

# ANTIBIOTIC SENSITIVITIES OF URINARY TRACT PATHOGENES IN MALTESE PATIENTS

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## ABSTRACT

A survey of over 1000 bacterial isolates from Maltese patients with urinary tract infection was performed in order to investigate resistance patterns to commonly used oral antibiotics. Resistance was detected in high frequency, particularly for ampicillin, trimethoprim and sulphonamides, in samples originating from both community and hospital. A population comparison to a similar survey conducted in the UK showed local resistance rates to be twice as high.

## INTRODUCTION

The knowledge of current resistance patterns is vital to the successful treatment of urinary tract infections (UTI). Most community cases are treated without concurrent laboratory investigation. Even when a mid-stream urine specimen is sent to the laboratory, a result will not be available before a minimum of 48 hours. Local factors and prescribing patterns greatly influence the incidence of resistance and therefore regular monitoring of such trends is essential to formulate proper antibiotic prescribing guide-lines.

## MATERIALS & METHODS

The survey studied 1052 consecutive bacterial isolates from urine samples submitted to the Bacteriology Laboratory, St. Luke's Hospital over a three month period between February and April 1991. Specimens were designated as "Community" or "Hospital" depending upon their origin; the former comprised specimens submitted from out-patient departments and health centres. Primary plating was carried out within 30 minutes of submission on Cystine Lactose Electrolyte Deficient (CLED) and MacConkey media. Isolates showing not more than two colonial morphologies at concentrations of  $>10^5$  bacteria/ml of urine were interpreted as indicating significant bacteruria. Bacterial identification up to species level was carried out according to morphological and biochemical characteristics.

Antibiotic susceptibility was performed by means of a non-comparative disc diffusion technique using IsoSensitest medium (Oxoid). The antibiotics chosen were first line oral agents in most common local use and

tested at the following concentrations: ampicillin (25ug), trimethoprim (1.25ug), nalidixic acid (30ug), cefuroxime (30ug), sulphphonamide (100ug), nitrofurantoin (300ug) and amoxicillin/clavulanic acid (30ug).

Statistical analysis of probability limits was calculated from the standard error of difference between the two sets of percentages obtained.

## RESULTS

### Species isolated

As was to be expected the majority of isolates were obtained from ages of 60 years or more with a female predominance of 61.5%. Overall, the most common species isolated was *Escherichia coli* (35.4%) followed by *Pseudomonas aeruginosa* (9.2%), *Proteus vulgaris* (8.3%), *Klebsiella* (7.4%), *Enterobacter* (7.1%) and *Enterococci* (6.9%).

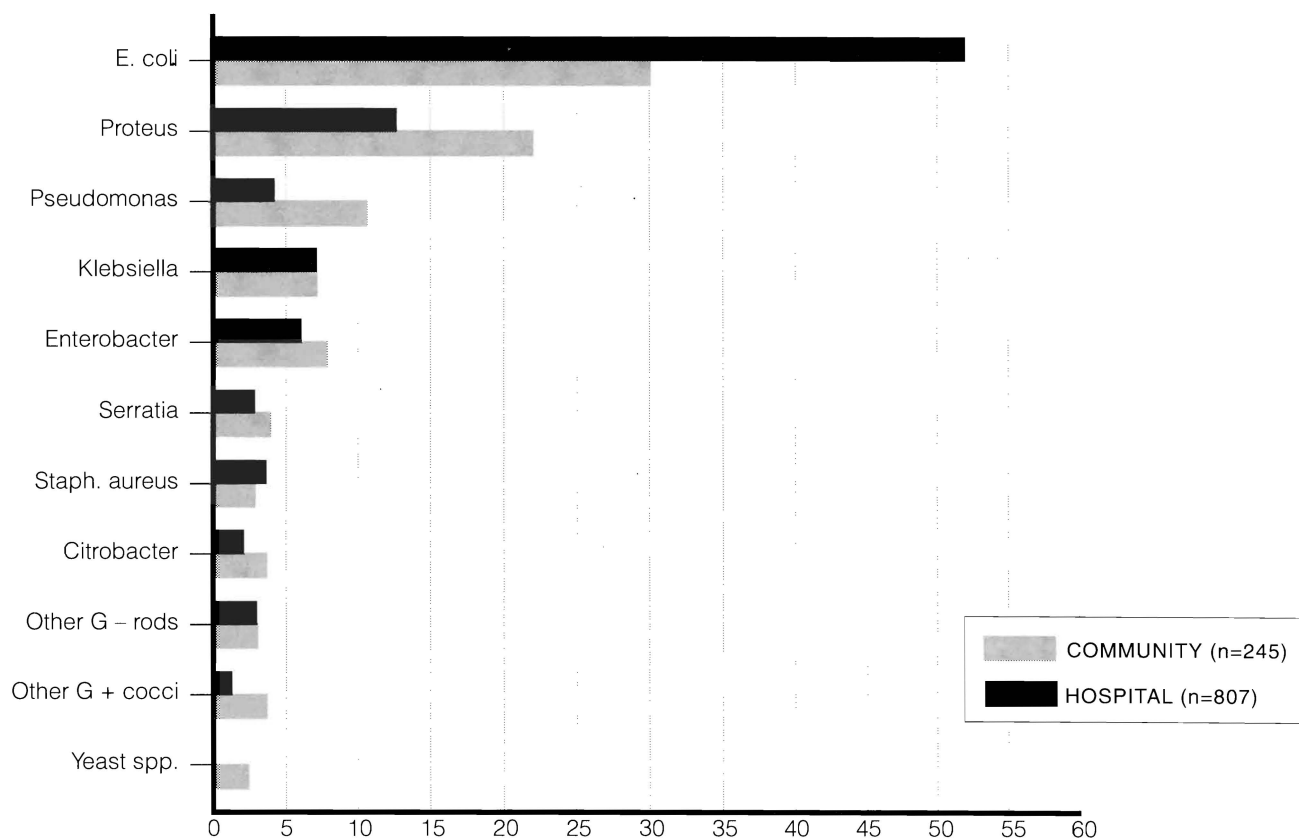
Figure I depicts the frequency distribution of isolates according to origin. *Escherichia coli* is the predominant organism particularly in community specimens; other members of the Enterobacteriaceae are more frequently isolated from hospitalised patients particularly *Pseudomonas*, *Klebsiella* and *Proteus*.

