

## Management of urinary tract infections in elderly patients: Strategies for improvement

Vee Han Lim, Thomas Whitehurst, Emem Usoro, Sieu Ming Ng  
Royal Albert Edward Infirmary, Wrightington, Wigan and Leigh NHS Foundation Trust

### Abstract

Urinary tract infection (UTI) is one of the most common infections affecting the elderly. However, UTI is overdiagnosed and overtreated in this group. This project aimed to look into strategies for improving the management of UTI in elderly medical inpatients. A retrospective audit was performed on the case notes of medical inpatients in a district general hospital from December 2012 to April 2013. The target measures for improvement include increasing adherence to SIGN guidelines in the diagnosis of UTI, increasing the frequency and timeliness of urinary culture collection in suspected UTI, and increasing use of urine culture sensitivities to tailor antimicrobial treatments.

Initial baseline measurement revealed 16 patients treated for UTI. 31.3% of these fulfilled SIGN criteria for UTI. 68.5% had urine cultures performed. 60% of patients with positive urine cultures had correct antibiotic therapy after sensitivity results. The mean time from the diagnosis of UTI to urine collection for culture was 4 days.

Three further cycles were performed. Following each cycle, improvement measures were implemented to raise the awareness of medical staff about the management of UTI in the elderly. These comprised presentations to junior doctors at local teaching sessions; emails to ward managers with results of the previous audit cycle broken down by ward; and prominent display of guidelines on medical wards and ensuring availability of 'Newcastle pads' for taking sterile urine cultures from incontinent patients.

In the final cycle, 19 patients were diagnosed with UTI. 42.1% of these fulfilled SIGN criteria for diagnosis of UTI. 89.5% had urine cultures sent. 86.7% of patients with a positive urine culture were treated with appropriate antibiotics after sensitivities became available. Mean time from UTI diagnosis to culture collection improved to zero days.

In conclusion, continuous educational measures, performance feedback, and increased availability of specialist equipment are imperative for improving management of UTIs in the elderly.

### Problem

Urinary tract infection (UTI) is one of the most common infections affecting the elderly in both the primary and secondary care settings (1). Despite being common, the inpatient management of UTIs has been suboptimal. Clinicians are often overtreating elderly patients on the basis of non-specific symptoms. In most cases, there are insufficient recorded enquiries of lower urinary tract symptoms. Urine samples are also poorly collected for cultures and sensitivities. Therefore, many patients may be treated with antimicrobials to which the causative organism is resistant.

This project aimed to look into potential strategies for improving the management of UTI in elderly medical inpatients. These include increasing adherence to Scottish Intercollegiate Guidelines Network (SIGN) guidelines on the diagnosis of UTI, increasing the frequency and timeliness of urinary culture collection in suspected UTI, and increasing use of urine culture sensitivities to tailor antimicrobial therapy.

### Background

UTI is often overdiagnosed and overtreated in the elderly population (1, 2). Studies have suggested that UTI is misdiagnosed in 40% of hospitalised elderly patients (3). Clinicians often misdiagnose UTI in the elderly who present with non-specific symptoms such as anorexia, fatigue, malaise, or generalised weakness (4). Antibiotic therapies are commenced in this group of patients without sufficient evidence supporting a diagnosis of UTI. Therefore, it is unsurprising that UTI rates as the second most common reason for empirical antibiotic therapy in secondary care (3). While the SIGN (5) guidance for the management of suspected bacterial UTI in adults recommends that urine cultures are appropriate in certain cases (where symptoms are resistant to trimethoprim or nitrofurantoin, UTI in men and pregnant women), their algorithm for the treatment of UTI in the elderly (6) recommends the collection and analysis of urine samples in all cases, once a diagnosis of UTI has been made based on symptoms and signs. Antimicrobials should then be tailored in light of sensitivities, switching to narrow spectrum if possible. In view of increasing *Clostridium difficile* infection and antibiotic resistance, it is imperative that changes are made to the management of UTIs in the elderly population.

### Baseline Measurement

Assessment of UTI management in a district hospital setting ( Royal Albert Edward Infirmary, Wroughtington, Wigan) was achieved retrospectively from 160 case notes of medical inpatients aged 65-95 years, using a proforma recording demographics, date of UTI diagnosis, date of urine sample taken for culture, presenting symptoms and signs, incontinence, type and route of antibiotics used, results of urine culture and sensitivities, and actions taken after culture results were available. Patients under the age of 65 or diagnosed with neutropenic sepsis were excluded from the data. Sixteen patients were treated for UTI: 31.3% of these fulfilled SIGN criteria for UTI; and 68.5% had urine cultures performed (40% of incontinent patients). The mean time from the diagnosis of UTI to urine collection for culture was 4 days. Sixty per cent of patients with positive cultures had correct antibiotic therapy based on sensitivity results.

