary tract infection (UTI)
• Urinary tract infection is the most common bacterial infection managed in general medical practice
• Accounts for 1-3% of consultations
• Up to 50% of women will have a UTI at some point in their life
• UTI uncommon in men except over the age of 60 when urinary tract obstruction due to prostatic hypertrophy may occur
Urinary System Infections

- Serious problem in hospitals
- Cause morbidity
- Pathogens can travel up the ureters and reach the kidneys in a small minority of cases, causing renal damage and kidney failure
- UTIs are named according the place of infection
  - In the urethra = Urethritis
  - In the bladder = Cystitis
  - In the kidneys = Nephritis
  - In the prostate (men) = prostatitis
- Majority of infections are caused by bacteria, though some are fungal
Brief Anatomy

(a) certain bacteria and yeasts can enter the renal tract via the renal artery
(b) in nephritis, bacteria can enter the blood via the renal vein, with resulting bacteremia

Figure 23.1 Microbiology: A Clinical Approach (© Garland Science)
OVERVIEW

Infections of the Genitourinary System

Urinary Tract Infections (UTIs)

UTI in the community

Organisms causing UTI in the community:
- *Escherichia coli*
- *Proteus*
- *Pseudomonas*
- *Streptococci*
- *Staphylococcus aureus*

UTI in the hospital

- *Escherichia coli*
- *Streptococci*
- *Klebsiella species*

Reproductive System Infections

Bacterial infections of the reproductive system

Viral Infections of the reproductive system

Fungal infections of the reproductive system

24/06/2013
Beryl Navti, Clinical Pharmacist, SEPT
Bacterial UTIs

- Urine is an excellent culture medium for bacteria
- Bacteria entering the bladder from the external environment or blood passing through the renal artery can normally be flushed out during urination
- Infections occur when bacteria get into the urine and remain
- As all portions of the urinary tract connect to each other, infection spreads easily
- More easily in women because of a shorter urethra and absence of bacteriostatic prostatic secretions (as in men)
- Catheterisation may also introduce organisms into the bladder
Risk Factors for Urinary Tract Infection

• Incomplete bladder emptying:
  - Bladder outflow obstruction
  - Neurological problems (eg multiple sclerosis, diabetic neuropathy)
  - Gynaecological abnormalities (eg uterine prolapse)

• Foreign bodies:
  - Urethral catheters
  - Ureteric stent

• Loss of host defences:
  - Atrophic urethritis and vaginitis in post-menopausal women
  - Diabetes mellitus
Symptoms of UTIs

• Typical features of *cystitis* and *urethritis* include:
  - Abrupt onset of frequency of micturition (urination)
  - Scalding pain in the urethra during micturition (dysuria)
  - Lower back pain, abdominal pain and tenderness over bladder
  - Suprapubic pain during and after voiding
  - Intense desire to pass more urine after micturition due to spasm of inflamed bladder (urgency)
  - Urine that may appear cloudy and have an unpleasant smell
  - Presence of blood in the urine (haematuria)
  - Cystitis has more acute onset and severe symptoms

• Systemic symptoms suggestive of *pyelonephritis*:
  - Fever above 38.3°C
  - Loin pain
  - May be indication for hospitalisation

24/06/2013
Beryl Navti, Clinical Pharmacist, SEPT
Symptoms continued

• Prostatitis is suggested by
  - Pain in the lower back, perirectal area and testicles
  - High fever, chills and symptoms similar to bacterial cystitis
  - Inflammatory swelling of prostate, which can lead to urethral obstruction
  - Urinary retention, which can cause abscess formation or seminal vesiculitis
Diagnosing UTIs

- Based on examination of the urine
- Requires collection of a clean voided midstream sample
- Urine dipstick tests can be used to test for UTI
- One tests for nitrite—most urinary pathogens can reduce nitrate to nitrite
- Another tests for leucocyte esterase, suggesting the presence of neutrophils. If either test is positive, UTI is probable and if both are negative, UTI is unlikely
- Most positive way to confirm is a gram stain of urine sample and one bacterium per oil-immersion field indicates infection
- Definitive diagnosis rests on combination of typical clinical features with findings in the urine

