UTI's in older people

Theory and Practice

What's special about UTI & older people?

- Urine not always a sterile fluid
- Presentation
- Specimen collection difficulties
- Catheter use widespread
- Comorbidity

Asymptomatic bacteriuria

- Age-related changes
  - ↑vaginal pH favour coliform growth
  - Changes in bactericidal activity prostate secretions
  - Reduced bladder emptying - high PVRU’s
    - Age-related decrease in detrusor contractility
    - Prostate enlargement
    - Cystocoele
- Perineal hygiene

Diagnosis of asymptomatic bacteriuria

- Correct specimen collection*
- Women: 2 consecutive voided specimens with one bacterial strain of $\geq 10^5$ bacteria per ml*
- Men: single clean catch specimen with one bacterial strain in count of $\geq 10^5$ per ml
- Both sexes: in-out catheter specimen with one bacterial strain in count of $\geq 10^5$ per ml

Prevalence of asymptomatic bacteriuria - community

Sex and age group	Prevalence (%)
Women	
< 50	1-2%
> 65	6-16%
> 80	20%
> 90	25-40%
Men	
< 60	< 1%
> 80	5-10%
> 90	20%

Prevalence of asymptomatic bacteriuria

Sex and setting or context	Prevalence
Women	
Long-term care facility	**25-50%**
Men	
Long-term care facility	15-35%
Both sexes	
Long-term catheter	100%

Risk factors for asymptomatic bacteriuria

- Reduced mobility and functional impairment
- Cognitive impairment
- Urinary incontinence
  - Probably a result of common risk factors eg voiding abnormalities, rather than causative
- In-dwelling catheter
  - Foreign body and biofilm formation
- ? Comorbidity

Microbiology of asymptomatic bacteriuria

- Ascending infection via urethra from colonising flora of perineum, vagina or rectum
- E. coli in ≈ 75%
- Others:
  - Community – *E. coli* and *staphylococci*
  - Residential care – *Klebsiella*, *proteus*
  - Long-term catheters – *proteus*, *pseudomonas*

Course & outcome of asymptomatic bacteriuria

- ≈ 1/3 of those with bacteriuria have negative cultures at 6 months
- ≈ 1/3 of those without bacteriuria have positive cultures at 6 months
- Organism may change over time
- No longer term negative outcomes
  - Decreased survival BUT …
  - Accounted for by associated disability & comorbidity

Prevention of asymptomatic bacteriuria

- "Few high quality studies"
- Topical oestrogen shown to be effective but
  - Not in all studies
  - Only studied in women with recurrent UTI's
  - Not recommended all post-menopausal women*
- Cranberry juice reduced bacteriuria and pyuria in some (not all) trials
  - Widely used, some evidence, but why "treat"

Management of asymptomatic bacteriuria

- Don’t screen for it except…
  - Pre-TURP
  - Pre-invasive urological procedures eg cystoscopy
  - Women in early pregnancy
- Don’t treat – clears organism but
  - No reduction in morbidity
  - No reduction in mortality
  - No difference in long term rates of incontinence

Asymptomatic bacteriuria

What's the big deal?

- What really is asymptomatic?
  - Non-specific disease presentation in frail elderly
  - Low threshold for doing urinalysis
- Who do you treat?
  - Almost certain over-treatment "UTI" in LTCF, hospital
- Inappropriate antibiotic use
  - Short term side-effects – GI upset, C. diff diarrhoea
  - Long term development of resistant organisms

UTI's - terminology

Anatomical – organ involved

- Cystitis – bladder / lower urinary tract
- Pyelonephritis – upper urinary tract
  - Usually sicker, local loin pain, fever
- In older patients, often thought to be cystitis
  - Distinction rarely source of major diagnostic concern - ? should be

UTI's - terminology

Underlying cause

- Uncomplicated
- Complicated
  - Underlying structural or functional abnormality
  - eg IDC, neurogenic bladder with spinal disease, stones, tumour, high residual urine
  - Predisposes to development of UTI, complications & Rx failure
  - Wider range of potential organisms

