Diagnosis of urinary tract infections: quick reference tool for primary care

Flowchart for women (under 65 years) with suspected UTI

Excludes women with recurrent UTI (2 episodes in last 6 months, or 3 episodes in last 12 months) or urinary catheter^{10,20}

Urinary signs/symptoms

Do not treat asymptomatic bacteriuria in non-pregnant women as it does not reduce mortality or morbidity^{3A+4C}

First exclude vaginal and urethral causes of urinary symptoms:
- vaginal discharge: 80% do not have UTI^{5A+6A+}
- urethritis - inflammation post sexual intercourse, irritants^{7C}
- check sexual history to exclude sexually transmitted infections^{6A+7C}
- genitourinary syndrome of menopause (vulvovaginal atrophy)^{8D,9B+}

Follow relevant diagnostic guide and safety-netting

THINK SEPSIS - check for signs/symptoms using local/national tool such as NICE, RCGP or NEWS2^{10C,11A,13A}

consider pyelonephritis or suspected sepsis:
- send urine for culture^{3A+}
- immediately start antibiotic/management for upper UTI/sepsis using NICE/PHE guideline on pyelonephritis: antimicrobial prescribing or local/national guidelines for sepsis^{10C,11A,13A}
- refer if signs or symptoms of serious illness or condition

NO

NO

Does patient have any of 3 key diagnostic signs/symptoms?^{14B+}
- dysuria (burning pain when passing urine)^{5A+5B+14B+15B+16B+}
- new nocturia (passing urine more often than usual at night)^{5A+14B+}
- urine cloudy to the naked eye^{14B+}

2 or 3 symptoms

NO

YES

Are there other urinary symptoms that are severe?
- urgency^{5A+6A+15B+16B+}
- visible haematuria^{5A+6A+}
- frequency^{5A+2A+}
- suprapubic tenderness^{15B+,17B+}

Perform Urine Dipstick Test

POSITIVE nitrite OR leukocyte and RBC POSITIVE^{14B+}

UTI likely

NEGATIVE nitrite POSITIVE leukocyte^{14B+}

UTI equally likely to other diagnosis

NEGATIVE for ALL nitrite, leukocyte, RBC^{14B+}

UTI LESS likely

Send urine culture if risk of antibiotic resistance^{6A+}
If not pregnant and mild symptoms, watch & wait with back-up antibiotic
OR
Consider immediate antibiotic using NICE/PHE guideline on lower UTI: antimicrobial prescribing^{6A+19A+,19B+,20B+}

Review time of specimen (morning is most reliable)
Send urine for culture to confirm diagnosis
Consider immediate or back-up antibiotic (if not pregnant) depending on symptom severity using NICE/PHE guideline on lower UTI: antimicrobial prescribing^{18A+,19B+,20B+}

ALL PATIENTS: share self-care and safety-netting advice using TARGET UTI leaflet
If pregnant always send urine culture – follow national treatment guidelines if any bacteriuria

*Signs of pyelonephritis^{21C}
- kidney pain/tenderness in back under ribs
- new/different myalgia, flu like illness
- shaking chills (rigors) or temperature 37.9°C or above
- nausea/vomiting

Suspected sepsis alert UTI symptom Action advised Other advice

## Diagnosis of urinary tract infections: quick reference tool for primary care

<table>
<thead>
<tr>
<th>Review need for culture when considering treatment</th>
<th>Consider risk factors for resistance and send urine for culture if:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Send a urine for culture in:</strong></td>
<td>• abnormalities of genitourinary tract(^{4c})</td>
</tr>
<tr>
<td>• over 65 year olds if symptomatic and antibiotic given(^{1b})</td>
<td>• renal impairment(^{4c})</td>
</tr>
<tr>
<td>• pregnancy: for routine antenatal tests, or if symptomatic(^{2b})</td>
<td>• care home resident(^{5a})</td>
</tr>
<tr>
<td>• suspected pyelonephritis or sepsis(^{3c})</td>
<td>• hospitalisation for &gt; 7 days in last 6m(^{5a})</td>
</tr>
<tr>
<td>• suspected UTI in men(^{4a})</td>
<td>• recent travel to a country with increased resistance(^{4a})</td>
</tr>
<tr>
<td>• failed antibiotic treatment or persistent symptoms(^{5a},^{6a},^{7b})</td>
<td>• previous UTI resistant(^{5a},^{4b})</td>
</tr>
<tr>
<td>• recurrent UTI (2 episodes in 6m or 3 in 12m)(^{3a})</td>
<td></td>
</tr>
<tr>
<td>• if prescribing antibiotic in someone with a urinary catheter(^{4a})</td>
<td></td>
</tr>
<tr>
<td>• as advised by local microbiologist</td>
<td></td>
</tr>
</tbody>
</table>

