

**SECTION D**  
**CLINICAL PHARMACY**

**URINARY TRACT INFECTIONS IN  
HOSPITALISED ELDERLY PATIENTS**

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## Introduction

The increased susceptibility to urinary tract infection (UTI) in the geriatric patient is mainly due to physiologic aging as well as to an age-related increase in chronic degenerative diseases (Sant, 1987). These factors, together with hospitalisation, constitute a greater risk of infection by exposing patients to invasive procedures, such as urethral catheterisation, in an environment abundant with antibiotic resistant pathogens.

Two studies were carried out:

- a) to assess age, female sex, and catheterisation as predisposing factors to UTIs.
- bi) to determine the prevalence of bacteriuria in urethrally catheterised patients, and whether there was a change in the infecting uropathogens with time.
- bii) to evaluate underlying diseases and other factors that may predispose to UTIs in an elderly patient. Consequences of infection were also considered.
- biii) to evaluate the treatment of symptomatic UTIs and the impact of antibiotic therapy on bacteriuria.

## Methodology

In Study 1, the microbiology results of the urine specimens collected during a four week period, from patients in acute and chronic care facilities in Malta, were reviewed retrospectively. Those patients with significant bacteriuria ( $\geq 10^5$  bacteria/ml urine), were eligible for the study. To achieve a distribution of UTIs according to age, the study population was divided into decade specific age groups.

In Study 2, the prevalence of catheterised patients in 6 surgical and 6 medical wards, at St Luke's Hospital was determined. A catheter specimen of urine (CSU) was taken on day 1 and on day 10 of the study, using an aseptic aspiration technique. Urine specimens were subjected to standard bacteriological methods and identified mainly by lactose fermenting properties, cultural and microscopic characteristics and

biochemical tests. The disk diffusion technique was used to determine the sensitivity patterns.

## Results

In Study 1, 167 patients in acute care facilities and 25 patients in chronic care facilities, were found to have a UTI during the period studied.

In acute care facilities, age ranged from 15 months to 101 years, and 52% of the patients were elderly (>60 years). Peak incidence occurred in the age group 70 - 79 years (26.3%) - Figure 1. In chronic care facilities, age ranged from 43 to 94 years and the peak incidence occurred in the age group 80 - 89 years (40%) - Figure 2. Apart from the aging process, female sex also accounted for a higher prevalence of UTIs in both acute and chronic care facilities (61.7% and 68% respectively). In acute care facilities, catheterisation was only found to predispose to UTI both during catheterisation (36.4% in patients between 70 - 79 years) and after catheter removal (54.1% in patients between 30 - 39 years who had undergone either gynaecological surgery, or a caesarean section delivery). *E.coli* and other Enterobacteriaceae were the most prevalent uropathogens, regardless of age or care facility. Sensitivity of the uropathogens towards ampicillin, trimethoprim and sulphonamides was found to be low. A higher sensitivity was recorded towards nitrofurantoin, nalidixic acid and cefuroxime in both care facilities.