Diagnosis of UTI in older people

- May be difficult to tell if symptoms of someone who is sick are related to UTI
  - Non-urinary usually >> urinary symptoms
  - "Asymptomatic" bacteriuria
- No difference in prevalence of a number of urinary & non-urinary symptoms in those older people with and without bacteriuria
- Incidence: women 55-75 of 7/100 patient/yrs

Proposed UTI diagnostic criteria -1 for LTCF residents – no IDC*

- $T \geq 38°C$
- New /increased dysuria, urgency or frequency
- New flank / suprapubic pain or tenderness
- Change in character of urine*
- Worsening of mental or functional status

Need ≥ <u>3</u> of these features to diagnose UTI

McGeer A et al. Am J Infect Control 1991;19: 1

Proposed UTI diagnostic criteria -1 for LTCF residents

- What have you noticed?
- What is missing?
- Doesn’t require results of MSU
  - High prevalence of asymptomatic bacteriuria
- Does this really happen?

Proposed UTI diagnostic criteria -2 for LTCF residents – no IDC

- Acute dysuria OR…
- Fever (T $\geq$ 38°C or $\geq$ 1.5°C baseline) AND 1 of…
  - New or worsening urgency
  - Suprapubic pain
  - Costovertebral angle tenderness
  - Haematuria
  - New onset incontinence

Loeb M et al. Infect Control Hosp Epidemiol 2001; 22: 120

Diagnosis UTI LTCF residents

Rules of thumb

- Clinical deterioration <u>without any localized GU symptoms*</u> unlikely to be due to symptomatic UTI, even with bacteriuria
- Negative urinalysis effectively rules out UTI, particularly negative pyuria (leucocytes)

Urinalysis findings – indications of UTI

- Positive nitrites
- Positive leucocytes
- +/- Haematuria
- +/- Proteinuria
- Usually don’t have “full hand”

Urinalysis for UTI - nitrites

- "Nitrites" produced by many uropathogenic organisms converting nitrates to nitrites
- Sensitivity only ≈ 40%, specificity >90%
  - Positive test helpful, negative test not
- False negative tests
  - Bacteria causing UTI's doesn't produce nitrites
  - Very dilute or acid urine
- False positive tests
  - Prolonged exposure to air when testing

Urinalysis for UTI – leucocytes

- “Leucocytes” tests for enzyme (leucocyte esterase) produced by white cells (pyuria)
- Sensitivity of ≈ > 90%
- False positive tests (for diagnosis of UTI)
  - A non-specific finding or contamination; asymptomatic bacteriuria; rarer important causes of “sterile pyuria”
- False negative tests
  - Glycosuria; drugs – cephalexin, nitrofurantion; high doses vitamin C

UTI - leucocytes (pyuria)

- Pyuria may not indicate symptomatic UTI!
  - Either leucocyte esterase urinalysis or microscopy
- Seen in symptomatic UTI & asymptomatic bacteriuria*
  - In > 50% of older people with asymptomatic bacteriuria, and up to 100% of those with IDC
- Occurs in ≈ ≥1/3 LTCF residents without accompanying bacteriuria

UTI - leucocytes (pyuria)

- Degree of pyuria in those with IDC may not increase with symptomatic UTI's
- Absence of pyuria useful to exclude UTI
  - Unlikely to have symptomatic UTI without pyuria
- Pyuria non-specific response to "irritation"
  - Asymptomatic bacteriuria, symptomatic UTI and ? other source lower urinary tract irritation

Urinalysis – general comments

- Interpret results with common sense
  - Minor abnormalities are common, often transient and may be unexplained
- Abnormalities may indicate other pathology apart from UTI eg haematuria due to bladder tumour, proteinuria due to renal disease
- Repeat if in doubt

Urinalysis - general comments

Rules of thumb

- In patient without local urinary tract symptoms negative leucocytes & nitrites effectively rule out a UTI
- In patient with local urinary tract symptoms negative leucocyte test makes a UTI unlikely
- In LTCF residents with or without local symptoms, a negative urinalysis (particularly leucocytes) effectively rules out a UTI

Urinalysis abnormalities - what to do?

