Agenda

• The myths of UTI
  – The myth
  – How to manage it
• Local data (SPH)
• Discussion
Acknowledgement

• Many of the slides in this presentation are from Dr. V. Leung of SPH ASP
- 22-89% of antimicrobial Rx for LTC residents is inappropriate
- 30-50% Hospital Prescriptions are inappropriate
- UTIs are in the top two reasons for Rx
- UTI treatment can be avoided 39% of the time (CDC March 2014)
• SHEA:
“Don’t perform urinalysis, urine culture . . .unless patients have signs or symptoms of infection.”

• AMDA:
“Don’t obtain a urine culture unless there are clear signs and symptoms that localize to the urinary tract.”

• IDSA:
“Don’t treat asymptomatic bacteriuria with antibiotics.”

• Urology:
“Don’t use antimicrobials to treat asymptomatic bacteriuria in the elderly.”

• Hospitalist Medicine:
“Don’t prescribe antibiotics for asymptomatic bacteriuria (ASB) in non-pregnant patients.”

• Geriatrics:
“Don’t use antimicrobials to treat bacteriuria in older adults unless specific urinary tract symptoms are present.”
It is safe not to treat bacteriuria in those with non-specific symptoms.

There is compelling evidence to support NOT treating asymptomatic bacteriuria in residents of long-term care facilities.

Data from 4 RCT demonstrate the lack of benefit.

Conclusion: Treatment of asymptomatic bacteriuria is neither beneficial or effective.
A 12 month antibiotic utilization in chronic care study showed that 30% of prescriptions for a urinary indication were for asymptomatic bacteriuria


But . . . It is still being done
The Myths

- Cloudy/smelly urine and UTI
- Bacteriuria and UTI
- Squamous cells and UTI
- Pyuria and UTI
- Nitrates and UTI
- Altered Mental Status and UTI
- Yeast in urine
Myth 1

• “Cloudy and Smelly Urine are indicators of UTI”
Myth 1

"Cloudy and Smelly Urine are indicators of UTI"

Urine Colour and Odour should not be used diagnose UTI in any patient population

• Sens 13.3%, PPV 40%
  – For bacteriuria, not infection

• Odour is subjective
  – Affected by hydration and urea concentration
  – Stagnant urine stinks!
SOUR-PEE study

*(Scent of Urine and other Physical Characteristics in the Evaluation of UTI)*

- Observational Study n=537
- Cloudy urine: $+LR = 0.82 \ [0.33, 2.05]$  
  - $LR = 1.05 \ [0.87, 1.26]$  
- Smelly Urine: $+LR = 0.66 \ [0.28, 1.57]$  
  - $LR = 1.19 \ [0.9, 1.57]$
Myth 2

“Bacteria detected in urine (microscopy or other) is diagnostic of UTI”
Myth 2

“Bacteria detected in urine (microscopy or other) is diagnostic of UTI”

Bacteria seen in urine is not diagnostic of UTI

Bacteria seen on microscopy do not mean that a patient has a UTI

Reasons for false positive microscopy:
1. Contamination
2. Growth after collection
3. Colonization
4. Concentration (sedimentation)
5. Asymptomatic bacteruria
6. Other infections (urethritis, cellulitis)
Myth 3

“Positive urine cultures with >5 squamous cells per HPF are considered positive and require treatment.”
Myth 3

“Positive urine cultures with >5 squamous cells per HPF are considered positive and require treatment.”
Myth 4

“ A positive Leukocyte esterase is diagnostic of UTI and requires treatment.”
Myth 4

“A positive Leukocyte esterase is diagnostic of UTI and requires treatment.”

LE shows the presence of WBC but does determine their Clinical Significance

Patients can have WBC in the urine for many reasons

– Catheterization
– Stones
– Vaginitis/urethritis
– Asymptomatic bacteriuria
Myth 5

“Pyuria is diagnostic of UTI.”
Myth 5
“Pyuria is diagnostic of UTI.”

The presence of WBC
does not diagnose UTI

Patients can have WBC in the urine for many reasons

– Catheterization
– Stones
– Vaginitis/urethritis
– Asymptomatic bacteriuria
– Sedimentation
– Non-infectious bladder inflammation
Myth 6

“The presence of nitrates is diagnostic of UTI.”
Myth 6

“The presence of nitrates is diagnostic of UTI.”

