Auditing the Correctness of UTI Diagnosis & Management in a DGH

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Inclusion Criteria

47 consecutive patients admitted to the Acute Medical Unit (AMU) with the 'admission diagnosis' of UTI or Urosepsis were included in this audit.

Aims of the audit

1. To establish the correctness of the 'admission diagnosis' of UTI or Urosepsis.
2. To know whether or not we are offering blanket antibiotic therapy to patients who had positive urine dipstick analysis due to 'asymptomatic bacteriuria' (rather than true UTI).

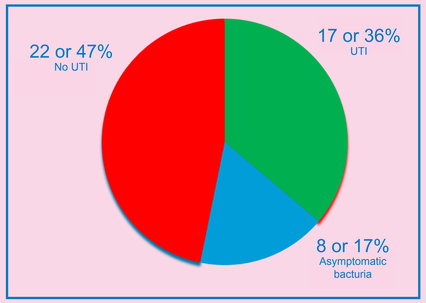
Methods

In this audit, we selected 47 consecutive patients admitted & treated for an admission diagnosis of UTI or Urosepsis. The 'correctness' of the 'admission diagnosis' was then verified using retrospective evidence (presenting complaints & urine dipstick findings) and prospective evidence (urine microscopy and culture findings).

Results

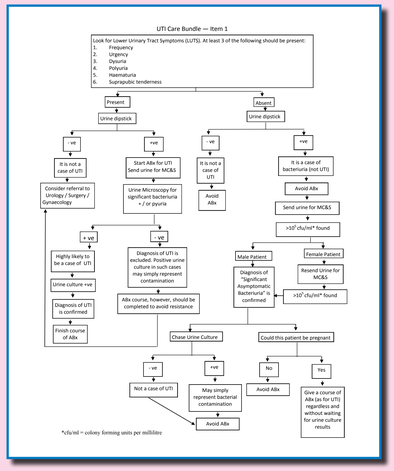
Negative urine dipstick virtually excludes UTI (negative predictive value for UTI of 100%). In this audit, urine dipstick was negative in 25 out of 47 patients, yet they were wrongly labelled & treated for UTI.

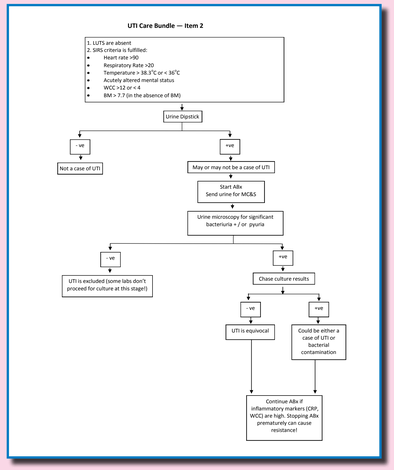
Total number of patients:	**47**
Patients who had LUTS:	9
Patients who had SIRS or sepsis:	6
Positive urine dipstick:	22
Negative urine dipstick:	25
Positive urine microscopy:	13
Positive urine culture:	17



Conclusions

We conclude that UTI is over-diagnosed, often in the absence of any supporting clinical &/or lab evidence. To overcome this shortcoming in clinical practice, we have developed an evidence-based care bundle for UTI diagnosis and management. We intend to submit this care bundle for trust approval and would recommend incorporating the same in the admission clerking notes.