- Follow-up abnormal urinalysis results with MSU when possible
  - Minor abnormalities – repeat urinalysis as 1st step
- Ideally repeat an MSU suggesting contamination, but not always possible
- Inform doctor of clearly positive findings – obvious haematuria, strongly positive or multiple positive abnormalities

Laboratory (MSU) diagnosis of UTI

- Simple guide*
  - $\geq 10^5$ organisms/ml and pyuria $\geq 10^4$ white cells
  - Same quantitative count for IDC collected CSU
- Not so simple guide
  - Men $\geq 10^3$ organisms/ml (or 10^4 if pyelonephritis suspected) in well collected MSU
  - Any count (really $\geq 10^2$) if collected by in-out, or newly inserted, catheter

Contaminated specimens - clues

<u>Microscopy</u>

- White cells without bacteria
- Bacteria without white cells
- Epithelial squames

<u>Culture</u>

- "Mixed" growth
- Growth of skin or vaginal organisms

Microbiology UTI in older people

- In community
  - 80% Gram negatives such as *E. coli (*and *Enterobacter, Proteus, Klebsiella)*
  - 20% Gram positive organisms such as *Enterococcus* and some *Staph* species especially in men

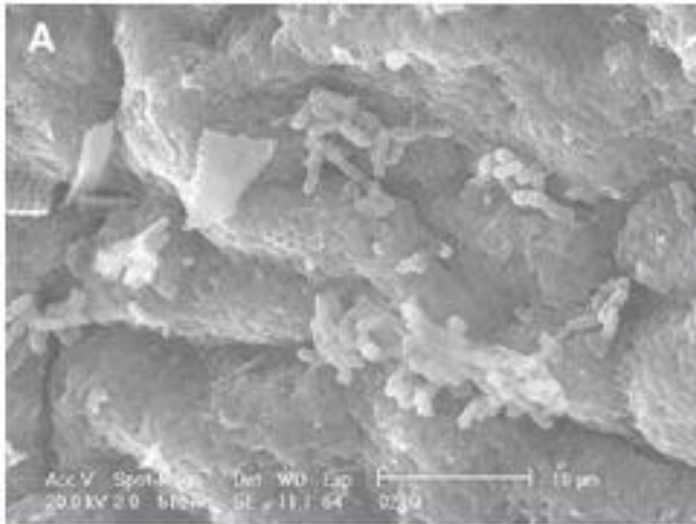
Microbiology UTI in older people

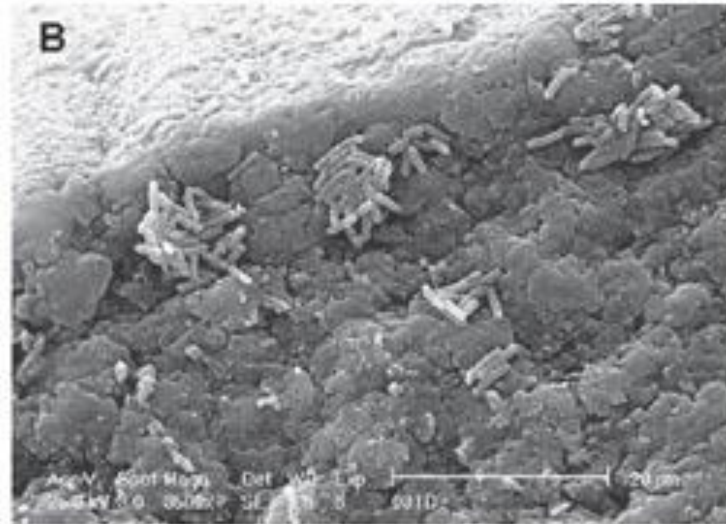
- In hospital
  - Complicated UTI's – catheters, procedures, previous AB courses, underlying conditions eg diabetes
  - "Locally common" organisms
  - Nosocomial organisms – *pseudomonas, MRSA, VRE,* multi-resistant Gram negatives