24/06/2013
Beryl Navti, Clinical Pharmacist, SEPT
Investigations to detect underlying factors

- Mostly for patients with recurrent UTIs:
  - Culture of midstream urine sample (MSU) or urine from supra-pubic aspiration
  - Microscopic examination or cytometry for white and red cells
  - Dipstick examination of urine for blood, protein and glucose
  - Blood culture if fever, rigors or evidence of septic shock
  - Pelvic examination for women with recurrent UTI
  - Cystoscopy if patients have suspected bladder lesion
Treatment of UTIs

- Antibiotics are recommended in all proven cases of UTI
- Treatment is best guided by antimicrobial susceptibility tests
- However, where a urine culture has been performed treatment can commence while waiting for results
- Treatment for three days is the norm, deemed less likely to induce antibiotic resistance
- Sulfonamides and Trimethoprim are commonly used, but Trimethoprim is the usual choice for initial treatment
- 10-40% of organisms are resistant to Trimethoprim
- Nitrofurantoin, quinolones like Ciprofloxacin and Norfloxacin, as well as Cefalexin are generally effective
- Only use Co-amoxiclav or Amoxicillin when organism is known to be sensitive
# Treatment of UTIs

<table>
<thead>
<tr>
<th>organism</th>
<th>treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>trimethoprim, cephalexin, gentamicin</td>
</tr>
<tr>
<td><em>Proteus spp.</em></td>
<td>trimethoprim, cephalexin, gentamicin</td>
</tr>
<tr>
<td><em>Klebsiella spp.</em></td>
<td>trimethoprim, cephalexin, gentamicin</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>ciprofloxacin, gentamicin</td>
</tr>
<tr>
<td><em>Enterococcus spp.</em></td>
<td>amoxicillin, vancomycin</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>trimethoprim, cephalexin, gentamicin</td>
</tr>
<tr>
<td>coagulase-negative staphylococci</td>
<td>trimethoprim, cephalexin, gentamicin</td>
</tr>
</tbody>
</table>

*Figure 23.3 Microbiology: A Clinical Approach (© Garland Science)*

24/06/2013 Beryl Navti, Clinical Pharmacist, SEPT
Treatment of UTIs: Algorithm

**Complicated UTI?**
- Pregnancy
- Elderly patient
- Underlying medical condition
- Abnormality of urinary tract

YES →
- Obtain urine culture
- Tailor treatment to culture result

NO →

**Pyelonephritis?**
- Fever
- Flank pain
- Symptoms > 7 days

YES →
- Treat for uncomplicated pyelonephritis

NO →

**Acute uncomplicated cystitis/urethritis?**

YES →
- Treat accordingly

NO →

**Risk factors for antibiotic resistance?**
- Current or recent use of Trimethoprim
- Recent hospitalisation
- Recent UTI (in the past year?)

YES →
- Use alternative agent such as
  - a quinolone for three days or
  - nitrofurantoin for 7 days

NO →
- Trimethoprim tablets
  200mg twice a day for three days
# Treatment of UTIs-Antibiotic doses

<table>
<thead>
<tr>
<th></th>
<th>Lower Urinary Tract Infection</th>
<th>Acute Pyelonephritis</th>
<th>Bacterial Prostatitis</th>
<th>Prophylactic therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trimethoprim</td>
<td>200mg twice a day for three days</td>
<td>200mg twice a day for 7-14 days</td>
<td>200mg twice a day for 4-6 weeks</td>
<td>100mg at night</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>50mg four times a day for three days</td>
<td>50mg four times daily for 7-14 days</td>
<td>-</td>
<td>50-100mg at night</td>
</tr>
<tr>
<td>Co-amoxiclav</td>
<td>375mg 8-hourly for three days</td>
<td>375mg 8-hourly for 7-14 days</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ciprofloxacin (adjust dose in renal impairment)</td>
<td>100mg 12-hourly for three days</td>
<td>250mg-500mg every 12 hours for 7-14 days</td>
<td>250mg 12-hourly for 4-6 weeks</td>
<td>-</td>
</tr>
<tr>
<td>Norfloxacin (adjust dose if renal function impaired)</td>
<td>400mg 12-hourly for three days</td>
<td>400mg 12-hourly for 7-14 days</td>
<td>400mg 12-hourly for 4-6 weeks</td>
<td>-</td>
</tr>
<tr>
<td>Cefuroxime (adjust dose if renal function impaired)</td>
<td>125mg 12-hourly for three days</td>
<td>250mg 12-hourly or 750mg 6-8hourly IV in seriously ill patient, for 7-14days</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cefalexin</td>
<td>500mg 12-hourly for three days</td>
<td>500mg 12-hourly for three days</td>
<td>-</td>
<td>125mg at night</td>
</tr>
</tbody>
</table>
Special consideration: Older adults