**If prescribing an antibiotic, review choice when culture and antibiotic susceptibility results are available**

### Sampling in all men and women

**Women:** mid-stream urine (NHS choices) and holding the labia apart may help reduce contamination but if not possible, sample can still be sent for culture\(^{1b},^{2a},^{3b},^{4b},^{5b},^{6a}\). Do not cleanse with antiseptic, as bacteria may be inhibited\(^{6b}\).

**Elderly frail:** only take urine sample if symptomatic and able to collect good sample. If incontinent, clean catch in disinfected container and condom catheters for men may be viable options but little evidence to support\(^{4a}\).

**Men:** advise on how to take a mid-stream specimen (NHS choices).

**People with urinary catheters:** collect from newly placed catheter using aseptic technique if changed, drain a few mL of residual urine from the tubing before using sampling port, then collect a fresh sample from catheter sampling port\(^{1b},^{3b}\).

Culture urine within 4 hours of collection, refrigerate, or use boric acid preservative. Boric acid can cause false negative culture if urine not filled to correct mark on specimen bottle and can affect urine dipstick tests\(^{16},^{40},^{64}\).

### How do I interpret a urine culture result if I suspect a UTI?

Culture should be interpreted in parallel to severity of signs/symptoms. False negatives/positives can occur.

**Do not treat** asymptomatic bacteriuria unless pregnant as it does not reduce mortality or morbidity\(^{1C},^{2D},^{3a}\).

### Urine culture results in patients with urinary symptoms that usually indicate UTI:

- many labs use growth of 10⁷-10⁹ cfu/L (10⁴-10⁵ cfu/mL) to indicate UTI\(^{4b}\).
- lower counts can also indicate UTI if patient symptomatic:
  - strongly symptomatic women - single isolate ≥10⁶ cfu/L (≥10² cfu/mL) in voided urine\(^{6a},^{5b}\).
  - in men counts as low as ≥10⁵ cfu/L (≥10³ cfu/mL) of a pure or predominant organism\(^{6b}\).
  - any single organism >10⁴ cfu/L (≥10³ cfu/mL) of a pure or predominant organism\(^{6b}\).
  - *Escherichia coli* or *Staphylococcus saprophyticus* ≥10⁶ cfu/L (≥10³ cfu/mL)\(^{4b}\).
  - ≥10⁵ cfu/L (≥10⁴ cfu/mL) mixed growth with 1 predominant organism\(^{6b}\).

### Epithelial cells/mixed growth:

- the presence of epithelial cells is not necessarily an indicator of perineal contamination, culture result should be interpreted with symptoms and repeated if significance is uncertain\(^{1b}\).
- mixed growth may indicate perineal contamination; however, a small proportion of UTIs may be due to genuine mixed infection. Consider a re-test if symptomatic\(^{4b},^{7b}\).

### Red cells:

- may be present in UTI\(^{6a},^{8b}\).
- chemical tests may be more sensitive than microscopy as a result of the detection of haemoglobin released by haemolysis\(^{8a}\).
- refer patients with persistent haematuria post-UTI to urology\(^{6a}\).

### White blood cells/leucocytes:

- white cells ≥10³ WBC/L (≥10⁴ WBC/mL) are considered to represent inflammation in urinary tract, this includes the urethra\(^{4b}\).
- white cells can be present in older people with asymptomatic bacteriuria, as the immune system does not differentiate colonisation from infection\(^{4b}\).

### Sterile pyuria:

- in sterile pyuria, consider *Chlamydia trachomatis* (especially if 16 to 24 years), other vaginal infections, other non-culturable organisms including TB or renal pathology\(^{1b}\).
- if recurrent pyuria with UTI symptoms, discuss with local microbiologist as lower counts down to 10⁵ cfu/L (10⁴ cfu/mL) may be significant. Higher volume of urine may need to be cultured, including for fastidious organisms\(^{8b}\).

### For all patients:

- take into account antibiotic susceptibility results and resistance when deciding on management and reviewing antibiotic treatment.