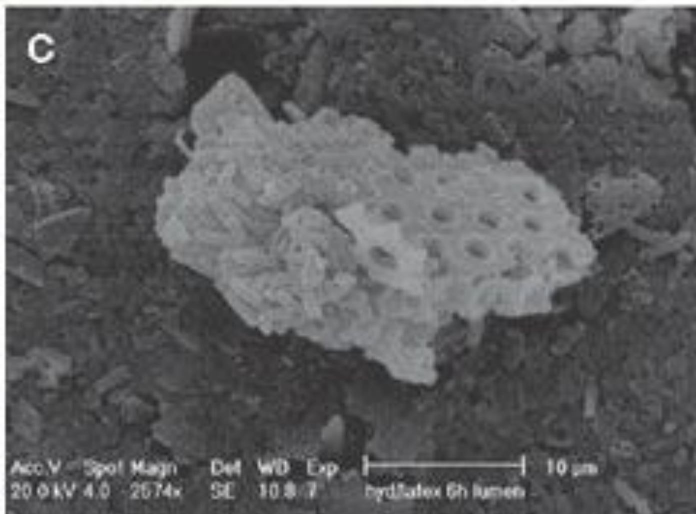
CAUTI - biofilms

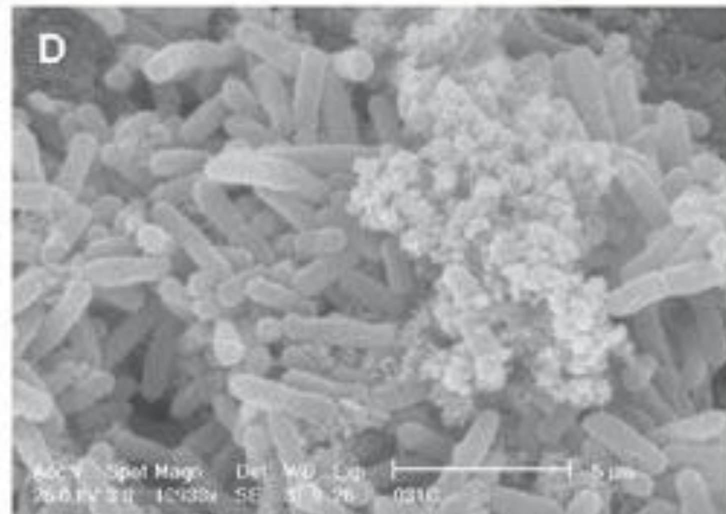
- Biofilm formation on IDC
  - Urine components – proteins, crystals
  - Bacteria and bacterial products
- Biofilm may eventually obstruct IDC
- Organisms in biofilm protected from host defences and AB's
- Urease producing organisms (eg Proteus) → ↑urinary pH → ↑ crystal formation → blockage

