

## Catheter Specimen Urines: Are They Worth Culturing?

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### Abstract

Urinary tract infections are the most commonly acquired bacterial infections, but the significance of growths from catheter related specimens, particularly heavy mixed growths, is uncertain and can pose a dilemma for the clinical laboratory responsible for processing and authorising reports, as well as a diagnostic dilemma for clinicians. Furthermore, inappropriate processing and reporting of samples may lead to inappropriate treatment of patients which can result in adverse effects as well as increased laboratory and clinical costs. This short communication summarises recent evidence and guidelines on the matter.

**Keywords:** Urine; Catheter; Mixed Growths; Infections

### Introduction

Urinary tract infections (UTIs) are the most commonly acquired bacterial infections and account for an estimated 25-40% of all nosocomial infections [1]. In acute healthcare settings, 20-30% of catheterised patients develop bacteriuria of which 2-6% eventually get symptoms of UTI [2]. The longer the catheter remains in situ, the higher the chances of acquiring infection. SIGN (Scottish Intercollegiate Guidelines Network) recommend not using laboratory microscopy to diagnose UTI in patients with catheters since the presence of a catheter invariably induces pyuria regardless of whether infection is present [3]. The interpretation of catheter specimen urines can often pose a diagnostic challenge without appropriate clinical information.

The presence of a urinary catheter significantly increases the risk of developing a UTI by enabling biofilm formation of common bacterial pathogens. These commonly include *Staphylococcus epidermidis*, *Enterococcus faecalis*, *Escherichia coli*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and other gram-negative organisms [4]. The spectrum of microorganisms varies depending on patient population, site and prior antimicrobial exposure. Microbiologists are commonly faced with the problem of having to interpret and act on a result of heavy mixed growth from catheter specimen urine. Many of the organisms stated above are colonising the catheter site and not causing infection. If the patient is symptom-free then the significance of 'Heavy Mixed Growth' from a catheter specimen urine is doubtful. Alternatively if a pure growth of an organism is identified and the patient is symptomatic with a catheter related UTI then antimicrobial susceptibility testing plays an important role in guiding appropriate therapy. The clinical circumstances therefore are essential in the interpretation of these often misleading results.

Currently on a national level, a huge burden is placed on microbiology laboratories to process a large volume of catheter specimen urines. This has implications on cost and work-load. Although data from large studies is some what lacking, recent literature suggests urine culture may not be necessary as part of the

evaluation of uncomplicated UTIs. The Centres for Disease Control and Prevention [5] actually emphasises that bacteriuria commonly leads to unnecessary antimicrobial usage and urinary drainage systems can act as reservoirs for multi-drug resistant (MDR) bacteria. The guidelines also emphasise the need to review the need for catheters on a daily basis and remove them as soon as they are deemed unnecessary. Efficient infection control practices are required when handling and maintaining catheters in order to reduce infection rates. NICE guidelines emphasise the need for healthcare professionals to be trained in catheter maintenance and aseptic techniques [6].

Approximately 75-90% of patients with asymptomatic bacteriuria do not proceed to symptoms or signs suggesting infection [7]. In addition most cases of symptomatic UTI are not preceded by asymptomatic bacteriuria for more than a day so the monitoring and treatment of asymptomatic bacteriuria is therefore not an effective preventative strategy [8]. Studies have indicated that there is no reported benefit of bacteriologic monitoring to prevent catheter associated UTIs. Relatively older studies [9,10] involving daily bacteriological monitoring in catheterised patients was found to be an inefficient and a costly method of preventing catheter associated UTIs.

A study by Bartlett et al. [11] was conducted to determine the clinical significance of mixed bacterial cultures of urine i.e. a result stating 'Heavy Mixed Growth' in both clean catch urine specimens and urine from closed drainage systems. The authors found that a large percentage (67% for clean catch urines and 77% for closed drainage systems) were improbable infections. They concluded that empiric antibiotic therapy and reporting of mixed cultures based on culture morphology without complete identification or antibiotic susceptibilities (except for certain colony types suggesting potentially multi-drug resistant strains) with request for resubmission would be cost-effective solution to the mixed culture problem in the diagnosis and treatment of urinary tract infection.

If a patient with an indwelling catheter has a presumed UTI, catheter change is associated with better outcomes in terms of resolution of infection. Gentamicin is commonly used for catheter changes without clear evidence base, and the European Association of Urology guidelines [12] have recommended against antimicrobial prophylaxis for urinary catheter insertions.

In current practice it is advised that in catheterised patients, urine samples should only be sent and treatment initiated in those patients with features of systemic infection and/or localising signs and symptoms of infection in whom other sources of infection have been excluded or are thought to be less likely [13]. Clinicians should be encouraged not to treat asymptomatic bacteriuria as this is a very common finding in catheterised patients and only exacerbates antimicrobial resistance [14] and may lead to harm if unnecessary antibiotics are prescribed. Alternatively, CSUs may be performed in patients in whom change of catheter has failed to resolve a clinical UTI provided the patient is not immunocompromised or at heightened risk of severe infection. In terms of pregnant women, asymptomatic bacteriuria should be treated [3], however the significance of a result of heavy mixed growth from catheter specimen is again uncertain and difficult to interpret.

In order to answer the question 'Catheter specimen urines: are they worth culturing?' we believe the answer to be 'Yes' to avoid bacteraemia developing in some patients from not treating a catheter related UTI. The clinical presentation is key in the interpretation of the results and is often not made available to microbiological staff as a great deal depends on the clinical scenario and symptoms of the patient. Catheters should be reviewed on a regular basis and removed if there is no clear indication. Most laboratories report a pure significant growth and suppress the antimicrobial sensitivities so that these results are not available to clinicians and hence avoid unnecessary prescribing. A comment code of 'Full sensitivities available if required' and 'Contact Microbiology if advice required' often accompany the report. This gives clinicians the opportunity to seek microbiological advice on appropriate antibiotic therapy if deemed necessary, yet still avoids the unnecessary prescribing problem. 'Reporting 'Heavy Mixed Growth' from a urine culture is common and may confuse the clinician in some instances. A comment code advising catheter change is often helpful in such circumstances.

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