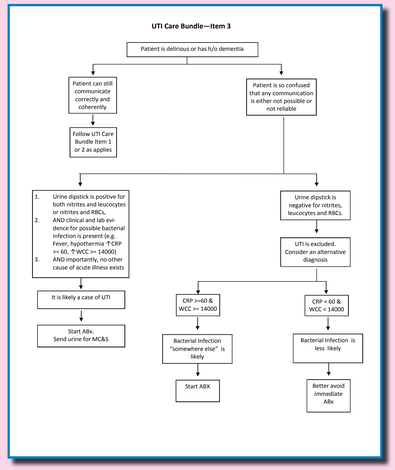


Table 1: Definitions and Management Plans:		
Condition:	**Definition:**	**Treatment:**
Urinary tract infection (UTI):	Invasion of the urinary tract with microorganisms with secondary development of lower urinary tract symptoms (LUTS) is called UTI. A positive urine culture in such cases would be confirmatory.	Antibiotic therapy is justified in such cases.
Lower urinary tract symptoms (LUTS):	In patients who can communicate, LUTS should comprise at least three of the following: frequency, urgency, dysuria, polyuria, hematuria, or suprapubic tenderness. **Tip:** •Acute stress urinary incontinence may be a symptom of UTI. •Chronic stable stress incontinence however is against the diagnosis of UTI.	(Provided patient lacks any associated history of vaginal discharge or irritation), **presence of LUTS means UTI probability of 90%.** Antibiotics are often justifiable in such cases. **Tip:** Patients who are **acutely delirious** due to infection, or have a background of **advanced dementia** may not be able to communicate LUTS. 'Absence' of LUTS in this particular subgroup of patients therefore doesn't exclude the possibility of UTI. **1.If** clinical & lab evidence for possible infection is present (e.g. fever/ hypothermia, ↑ WCC, ↑ CRP),* **2.and**, importantly, no other more likely cause of acute illness exists, **3.and**, urine dipstick is positive for both nitrites & leukocytes, or nitrites & RBC's, **then** antibiotics may be started on the **presumptive** diagnosis of UTI. **Tip:** *A CRP value of <60 mg/L &/or a WCC of <14000 cells/mm³ have a negative predictive value for bacterial infection of >90%. The positive predictive values of CRP >60 mg/L & WCC >14000 cells/mm³ are 90% & 39% respectively. In other words, if CRP is <60 mg/L & WCC is <14000 cells/mm³ then 9 out of 10 such patients are NOT suffering from a bacterial infection.
Systemic inflammatory response syndrome (SIRS) criteria:	•Heart rate >90 beats/min •Respiratory rate >20 breaths/min •Temperature >38.3°C or <36°C •Acutely altered mental status •White cell count >12/µL or <4/µL •Blood glucose >7.7 mmol/L in the absence of diabetes	Patients who fulfil SIRS criteria need to be examined for any localising signs of infection. Presence of LUTS in such cases would be highly suggestive of UTI and warrants treatment with antibiotics. If LUTS are absent, & urine dipstick is negative, it is not a case of UTI. If LUTS are absent, & urine dipstick is positive, it may or may not be a case of UTI.
Bacteriuria:	Bacteriuria refers to the presence of bacteria in the urine. It results from: 1.The presence of bacteria in the urine. 2.Or if urine gets contaminated during micturition with the normal bacterial flora of the urethra, vagina or perineum.	Gram negative bacteria, if present in the urine, will convert urinary nitrates to nitrites. Presence of nitrites on urine dipstick testing is therefore a sign of gram negative bacteriuria (not UTI) and as such doesn't require treatment unless associated with LUTS, SIRS or sepsis of unknown origin.
Significant Asymptomatic Bacteriuria:	Significant asymptomatic bacteriuria refers to the presence of bacteria in the urine without typical symptoms or signs of urinary tract infection. Quantitative counts of > 10^5 colony forming units per millilitre of urine (cfu/mL) are considered diagnostic of significant asymptomatic bacteriuria if found in a single sample in males or on two consecutive occasions in females.	•Significant asymptomatic bacteriuria is very common (incidence of up to 50% in residential/ nursing homes residents especially females). •Significant asymptomatic bacteriuria is not UTI and as such shouldn't be treated. •The only valid exception is during pregnancy in which antibiotics should be commenced if asymptomatic bacteriuria is found on routine urine testing.
Pyuria:	Elevated urinary white cell count (>10 white cells/mm³)	Pyuria cannot (& should not) be used to differentiate between UTI & asymptomatic bacteriuria as it may be present in both. It may even be present in the absence of UTI or bacteriuria especially in older people.