Biofilms

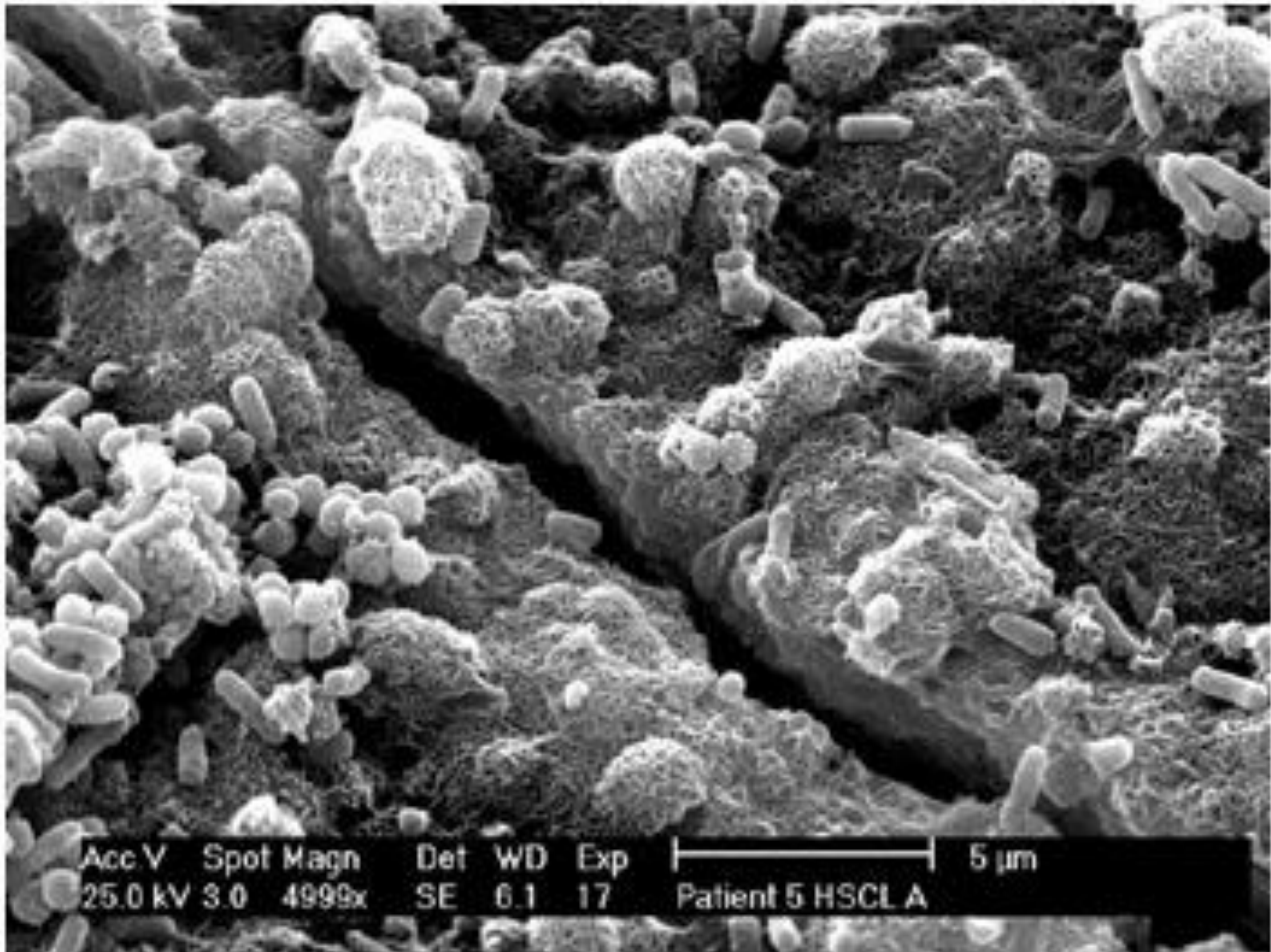








Biofilms



CAUTI in LTCF

- In those with permanent IDC, there is always associated bacteriuria
- Incidence of new organism colonisation of 3-7%/ day – all colonised by ≈ 4 weeks
- Incidence symptomatic UTI ↑ ≥ 3x cf no IDC
  - Reported incidence 7.5/1,000 catheter days*
- Incidence bacteraemic UTI ↑ up to 40x
- Greater mortality probably accounted for by those with IDC bacteriuria being more disabled & sicker

CAUTI - diagnostic criteria LTCF residents - 1*

- $T \geq 38°C$
- New flank / suprapubic pain or tenderness
- Change in character of urine*
- Worsening of mental or functional status

Need at least 2 of these features to diagnose UTI

McGeer A et al. Am J Infect Control 1991; 19:1

CAUTI - diagnostic criteria LTCF residents – 2*

- T $\geq$ 38°C
- T $\geq$ 1.5°C above baseline*
- Rigors with or without identifiable cause
- New costovertebral angle tenderness
- New onset delirium without other cause*

Need only 1 of these features to <u>order MSU</u> and <u>treat suspected UTI</u>

Loeb M et al. Infect Control Hosp Epidemiol 2001; 22: 120

Oral antibiotic treatment of UTI

- Trimethoprim 300 mg daily
- Amoxicillin 250-500 mg tds
  - Many organisms now resistant…
- Amoxicillin / clavulanate (Augmentin DF) 1 tds
- Cephalexin 250-500 mg tds
- Norfloxacin 400 mg bd
  - Reserve this for known resistant organisms

