URINE SAMPLING AND RESULT INTERPRETATION GUIDE

Contents

Do not perform urine dipsticks for the diagnosis of urinary tract infection (UTI) in >65yrs OR if catheterised

*Dipsticks become more unreliable with increasing age over 65 years. Up to half of older adults, and most with a **urinary catheter** will have bacteria present in the bladder/urine without an infection (asymptomatic bacteriuria).*

When to send a urine sample for culture

Symptoms of an upper UTI*	
All patients	Send immediately
Symptoms of a lower UTI	
UNDER 65 years old:	
• Children • Pregnant women • People with an anatomically male urinary tract	Send immediately
• Non-pregnant females • People with an anatomically female urinary tract	Routine culture is not indicated. Send if risk factors for resistance: • Urinary tract abnormalities • Impaired renal function • Immunosuppressed • Previous resistant UTI • Care home resident • Recent hospitalisation or treatment failure
OVER 65 years old:	
All patients	*Dipstick testing is not recommended in this group.* Send culture prior to starting antibiotics (if able), as resistance and atypical organisms are more likely in this age group. New onset dysuria is the most suggestive symptom of UTI.
Symptoms of a Catheter Associated UTI (CAUTI)	
All patients	Send culture prior to starting antibiotics (if able), as resistance is more likely in this age group. *Dipstick testing is not recommended in this group.*
Asymptomatic patients	
If the patient is NOT pregnant or awaiting certain urological procedures	Do not send urine for culture, regardless of dipstick result. Detecting and treating bacteriuria in other situations does not reduce subsequent symptomatic infections and may even increase them.

*For symptoms of an upper UTI, please see the following APC guideline: acute-pyelonephritis-adult.pdf

The UKHSA primary care UTI quick reference diagnostic tools are also included as a reference at the bottom of this page.

Providing relevant clinical details when requesting a urine sample for culture

- Indicate if symptoms suggestive of an upper UTI (fever, loin pain etc) so that appropriate antibiotic options are tested, with additional testing as required, depending on resistance profile (e.g. nitrofurantoin is not effective for treating upper UTI).
- Specify any relevant antibiotic allergies including the nature of the allergy and any planned or recent antibiotics, to ensure appropriate options are tested and released.
- Please highlight any unusual clinical details, or recurrent sterile pyuria on the request
    - Urine culture methods target the common pathogens, but light growth, atypical organisms or Candida species could be missed.

How to obtain urine sample for culture

Container & test	Sterile 30ml Boric Acid – **Red** top Use when transporting from outside the hospital or significant delay expected 	Sterile 30ml Universal – **white** top Use only if the volume of urine is <10ml 
Min vol. required	**10ml - <u>if using a boric acid (red top) container, please fill to line indicated,</u> otherwise it will not be processed.** If insufficient urine, use a white top bottle.	
Guide to collection	A mid-stream urine is preferrable: • Peri urethral cleaning is recommended • First part of voided urine is discarded and without interrupting urine flow approximately 10ml is collected into the container. • Remaining urine is discarded.	
Transport and handling	• Specimens should be transported to the laboratory as soon as possible. • Any delay in receiving the sample in the lab can lead to sample degradation and/or bacterial overgrowth which can affect the accuracy of urinalysis and culture results • If delays of greater than 4 hours, then refrigerate sample • If a urine sample in a Universal (white) container is received in the lab more than 48 hours after it was collected, it will not be processed • Urine samples in Boric Acid containers will be processed upon receipt up to 96 hours after collection.	
Comments	If you suspect or know the patient has an infection with a **Biohazard group 3 pathogen** (e.g. TB or Salmonella typhi), please mark on the request card and label the specimen as high risk (for the safety of laboratory staff who will process the sample differently)	

Urine microscopy interpretation

The clinical context	A positive culture result should not automatically be treated. In the elderly, asymptomatic bacteriuria is particularly common (e.g. >30% of nursing home residents), and treatment is likely to do more harm rather than benefit.	
Microscopy	White blood cells (WBC)	A lack of an elevated WBC count (<100/µL) makes UTI less likely; however, in the immunocompromised, infants, and pregnancy, WBC may not be raised.
	Red blood cells	Red blood cells in the urine can be present during UTI, however the NICE guidance on recognition and referral of urological cancers should be followed for the need to investigate for visible/non-visible haematuria that persists after UTI treatment.
	Epithelial cells	Though a high epithelial cell count can represent the host response to bladder infection, a high epithelial cell count often reflects a poorly taken/contaminated sample and so the culture result should be interpreted with caution or repeated if the patient remains symptomatic.
Sterile pyuria	This is defined as white blood cells present on microscopy but no significant growth. This could be due to infectious or non-infectious causes. Infectious causes include: • low colony counts of bacteria in a genuine UTI – this can often be seen with recurrent UTI • a partially treated UTI (i.e. sample taken on antibiotics) • infection with an organism which may not grow on standard urine culture (such as fungi including Candida species) • sexually transmitted infections • other infections such as tuberculosis. Consider causes for possible sterile pyuria and discuss with the duty microbiologist if clinical concerns and/or the patient's symptoms have not responded to empirical antibiotic therapy.	
Pregnant patients	Some antibiotics may be released on the urine culture report but are contraindicated in pregnancy depending on gestational age. Use the agent appropriate to the stage of pregnancy. **Asymptomatic bacteriuria in pregnancy should be confirmed with a second sample before treating (unless the patient is under the care of the Renal-Obstetrics team).**	