Table 2: Positive & negative predictive values of different tests:		
Test:	**Positive predictive value:**	**Negative predictive value:**
LUTS (at least three)	90% (for UTI)	---
CRP <60 mg/L	---	90% for bacterial infection (not necessarily UTI)
WCC <14000 cells/mm³	---	90% for bacterial infection (not necessarily UTI)
CRP >60 mg/L	90% for bacterial infection (not necessarily UTI)	---
WCC >14000 cells/mm³	39% for bacterial infection (not necessarily UTI)	---
Negative urine dipstick (negative for nitrites, leukocytes & RBC's):	---	~100% (for UTI)
Positive urine dipstick: Nitrites only:	45% for the presence of bacteriuria (not UTI)	---
Positive urine dipstick: Leukocytes only:	45% for the presence of bacteriuria (not UTI)	---
Positive urine dipstick: Nitrites AND Leukocytes:	90% (for UTI)	---
Positive urine dipstick: Nitrites AND RBC's:	90% (for UTI)	---
Urine microscopy: No bacteriuria &/or pyuria:	---	~100% (for UTI)

Table 3: Interpretation of patient's symptoms & urine analyses:	
Interpretation of urine dipstick analysis:	
Nitrites, Leukocytes & RBC's negative:	UTI is almost excluded. **Tip:** Whereas to make a diagnosis of UTI may be tricky in certain instances, excluding UTI is pretty straightforward. A negative urine dipstick test has a negative predictive value of almost 100%. Therefore regardless of the symptoms, if urine dipstick test in a given patient is negative, he/ she is NOT suffering from UTI.
Nitrites positive:	Bacteria, if present in the urine, convert urinary nitrates to nitrites. Presence of urinary nitrites thus suggests bacteriuria (not UTI).
Leukocytes positive:	Pyuria (presence of leukocytes in the urine) may be found in older people without bacteriuria. Therefore pyuria per se should not be considered as evidence for UTI.
Nitrites OR leukocytes positive:	Positive nitrites OR leukocytes have a positive predictive value of 45% for the presence of bacteriuria (not UTI). If LUTS are absent, and nitrites OR leukocytes are present, then it means that there is a 45% probability that such a patient is having bacteriuria. Bacteriuria per se in the absence of LUTS should not be considered as UTI & antibiotics should be avoided in such cases.
Nitrites AND Leukocytes positive:	Presence of both nitrites and leukocytes has a positive predictive value for UTI of >90% (i.e. 9 out of 10 such patients would have a UTI).
Nitrites AND RBC's positive:	Positive predictive value for UTI = >90%.
Interpretation of clinical picture and urine dipstick analysis together:	
LUTS + Positive dipstick:	LUTS with positive dipstick suggests UTI. Antibiotics therapy may be justified in such cases.
No LUTS + Positive dipstick:	Positive dipstick in the absence of LUTS merely suggests bacteriuria. It is not UTI and should not be treated with antibiotics.
LUTS + Negative dipstick:	For all practical purposes, a negative dipstick excludes UTI. LUTS however may be present in non-UTI cases, e.g. in patients with obstructive uropathy (due to prostatomegaly, bladder outlet obstruction [BOO], urethral stricture), uterine/ bladder/ rectal prolapse etc.
Interpretation of urine microscopy:	
No bacteriuria &/or pyuria:	Effectively excludes the possibility of UTI. Antibiotics shouldn't be prescribed/ stopped in such patients. **Tip:** Many laboratories do not proceed to urine culture if bacteriuria &/or pyuria is not observed on microscopy.
Interpretation of clinical picture and urine microscopy together:	
No LUTS + Positive dipstick + Significant bacteriuria on urine microscopy:	
Interpretation of urine culture:	
LUTS + Positive urine culture:	•LUTS and positive urine culture confirms the diagnosis of UTI. Antibiotics should be prescribed in such cases.
SIRS or sepsis of unknown origin + Positive urine culture:	•It may either be a case of UTI or bacterial contamination. Antibiotic course, once started, however should be completed to avoid bacterial resistance.
LUTS + Negative urine culture:	•Urine culture may be falsely negative due to commencing antibiotic therapy prior to urine sampling. A negative urine culture in the presence of LUTS therefore doesn't necessarily exclude the diagnosis of UTI. Antibiotic course, once started, should be completed in such cases. **Tip:** The correct specimen for urine culture is either a midstream urine sample or a clean catch sample. In men a urine sample may be obtained by the use of an external condom catheter. Latter has a sensitivity of 90% compared with in and out catheterisation.
No LUTS, SIRS or sepsis of unknown origin + Positive urine culture:	May simply represent bacterial contamination.

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