### Design

Following the baseline measurement, it became apparent that there was a lack of awareness from clinicians regarding the current local UTI guidelines which are adapted from the SIGN 88 guideline. Many patients did not fulfill SIGN criteria for UTI based on recorded symptoms and signs. Urine samples were not collected in a timely manner while urine culture results were not followed up and acted upon. Patients who were incontinent were least likely to have their urine samples collected.

To ensure the improvement of current practice standards, a collaboration between doctors and nurses was necessary. Junior doctors were educated at the local teaching programme to increase their awareness of current UTI guidelines. The importance of following up on urine culture results was stressed repeatedly as the results served as an important guidance for the clinicians to tailor the antibiotic therapy accordingly or to discontinue it. Communication to ward managers was performed via email to inform them of the performances of their respective wards. They cooperated by educating and encouraging their nursing team to collect urine cultures in a timely manner and ensuring availability on medical wards of 'Newcastle pads' for taking sterile urine cultures from incontinent patients.

Feedback from colleagues was that the guidelines were not easy to locate on the local intranet . Navigation of the intranet was difficult due to various other guidelines and hospital related information. In order to overcome this issue, a summarised flow chart of the UTI guidelines was printed out and displayed prominently on the medical wards.

### Strategy

PDSA cycle 1: Following the baseline results, the findings were presented to the doctors at the local teaching programme. Ward managers were notified via emails of the performances in the respective wards. Feedback from the local consultant microbiologist prompted slight changes to the initial proforma to include other data to help further clarify current practice.

PDSA cycle 2: The results of ward performance from cycle 1 were updated to doctors and ward managers. The feedback from colleagues was the lack of prominent UTI guidelines in the ward setting. Navigation through the intranet to obtain the guidelines was difficult. As a result, summarised UTI guidelines flowcharts were printed and displayed as posters on the medical wards. Ward managers were assigned the task of ensuring availability of specialist equipment (Newcastle pads) to collect samples from incontinent patients.

PDSA cycle 3: The results of the project were presented to the entire medical staff at the monthly audit meeting. Feedback was positive. Efforts were made to liaise with the IT department to make guidelines on the intranet more user friendly.

### Results

Results from the final cycle of the audit were analysed and compared to the baseline results obtained initially. Nineteen patients were diagnosed with UTI in the final cycle. In comparison to the baseline results, there was an increase in the percentage of these patients (421%) being correctly diagnosed with UTI, by fulfilling the SIGN criteria. There were also improvements in other aspects of UTI management after implementing the strategies: 89.5% had urine sent for cultures, 71.4% of incontinent patients had urine collected for cultures, and 86.7% of patients with a positive urine culture were treated with appropriate antibiotics after sensitivities became available. In addition, the mean time from UTI diagnosis to urine collection for cultures and sensitivities improved to zero days.

### Lessons and Limitations

The strategies implemented were simple, straightforward, cost effective, easily achievable, and can be implemented in any setting, be it a district or teaching hospital. This study has demonstrated an overall improvement of the various aspects of UTI management. This was likely due to a combination of increased medical and nursing staff awareness and increased availability of specialised equipment detailed above. However, despite a small improvement, the number of patients fulfilling SIGN criteria for a diagnosis of UTI remained low. Small sample sizes and consequent reduction in power meant we were unable to demonstrate statistical significance for any of these improvements.

The low number of patients fulfilling SIGN criteria for a diagnosis of UTI (6) presents problems in interpreting the effects of our measures on other outcomes, such as the increased number of urine cultures sent. Since the SIGN guidance (6) requires that urine cultures be sent only after a certain number of symptoms and signs have been demonstrated, it could be argued that increases in urine culture rates without similar increases in the number of diagnoses concurring with SIGN guidelines do not represent an improvement in management.

Due to the complex presentation of some of the elderly patients with altered mental state, it was challenging for clinicians to obtain a

comprehensive history to diagnose a UTI. This posed a similar challenge for our nursing colleagues when attempting to obtain urine samples from this group of patients. For future purposes, the proforma could be improved by including patients' mental or behavioural state on admission. Data could then be analysed for any effect of patient's mental state on the management of their illness.

There will be difficulties in sustaining improvements in practice. The high turnover of medical trainees means many of the educational actions will have to be repeated. There is ongoing work to include a summarised version of the guidelines into the induction pack of both doctors and nurses.

## Conclusion

Continuous educational measures, performance feedback, and increased availability of specialist equipment are useful tools for improving the management of UTIs in the elderly. Small improvements in adherence to guidelines for UTI diagnosis were demonstrated. Additionally, it was shown that these measures could increase the number of urine cultures sent for both continent and incontinent patients, decrease the length of time from diagnosis of UTI to urine collection for culture, and increase the frequency with which appropriate antibiotics are used based on urine culture results. However, the relevance of the latter outcomes rests on the correct initial diagnosis of UTI. Larger studies are needed and should investigate whether these educational measures decrease hospital stay and mortality.

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## Declaration of interests

None declared

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