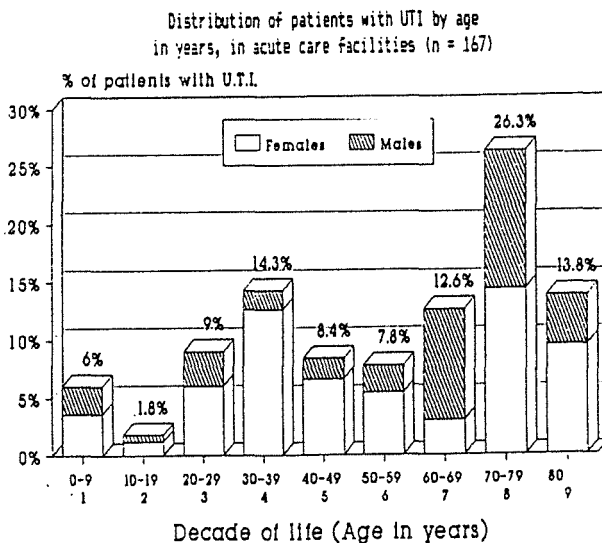
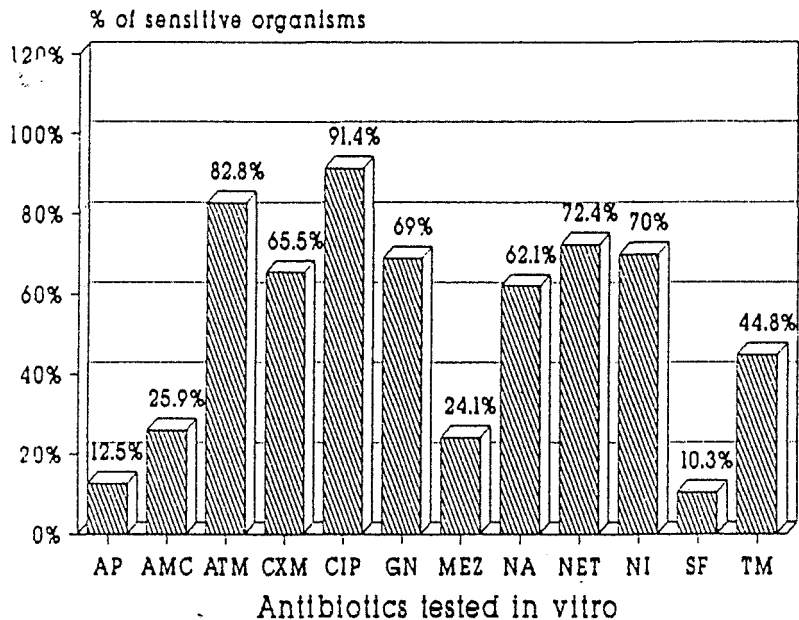


Figure 2  
 In vitro sensitivities of the organisms,  
 isolated from catheterised patients  
 on day 1 and day 10



Key to Figure 2

AP = Ampicillin	MEZ = Mezlocillin
AMC = Amoxicillin/Clavulanic acid	NA = Nalidixic acid
ATM = Aztreonam	NET = Netilmicin
CXM = Cefuroxime	NI = Nitrofurantoin
CIP = Ciprofloxacin	SF = Sulphonamides
GN = Gentamicin	TM = Trimethoprim

In Study 2, 16.5% of the patients were found to be catheterised. Bedridden and incontinent elderly patients accounted for 44% of the catheterised patients.

**Table 1:** Semiquantitative culture results to determine presence of Significant Bacteriuria in urethrally catheterised patients

Day of specimen collection	Day 1	Day 10
No significant bacteriuria <sup>a</sup>	10	3
Significant bacteriuria <sup>b</sup>	38	25
Mixed infection <sup>c</sup>	1	5
% of patients with bacteriuria	79.6%	90.9%

Key: a=<20CFU [colony forming units] (<10<sup>5</sup> bacteria/ml urine)  
 b=>20CFU (>10<sup>5</sup> bacteria/ml urine)  
 c=2 types of organisms only

Only 7 patients exhibited signs and symptoms of infection on either days. 13 patients were infected with the same uropathogens on both days, 11 patients were infected with a different organism and 6 had a mixed infection on either days. *E.coli* was the most prevalent organism (26.9%) followed by *Pseudomonas aeruginosa* (17.4%), *Enterobacter* and *Proteus*. 91.4% and 82.8% of the organisms were found to be sensitive to ciprofloxacin and aztreonam respectively, followed by netilmicin, nitrofurantoin, gentamicin, cefuroxime and nalidixic acid - Figure 2.

Old age, female sex and catheterisation for more than 30 days were again found to be highly statistically significant risk factors followed by antidepressant and antipsychotic therapy, diabetes and cerebrovascular accident. Death of some of the patients in this study was not attributed directly to the urinary tract, but to other severe underlying diseases.

