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Research paper

A pilot study on improving the appropriateness of urine specimen collection among catheterised patients in acute aged care

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KEYWORDS

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Abstract *Background:* The culture of a urine specimen is one of the most common diagnostic investigations undertaken in the acute care environment. However, often urine specimen collection and culture is unnecessary, clinically inappropriate, leads to substantial over treatment and is a wasteful use of pathology. Furthermore urine specimen collection from patients with urinary catheters presents an opportunity for microorganisms to colonise the drainage system and cause clinical infection. Unnecessary specimen collection can also drive inappropriate antimicrobial use.

A new decision support tool was developed to inform clinically appropriate urine specimen collection and culture for patients with urinary catheters. The aim of this study was to test the effect and practicality of this tool in an acute aged care setting.

Methods: Specimen collection, catheter utilisation and infection rates were collected for eight weeks pre- and post-implementation of the tool. Implementation of the tool was carried out for four weeks and included the provision of targeted nursing and medical education.

Results: The collection of catheter specimen urine (CSU) specimens and all urine specimens reduced after the implementation of the tool. Implementation of the new tool was also associated with a significant reduction in catheter days and catheter utilisation.

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Conclusion: Implementation of the new decision support tool, together with the provision of targeted education, was associated with reducing the number of urine specimens collected and catheter dwell times in the unit.

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Highlights

- Urine culture specimens are collected from many catheterised patients despite there being no apparent clinical indication.
 - A decision support tool was developed to inform appropriate urine specimen collection for catheterised patients.
 - In an acute aged care setting this tool resulted in a significant reduction in urine specimen collection and catheter use.
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Introduction

The examination of a urine specimen by microscopy and quantitative culture is one of the most common clinical investigations undertaken in acute clinical care and is the 'gold standard' method for the laboratory diagnosis of urinary tract infection (UTI) [1]. The examination of urine by culture as part of an active screening programme is important for certain patient cohorts, such as pregnant women, where the risk of asymptomatic infection can be of severe clinical consequence [2,3]. However, for other at-risk cohorts, such as patients admitted for joint replacement surgery, the value of pre-operative urine culture remains contentious [4–6]. Beyond these at-risk groups there are still many other patients from which urine specimens for culture are collected without any specific clinical need; recent literature reported that culture specimens are collected from almost 70% of patients with an indwelling urinary catheter (IDC) despite these patients not meeting current guideline-based criteria for urine culture [7]. The ordering of urine specimens for culture appears to be underpinned by inaccurate knowledge of the appropriate clinical indications for culture [8], guided heavily by urinalysis results [9], and is particularly reminiscent of the ordering behaviours of the early 1990s [10].

The collection and culture of urine specimens presents two apparent risks, particularly for patients with IDCs. Firstly, collection of a urine specimen from a patient with an IDC requires the closed drainage system to be breached. Without strict adherence to aseptic technique and correct collection technique, specimen collection can potentially contaminate the drainage system and promote the establishment of a catheter-associated urinary tract infection (CAUTI) [11]. There is substantiated concern for this risk given that approximately 10% of nursing staff do not adhere to correct practices for specimen collection [8], and there is poor knowledge among medical staff on the clinical indications for urine culture [12]. Secondly, the internal surface of the IDC is inevitably colonized by biofilm over time. A biofilm normally colonises the catheter within 72 h of initial catheter insertion [13,14] and symptomatic illness may arise if the biofilm is allowed to ascend into the

bladder. Furthermore, culture of a catheter specimen of urine (CSU) alone cannot discriminate between asymptomatic bacteriuria and clinical infection [15] and may promote the unnecessary treatment of a 'false-positive'. Up to 64% of patients with asymptomatic bacteriuria receive unnecessary antimicrobial therapy [16] and almost one third of catheterized patients who have asymptomatic bacteriuria end up receiving unnecessary antimicrobial therapy [17].

Given the risks associated with urine specimen collection and culture for patients with IDCs, the Clinical Excellence Commission (CEC), Australia, developed a decision support tool (See Fig. 1) to assist clinicians who work in acute care settings and who are responsible for deciding whether to order a urine culture for their patient. The content of the tool was determined by an expert clinical reference group, including clinicians from emergency, intensive care, surgical, general medical, acute geriatric, maternity, urology, infection prevention and control units and reviewed by senior medical microbiologists.

A pilot of the new tool was undertaken to test whether implementation of the tool can improve the appropriateness of urine specimen collection and culture and reducing catheter utilisation in an acute aged care setting.

Methods

Setting

Pilot testing of the tool was undertaken in an acute aged care ward of a major tertiary referral hospital in metropolitan Sydney, Australia. The 30-bed ward admits acute geriatric medicine patients (65 years and older). Prior work had identified that there was a high level of pathology testing and indwelling catheter use in this ward (data not shown). Pilot testing was focussed on minimising the volume of urine specimens from patients with indwelling urinary catheters; specimen collection from intermittent 'in/out' catheters, urodomes and suprapubic catheters was not monitored in this project.

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