Nitrates show the presence of gram negative bacteria, not their clinical significance

The presence of bacteria can be due to
- Asymptomatic bactiuria
- Growth after collection
- Perineal contamination
- Biofilm formation on catheter
But . . .

• Negative Nitrate and LE **ARE** useful in eliminating UTI: NPV 88% [84%, 92%]

• Positive LE and Nitrate have poor sensitivity 48%

So

- LE/-Nit = no UTI, + LE/+Nit means nothing
Myth 7

“Patients with Bacteriuria will progress to a UTI and should be treated.”
The natural history of ASB is to remain ASB

Treating ASB leads to adverse events and is unlikely to benefit patients
- 15-50% of elderly have ASB
- So ASB >> UTI with + UC
- Treatment of ASB leads to more resistance and toxicity without improving patient care
Myth 8

“Falls and altered mental status in the elderly are usually due to UTI.”
There are many causes of confusion, most of which aren’t UTI

Conflation of ASB with UTI results in correct diagnosis being missed.
- Systemic signs should be present for UTI to cause aLOC
- UTI is Dx of exclusion
Myth 9

“Yeast (candida) in the urine signifies fungal UTI and should be treated.”
Myth 7

“Patients with Bacteriuria will progress to a UTI and should be treated.”

Yeast is very rarely a urinary pathogen

Perineal and catheter colonization cause positive cultures

- Treatment of candiduria does not benefit patients*
- Remove/change catheter
- Evaluate Non-catheterized patients for vaginosis/balanitis

* Note that some patient populations are excepted.
Summary

• UTI Can **ONLY** be diagnosed in the presence of symptoms and signs of UTI

• Not:
  – Microscopy, UA, flow cytometry, culture, smell, appearance or non-specific confusion.
UTI MANAGEMENT ALGORITHM

VCH Management of Urinary Tract Infections (UTI) in Non-pregnant Adults

KEY POINTS:
1. Malodorous/cloudy urine alone is **NOT** a sign/symptom of UTI and is **NOT** an indication to obtain urine cultures.¹
2. Changes in cognitive function and activities of daily living **DO** require clinical assessment; never assume these are due to UTI.
3. Urine should **ALWAYS** be collected midstream, by in/out catheterization, or through a new catheter (unless contraindicated).²
4. Positive urine cultures in asymptomatic patients should **NOT** be treated except in pregnancy or prior to urologic/gynecologic surgery.

Signs and Symptoms of Suspected UTI:²
- One of the following in febrile patients (oral temperature >37.8 °C or 100.2 °F above baseline in Spinal Cord Injury) or two of the following in febrile patients:
  - Presence of infection in another organ (i.e., pneumonia, meningitis, etc.).
  - New or marked increase in incontinence.
  - Pain.
  - New or marked increase in urgency.
  - Fever.
  - New or marked increase in frequency.
  - New or marked increase in urinary retention.

NOTE: Only after clinical assessment and ruling out other possible causes should changes in mental status and functional decline, and sudden fever, rigors or new-onset hypertension suggest UTI in patients; use clinical judgment.²

For Genitourinary and Spinal Cord Injury (including coma/acute encephalopathy): UTI may present identically; use clinical assessment to guide decision for urine culture & urinalysis.

**UTI unlikely?** (Only >20% chance of having a UTI)²
- Consider alternate diagnosis.

**Cystitis**
- If symptoms are mild, may wait for culture results.

**Pyelonephritis/Urosepsis**
- Obtain blood cultures when indicated.

Review post culture results for antibiotic guidance.²
- Preferred agents (total duration 3-7 days):²
  - Nitrofurantoin 50-100 mg QID or
  - Nitrofurantoin long-acting (Macneil®) 300 mg BID or QID x 3 days
  - Trimethoprim 150 mg QID BID x 3 days
  - Nitrofurantoin 50-100 mg QID or
  - Nitrofurantoin long-acting (Macneil®) 300 mg BID or QID x 3 days
- Other options:²
  - Aminoglycosides 100-200 mg IV QD x 3 days
  - Fosfomycin 3 g PO x 1 dose (Restricted to acute uncomplicated cystitis caused by susceptible organisms with demonstrated resistance and/or intolerance to all other oral agents)