32% of the catheterised patients studied had developed a symptomatic UTI during their stay in hospital, of which 8% had a recurrent UTI. Most of the infections were effectively treated with nitrofurantoin, ampicillin or nalidixic acid, when guided by sensitivity tests. However, blind therapy with ampicillin and co-trimoxazole proved to be ineffective. None of the patients received prophylactic therapy or were administered antibiotics for asymptomatic bacteriuria.

Onset of bacteriuria was affected by the administration of antibiotics, mainly indicated for chest infections, infected by sores and amputation wounds.

## Discussion

The incidence of catheterised patients is comparable with that of other studies (Griffith and Schell, 1987; Brandi, 1990; Wilson, 1990). The prevalence of bacteriuria was high when compared to similar studies (Brandi, 1990; Wilson, 1990). Such a difference may be mainly due to variations in duration of catheterisation, lack of standard policy for the management of the catheterised patient at St. Luke's Hospital and antibiotic therapy in the period studied.

These studies show that old age female sex and catheterisation do predispose to UTI. The most common type of bacteriuria seen in the elderly is asymptomatic bacteriuria, which persists in catheterised patients with frequent species changes over time (Boscia et al, 1986). The frequent use of antibiotics in these patients, is undoubtedly a factor altering the bacterial flora. It is also relatively common to isolate multiple organisms from elderly patients, which can give rise to symptomatic UTIs. Although death was not attributed to UTI, Nordenstam et al (1986), state that elderly, debilitated patients with bacteriuria may die sooner than controls without bacteriuria.

The use of ampicillin and co-trimoxazole for UTIs should only be done in conjunction with sensitivity tests since resistance is high. Nitrofurantoin, nalidixic acid or cephalexin are better candidates for blind therapy of lower UTIs, while amoxycillin/clavulanic acid, norfloxacin or cefuroxime for upper UTIs. Only one patient had severe gastrointestinal disturbances when administered nitrofurantoin. *Candida* was isolated from the urine of a small number of patients (4%), who had recently taken broad spectrum antibiotics.

Most of the patients who had no significant bacteriuria were being or were recently administered antibiotics. Studies have revealed that antibiotics are effective in postponement, but not prevention of infection (Platt et al, 1986).

## Conclusions

As a member of the Cross-Infection committee, the pharmacist is involved in:

- the formulation and evaluation of infection control policies. On ward visits, the pharmacist can also deal with problems and monitor the compliance of the ward staff to local policies
- antibiotic usage patterns by
  - a) issuing antibiograms at intervals to guide clinician in the proper choice of antibiotic
  - b) antibiotic audits
  - c) monitoring therapy and help in the selection of the most appropriate antibiotic for an elderly patient

Routine surveillance of Hospital-acquired infections and infection control programs should be implemented. A policy for the management of the catheterised patient was formulated in an attempt to reduce catheter-associated UTI in elderly patients.

Constant training and continuing education programmes on infection control, for all staff concerned should be instituted.

## References

Boscia JA et al. Epidemiology of bacteriuria in an elderly ambulatory population. *American Journal of Medicine* 1986; 80: 208 - 214

Brandi A. Studio sull'incidenza delle qualita' delle infezioni urinarie nei pazienti sottoposti a cateterismo vescicale. *Professioni infermieristiche* 1990; 43(2): 36 - 39

Griffith NC, Schell RE. Nosocomial Infections *American Family Physician* 1987; 35(6): 179 - 186

Nordenstam GR et al. Bacteriuria and mortality in an elderly population. *The New England Journal of Medicine* 1986; 314: 1152 - 1156

Platt R et al. Risk factors for nosocomial Urinary tract infection. *American Journal of Epidemiology* 1986; 124: 977 - 985



Sant GR, Urinary tract infections in the elderly. *Seminars in Urology* 1987; 5 (2): 126 - 133

Wilson M. Catheterisation under scrutiny. *Nursing times* 1990; 86 (49): 71 - 79