Urine culture result interpretation

No significant growth	The amount of growth falls below the threshold for urinary tract infection on the laboratory analyser used to detect growth. In symptomatic patients, a negative urine culture (no significant growth) does not exclude infection and may be influenced by factors such as prior antibiotic use. If there are white blood cells present on microscopy with no significant growth, this is defined as 'sterile pyuria' which is discussed further below.
Mixed growth	Mixed growth often indicates contamination with perineal skin flora and so we do not usually perform further work on these urine samples in the first instance. However, occasionally mixed infection can occur. If the patient is symptomatic of a UTI and has not responded to empirical therapy, discuss the case with the duty microbiologist.
Candida species	Candida is commonly isolated in urine if patient is suffering with vaginal/penile thrush. Clinically assess and consider treating if this is identified. Candiduria can also occur with asymptomatic Candida colonisation of the vagina/penis. If there are clinical concerns → repeat a urine sample (requesting Candida culture) and discuss the patient with the duty microbiologist. Candida is an increasingly recognised cause of UTI particularly in diabetic (especially those on SGLT2 inhibitors "flozins") and in immunosuppressed patients. This should be considered in sterile pyuria as may not grow on standard urine culture.
Coliforms	The term Coliform species is an umbrella term which refers to a large group of Gram-negative bacilli and covers many common bacterial species (including E. coli, Klebsiella, Enterobacter and Citrobacter species). The laboratory differentiates E. coli (Escherichia coli) from non- E.coli coliforms. The laboratory will refer Coliforms which look resistant on sensitivity testing to the medical microbiology team who may ask for identification of the specific species +/- additional sensitivities so sometimes a Coliform isolated in the urine is authorised out as a specific species.
Enterococcus species	This is a common perineal contaminant. In the absence of an abnormal urinary tract or recent urological intervention they are an uncommon cause of UTI and a repeat sample should be taken if there are ongoing concerns.
E. coli	This is the commonest cause of a urinary tract infection. E. coli bacteria belong to a group of bacteria called Coliforms. The laboratory differentiates E. coli from non- E. coli coliforms.
Proteus species	These commonly cause UTIs particularly in individuals with urinary stones or long-term urinary catheter use.

	Recurrent isolation of Proteus species in the urine is suggestive of a urinary tract abnormality or stones and further investigation for this should be considered if there is a clinical concern.
Pseudomonas aeruginosa	This is an environmental organism and is not a typical cause of a community UTI (in the absence of a urinary catheter or known renal tract abnormality). If the patient is clinically well, suggest repeating the urine culture in the first instance. If a genuine UTI with this organism consider further investigation of the renal tract. Ciprofloxacin* is the only oral option available to treat this organism. Dosing is reported as 'DS: Dose-dependent susceptible' meaning that higher doses of antibiotic therapy are required to achieve therapeutic success i.e. 750mg BD PO if normal renal function and no contra-indications to using this. More information is available regarding this on the APC website. *Fluoroquinolones can cause long-lasting (up to months or years) disabling, and potentially irreversible side effects, sometimes affecting multiple systems, organ classes, and senses. Please refer here for further information on MHRA alerts. As ciprofloxacin is the only oral option available to treat Pseudomonas aeruginosa, if treatment is warranted and the use of a fluoroquinolone is contraindicated, consideration will need to be made for hospital admission or OPAT referral for outpatient IV antibiotic therapy. Suggest discussion with duty microbiologist if this scenario arises.
Staphylococcus aureus	The presence of Staphylococcus aureus in a mid-stream urine may be indicative of deep Staphylococcal infection (either disseminated Staphylococcal infection or a deep urinary tract source), however is also a cause of UTI when there are structural abnormalities or a urinary catheter. Suggest repeat sample and if the repeat is positive, consider further investigations/discussion with the duty microbiologist.
Staphylococcus saprophyticus	This is a common cause of uncomplicated urinary tract infections in sexually active women.

For more information on sending samples, interpreting sensitivity results and implications for antibiotic dosing, see: Microbiology (NUH) , Clinical Microbiology (SFH) and Interpreting Sensitivity Results.

Resources

- The government urinary tract infection diagnostic tools for primary care
- The TARGET antibiotics toolkit hub includes leaflets to discuss with patients, diagnostic tools, and other UTI resources.
- To Dip or Not To Dip training animation - YouTube

Accessibility checked. Contains tables which may not be accessible to screen readers.