Review post culture results for antibiotic guidance.²
- Preferred agents (total duration 10-14 days):²
  - Ceftriaxone 500 mg IV QD x 3-7 days
  - Cefuroxime 500 mg QID x 3-7 days
  - Aztreonam 1 g IV QD x 3-7 days

Special considerations for patients with renal impairment or allergy to cephalosporins:
- Use of alternative agents (e.g., amoxicillin, clavulanate 500/125 mg TID x 3 days)
- Continue preferred agent or tailor down to preferred agent, if appropriate, once urine culture and susceptibility results are available.

Follow-up care:³
- Assess patient’s response to therapy.
- Reassess in 1-3 days for clinical improvement.
- Lack of response to antibiotic therapy should elicit search for other underlying conditions.

AT 48 hours
- Remove catheter (if possible) and reassess in 24 hrs, or replace catheter before urine collection (unless contraindicated, e.g., catheter placed by Urology, urethral stricture/tumor, patient unable to tolerate procedure).

³ Use with caution in elderly. If Ceftriaxone is used, consult Pharmacy for dosing & monitoring.

VCH Uti Algorithm

ASPIRES

Revised: January 14, 2023
KEY PRINCIPLES

1. Culture only if **SYMPTOMS** of UTI are present
2. Changes in cognitive function **REQUIRES** clinical assessment
   - **DO NOT ASSUME** these are due to UTI
3. Collect urine for **UA** and culture
   - Provides critical information for interpretation
4. Collect urine culture without **CONTAMINATION**
   - Clean catch *OR*
   - In and out *OR*
   - Change and collect through new catheter
5. Treat patients with **SYMPTOMS**, not cultures
## SYMPTOMS OF UTI

<table>
<thead>
<tr>
<th>UTI symptoms</th>
<th>Not UTI symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACUTE DYSURIA</strong> and one of the following in febrile (or 1°C above baseline in Spinal Cord Injury) or two of the following in afebrile patients:</td>
<td>• Cloudy urine</td>
</tr>
<tr>
<td>– New or increased incontinence</td>
<td>• Smelly urine</td>
</tr>
<tr>
<td>– New or increased urgency</td>
<td>• Confusion without other signs of infection*</td>
</tr>
<tr>
<td>– New or increased frequency</td>
<td>• Vaginal discharge</td>
</tr>
<tr>
<td>– New or increased retention</td>
<td>• *Note:</td>
</tr>
<tr>
<td>– Suprapubic pain</td>
<td>– Only after clinical assessment and rule-out of other causes should change of mental status suggest UTI</td>
</tr>
<tr>
<td>– Gross hematuria</td>
<td></td>
</tr>
<tr>
<td>– Swelling of testes, epididymis, or prostate</td>
<td></td>
</tr>
<tr>
<td>– Costovertebral pain</td>
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</tbody>
</table>
HOW TO COLLECT A GOOD URINE SAMPLE

Clean catch

• Client must be **ABLE** to collect urine alone or with help
• Clean perineum or prepuce
• Let first few drops go
• Collect sample
• Do not allow urine to contact perineum or foreskin (no bedpans!)

Catheter

• Must be collected through a **NEW** catheter
• In and out if client cannot perform a clean catch
• Replace existing Foley catheter with a new one to collect sample
• **Exception**
  – catheter placed by urology*

* Results must be viewed with scepticism.
WHEN TO TREAT A POSITIVE URINE CULTURE

- If patient has ongoing SYMPTOMS of UTI
- Prior to UROLOGIC surgery
- Patient shows signs of SEPSIS with no other identifiable source of infection

Many patients over the age of 50 years have positive urine cultures. Most don’t have a UTI and don’t need treatment.
WHICH ANTIBIOTIC TO SELECT FOR UTI

- **Nitrofurantoin** and **Co-trimoxazole** are preferred agents for lower UTI treatment

- Ceftriaxone is preferred for pyelonephritis and mild urosepsis (unless enterococcus is suspected)

- Pipercillin-tazobactam is preferred for urosepsis

- Fluoroquinolones are **NOT** recommended due to high propensity for collateral damage and resistance (antibiogram suggests only 60% susceptibility)
# WHICH ANTIBIOTIC TO SELECT FOR UTI