- Prevalence of UTI rises with age especially amongst the old and frail in institutional care (40% in women)
- Contributing factors include increased prevalence of underlying structural abnormalities, post-menopausal oestrogen deficiency in women, prostatic hypertrophy in men, amongst others
- The urinary tract is the most frequent source of bacteraemia in older patients admitted to hospital
- Symptoms may not follow classic patterns seen in younger adults and fever might not occur
- Patients with underlying conditions such as dementia may find it difficult to explain symptoms
- Agitation, change in mental state or other behavioural changes maybe the only sign of UTI in elderly men and women
- Left untreated, UTI can lead to delirium or even death in an elderly patient
Special Consideration: Recurrent UTIs

• Failure of treatment, with persistence of causative organism on repeat culture may suggest underlying cause needing investigation and treatment
• Re-infection with a different organism or with the same organism after an interval may also occur
• Recurrent infections are common, so further investigation is only justified if infections exceed three to four times a year
• If underlying cause cannot be identified or removed, prophylactic antibiotic therapy can be used to prevent recurrence
• This is to reduce risk of septicaemia and renal damage
• Recurrent UTIs, particularly where there are underlying causes (e.g. catheterisation) can result in permanent kidney damage
Measures to prevent UTIs

- Keep patients hydrated (Fluid intake of at least 2litres per day)
- Encourage regular complete emptying of the bladder
- Good personal hygiene
- For women, avoid feminine hygiene sprays
- Encourage front to back cleansing
- Showers preferable to baths
- Cranberry juice maybe effective
- Frequently change those who use incontinence pads
- Set reminders/timers for those who are memory-impaired to use the bathroom

24/06/2013

Beryl Navti, Clinical Pharmacist, SEPT
Case Study

- Ann is an 80 year old widow admitted to an elderly mentally ill (EMI) acute unit diagnosed with depression
- She has been stable for a few weeks and is being considered for discharge
- She wakes up this morning irritable and agitated and refuses her breakfast
- As nurses try to calm her, she becomes aggressive, shouting that she wants to go home as her husband is waiting for her for his tea.
- She barges into the ward doctor’s office, sits down and says she’s not leaving until the doctor says she can go home
- A nurse comes in and talks calmly to her and persuades her to leave the office. As Ann gets up, she swoons and has to be steadied, while the doctor notices that she wet herself while sitting down
- She has never wet herself before and doesn’t normally need help with toileting
- Ann is now sobbing uncontrollably
Questions from case study

Please read these questions and try to answer them.
The answers are on the next slide.

1. What action should be taken by the ward doctor?
2. What are the presenting features, signs and symptoms of UTI in older adults?
3. How do these differ from younger adults?
4. What organisms usually cause UTI?
5. What are the management recommendations for UTI in older adults?
6. What general steps can be taken to reduce incidence of UTIs in hospital wards?
Answers to the case study questions

1. Urine dipstick of MSU sample
2. Agitation, confusion, urinary incontinence, can lead to delirium
3. Younger adults present with urinary urgency, dysuria, frequency of urination, abdominal pain
4. Most common organism is *Escherichia Coli*, though *Klebsiella* and some streptococci are also seen in hospital
5. Antibiotic therapy
6. Keeping patients hydrated, helping patients maintain good personal hygiene and encouraging bladder emptying, general cleanliness on wards etc