Therapeutic Guidelines recommendations

Women with cystitis

- Trimethoprim 300 mg daily 3 days*
- Cephalexin 500 mg bd 5 days
- Amoxicillin/clavulanate 500/125 bd 5 days
- Nitrofurantoin 100 mg bd 5 days
- Norfloxacin 400 mg bd if resistant

Pyelonephritis

- As above (not nitrofurantion) for <u>10</u> days
- IV AB's (eg ceftriaxone) for more severe illness

IV antibiotic treatment of UTI

- Amoxicillin 1-2 g 6 hourly +/-
- Gentamicin ≤ 5 mg/kg daily
  - Not usually used in elderly as nephrotoxic
- Ceftriaxone 1-2 g daily
- Piperacillin/tazobactam (Tazocin) 3.375 g 8 hrly
  - *Pseudomonas* and resistant gram negatives
- Vancomycin ≤ 1g 24 hrly
  - MRSA UTI

Therapeutic Guidelines recommendations

Men

- Antibiotics as for women, 14 day course

Recurrent UTI's in women

- Trimethoprim 150 mg nocte 3-6 months
- Cephalexin 250 mg nocte 3-6 months

CAUTI

- As per uncomplicated Rx, 10-14 day course
- Prior to urological surgery

Duration of antibiotic treatment

- Uncomplicated cystitis women in community
  - 3 days antibiotic treatment said to be sufficient*
  - In reality, 7 (perhaps 5) day course prescribed
- For? pyelonephritis
  - Sicker, high temperature, loin tenderness - 10-14 day course advised
- Recurrent cystitis in men
  - Consider? prostatitis - need 6 to 12 week course*

Duration of antibiotic treatment

- For LTCF residents
  - Recommendations only – not high level evidence
  - Women with cystitis - normal duration of Rx
  - Males – 7-14 days
  - Women or men with more severe illness +/- slow recovery – 10-14 days*
  - IDC – 7-14 days

CAUTI – management issues

- Change IDC before specimen collection and / or beginning treatment if possible
  - Often / usually is not!
- Shorter Rx duration not recommended
- Organisms may be more resistant
  - Important to get CSU culture results
  - Not always easy to know what to treat if > 1 organism

Prevention of recurrent UTI

Community –uncomplicated UTI's

- Longer term suppressive AB treatment if $\geq$ 3 symptomatic UTI's over 12 month period
- Antibiotics
  - Trimethoprim 150 mg daily
  - Cephalexin 250 mg daily
  - Nitrofurantoin 50 mg daily
- Duration unclear but try 6-12 months initially

Prevention of recurrent UTI

Community –uncomplicated UTI's

- Cranberry juice or capsules
  - Placebo controlled trial reported 30% reduction UTI's – older women not reported separately
  - Efficacy in older people not supported by Cochrane
- Topical (not oral) oestrogen
  - Widely used, evidence mixed – only 2 positive placebo-controlled trials (279 subjects) cited in Cochrane review

Prevention of recurrent UTI

Complicated UTI's

- Underlying genitourinary problem, including IDC
- "Correct abnormality if possible"*
- Antimicrobial prophylaxis not recommended
  - Does not reduce recurrence
  - Development of resistant organisms
- Agents such as cranberry products and topical oestrogens not effective or recommended

CAUTI prevention – what works

- Maintenance of closed drainage system
- Good catheter care eg avoidance of traction by securing correctly
- Early recognition of obstruction
- Condom drainage, IMC or ISC, v IDC
- ? Good fluid intake
- Changing IDC before starting AB treatment

CAUTI prevention – what doesn't work

- Routine catheter change
  - Unless predicted timing of obstruction identified
- Use of specific type of long-term catheter
- Antibiotic / silver impregnated catheters
- Antiseptics in drainage bag
- Cranberry
- Methenamine hippurate (Hiprex)
- Catheter irrigation or washouts

Closing comments

- UTI diagnosis depends on more than just urinalysis or MSU results
  - "If it moves shoot it" responses common!
- Distinguishing symptomatic from asymptomatic bacteriuria is challenging
  - Clinical judgement +/- algorithms the mainstay of assessment unless biomarkers appear & ? won't
- Is this IDC really necessary?
  - IDC removal often the only real solution for catheter problems