<table>
<thead>
<tr>
<th>Gram-Negative Organisms, % Susceptible</th>
<th>E.coli</th>
<th>K.pneumoniae</th>
<th>E.cloacae</th>
<th>P.mirabilis</th>
<th>S.marcescens</th>
<th>Acinetobacter**</th>
<th>P.aeruginosa</th>
</tr>
</thead>
<tbody>
<tr>
<td># Isolates</td>
<td>1265 1389</td>
<td>223 260</td>
<td>61 60</td>
<td>129 152</td>
<td>29 25</td>
<td>14 23</td>
<td>139 146</td>
</tr>
<tr>
<td>Antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>61 61</td>
<td>0 0</td>
<td>0 0</td>
<td>76 72</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>84 87</td>
<td>94 93</td>
<td>0 0</td>
<td>8 27</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>88 89</td>
<td>97 94</td>
<td>0 0</td>
<td>29 30</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>92 92</td>
<td>100 97</td>
<td>87 87</td>
<td>99 98</td>
<td>100 100</td>
<td>14 22</td>
<td>0 0</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>92 92</td>
<td>100 97</td>
<td>89 87</td>
<td>100 100</td>
<td>100 100</td>
<td>86 91</td>
<td>94 97</td>
</tr>
<tr>
<td>Ciproflox</td>
<td>80 78</td>
<td>98 97</td>
<td>97 97</td>
<td>81 76</td>
<td>93 100</td>
<td>100 96</td>
<td>84 94</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>94 83</td>
<td>99 99</td>
<td>97 97</td>
<td>95 93</td>
<td>100 100</td>
<td>93 100</td>
<td>94 97</td>
</tr>
<tr>
<td>Imipenem</td>
<td>100 100</td>
<td>100 100</td>
<td>100 93</td>
<td>99 96</td>
<td>96 96</td>
<td>100 100</td>
<td>96 97</td>
</tr>
<tr>
<td>Meropenem</td>
<td>100 100</td>
<td>100 100</td>
<td>100 95</td>
<td>100 100</td>
<td>100 96</td>
<td>100 100</td>
<td>96 98</td>
</tr>
<tr>
<td>Pip/tazo</td>
<td>98 99</td>
<td>99 97</td>
<td>97 90</td>
<td>98 100</td>
<td>100 100</td>
<td>93** 96</td>
<td>97 99</td>
</tr>
<tr>
<td>SXT</td>
<td>79 80</td>
<td>97 94</td>
<td>90 88</td>
<td>79 69</td>
<td>97 100</td>
<td>100 91</td>
<td>0 0</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>80 77</td>
<td>96 87</td>
<td>87 93</td>
<td>0 0</td>
<td>0 0</td>
<td>100 96</td>
<td>0 0</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>92 92</td>
<td>100 99</td>
<td>97 93</td>
<td>93 92</td>
<td>69 92</td>
<td>93 91</td>
<td>96 99</td>
</tr>
<tr>
<td>Nitrofurantoin (simple cystitis only)</td>
<td>98 98</td>
<td>41 44</td>
<td>27 31</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
</tr>
</tbody>
</table>
WHEN TO REASSESS UTI THERAPY

• Patients generally should start feeling better within **36 hrs** of initiating treatment

• Continue preferred agents or tailor-down to preferred agents once UC results are back (**48 hrs**)  

• If on IV therapy, Step down to PO if patient temperature <38°C X 24 hrs

• **Reassess after 2-3 days** to ensure clinical improvement; if no improvement, search for underlying cause
IV to PO Conversion

• Not necessary with bioequivalent drugs
  – Ciprofloxacin, Co-trimoxazole, Fluconazole

• Can be done
  – Patient has a functional GI tract
  – Patient is improving
  – Afebrile for 24 hours

• Shorter LOS, fewer complications
Treatment Duration

- Cystitis:
  - 3-5 days sufficient, Nitrofurantoin 5-7 days

- Pyelonephritis/Urosepsis
  - 7 days is usually sufficient (esp. young healthy females)
  - Up to 14 days if slow response or urological abnormalities
  - Follow patient for defervescence, clinical improvement
Questions?