**Please refer to joint NICE/PHE guidance:** NICE/PHE guidelines on UTI (lower): antimicrobial prescribing or NICE/PHE guidelines on pyelonephritis (acute): antimicrobial prescribing or NICE/PHE guideline on catheter-associated UTI: antimicrobial prescribing

**Follow up:** Do not send follow-up urine unless pregnant, or advised by the laboratory. Consider non-urgent referral for bladder cancer in patients > 60 years with recurrent/persistent unexplained UTIs\(^{5a}\).
Diagnosis of urinary tract infections: quick reference tool for primary care

Table summary of diagnostic points for women under 65 years
Excludes women with recurrent UTI (2 episodes in last 6 months or 3 episodes in last 12 months) or urinary catheter

Using symptoms and dipsticks to help diagnose UTI: no individual or combination are completely reliable in diagnosing UTI, thus severity of symptoms and safety-netting are important in all

First exclude other genitourinary causes of urinary symptoms
□ 75 to 80% with vaginal discharge will not have UT
□ in sexually active check sexual history for STIs for example chlamydia and gonorrhoea
□ urethritis - urinary symptoms may be due to urethral inflammation post sexual intercourse, irritants, or STIs
□ genitourinary symptoms of menopause/atrophic vaginitis/vaginal atrophy

In all, check for new signs of pyelonephritis, systemic infection, or risk of suspected sepsis
If pyelonephritis or suspected sepsis: send urine for culture to inform definitive treatment and immediately start antibiotic using NICE/PHE guideline on pyelonephritis: antimicrobial prescribing or local/national guidelines for sepsis: refer if signs or symptoms of serious illness or condition

In women <65yrs use signs/symptoms of dysuria, new nocturia or cloudy urine to guide treatment
□ 2 or more of these 3 signs/symptoms in general practice are likely to have a UTI: consider immediate antibiotic, or back-up if mild symptoms and woman is not pregnant
□ 1 sign/symptom: UTI possible as 68% will have a culture confirmed UTI (>10⁶ cfu/L) therefore use urine dipstick to increase diagnostic certainty
□ none of the 3: UTI less likely - use urine dipstick if other severe urinary symptoms (frequency, urgency, haematuria, suprapubic tenderness)

<table>
<thead>
<tr>
<th>Dysuria, new nocturia or cloudy urine present</th>
<th>% of GP patients with suspected UTI presenting with these sign/symptoms</th>
<th>% with these symptoms who have culture confirmed UTI (&gt;10⁶ cfu/L)</th>
<th>Suggested management</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 3</td>
<td>29%</td>
<td>82%</td>
<td>Consider immediate antibiotic OR back-up if mild symptoms and not pregnant</td>
</tr>
<tr>
<td>≥2</td>
<td>71%</td>
<td>74%</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>25%</td>
<td>68%</td>
<td>Use urine dipstick to increase diagnostic certainty</td>
</tr>
<tr>
<td>None</td>
<td>4%</td>
<td>not specified</td>
<td>Use urine dipstick if other severe urinary symptoms</td>
</tr>
</tbody>
</table>

For antibiotic choice: use NICE/PHE guideline on lower UTI: antimicrobial prescribing; check history to determine risk

Using urine dipsticks to predict UTI in women <65 years with only 0 or 1 of dysuria, new nocturia, cloudy urine increases the diagnostic certainty, and reduces unnecessary antibiotics

□ positive nitrite OR positive leukocyte and blood: UTI likely - offer empirical antibiotics for lower UTI OR if milder symptoms (and not pregnant) consider back-up antibiotic with self-care and safety-netting
□ leukocyte positive but nitrite negative: UTI equally likely to other diagnosis - review time of specimen (morning is best): send urine for culture; use back-up (if not pregnant) or immediate antibiotic depending on symptom severity
□ ALL nitrite, leukocyte and blood negative: UTI Less likely - consider other diagnosis; reassure; give self-care and safety-netting advice

If pregnant: always send urine culture; follow NICE/PHE guideline on lower UTI: antimicrobial prescribing if any bacteriuria

ALL patients: share self-care and safety-netting advice using TARGET UTI leaflet

For all patients please refer to the information and reference tables in joint NICE/PHE guidance:
NICE guidelines on UTI (lower): antimicrobial prescribing or NICE guidelines on pyelonephritis (acute): antimicrobial prescribing