The resistance patterns in hospital and community strains investigated are seen in Table 1. In the majority of isolates, particularly those originating from hospitalised patients, resistance levels of over 20% are evident for most antibiotics tested.

In order to assess the severity or otherwise of the antibiotic resistance problem in the local setting, data obtained for *E. coli* were compared with equivalent results obtained from a similar study performed at University College Hospital, London, England (1). This organism

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**FIGURE 1 Species isolated by origin and frequency**



**TABLE I**

The overall proportion of bacterial isolates of community (245 isolates) and hospital (807 isolates) origin showing resistance to specific antibiotics.

ANTIBIOTIC	COMMUNITY	HOSPITAL	
Ampicillin	44.1%	51.0%	N.S.
Trimethoprim	39.6%	49.0%	p<0.01
Nalidixic Acid	20.8%	23.8%	N.S.
Cefuroxime	9.0%	19.5%	p<0.0001
Sulphonamides	69.8%	67.9%	N.S.
Nitrofurantoin	19.6%	30.4%	p<0.001
Amoxycillin + Clavulanic Acid	16.7%	21.5%	N.S.

**TABLE II**

Comparison of resistance incidence in community E.coli strains from Malta (127 isolates) and London (807 isolates).

ANTIBIOTIC	MALTA	LONDON	
Ampicillin	47.2%	24.0%	p<0.0001
Trimethoprim	33.1%	17.9%	p<0.001
Nalidixic Acid	11.0%	11.4%	N.S.
Cefuroxime	7.1%	*	
Sulphonamides	69.3%	29.5%	p<0.0001
Nitrofurantoin	3.9%	16.2%	p<0.0001
Amoxycillin + Clavulanic Acid	3.1%	*	

**TABLE III**

Comparison of resistance incidence in hospital *E.coli* strains Malta (234 isolates) and London (4238 isolates).

ANTIBIOTIC	MALTA	LONDON	
Ampicillin	56.0%	43.1%	p<0.001
Trimethoprim	44.4%	23.9%	p<0.0001
Nalidixic Acid	14.5%	2.1%	p<0.0001
Cefuroxime	7.7%	*	
Sulphonamides	71.4%	40.9%	p<0.0001
Nitrofurantoin	15.0%	5.8%	p<0.005
Amoxicillin + Clavulanic Acid	4.3%	*	

\* no data available from London study.

was chosen because it is by far the commonest pathogen in urinary tract infection and eliminates bias due to other organisms such as *Pseudomonas*, *Klebsiella* and *Enterobacter* that are inherently resistant to many first-line antibiotics.

Both hospital and community strains isolated locally show markedly increased resistance when compared with those isolated in London, particularly with respect to trimethoprim, nalidixic acid, nitrofurantoin and sulphonamides (Tables II & III).

**DISCUSSION**

The results show no significant difference in resistance levels between hospital and community strains for ampicillin, nalidixic acid, sulphonamides and amoxicillin/clavulanic acid. Highly significant differences (p<0.001) are only apparent for cefuroxime (available in an oral form only recently) and nitrofurantoin (rapidly falling out of favour in general practice). This state of affairs strongly differs from most European countries where resistance in community strains is often much lower than equivalent hospital isolates (2). Such a situation would indicate a wide-spread use (and possibly mis-use) of antibiotics in the community.

The role of long-established drugs, such as ampicillin and co-trimoxazole, in the treatment of urinary tract infections needs to be evaluated. Antimicrobials that have in recent years fallen out of favour, particularly nalidixic acid and nitrofurantoin, remain useful alternatives particularly for uncomplicated UTI's out of hospital.

The overall resistance patterns are alarmingly higher than those found in the London study (1), sometimes with up to two-fold increase for practically all antibiotics compared. This is a very discouraging situation that can only be remedied by judicious use of antibacterial agents in both the community and hospital setting.

In this first comprehensive study of antibiotic resistance in Malta, the relative sensitivities of urinary isolates to a series of antimicrobials have been investigated. In the light of the findings it is clear that antibiotic treatment strategies, both at hospital and general practice levels, need to be reviewed and appropriate action taken if the high degree of resistance elucidated is to decrease appreciably in the near future.

**References**

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2. Lionsquay G, Delaitre E, Pin P, Bourlioux P et al. Incidence of isolation and antibiotic resistance of *E. coli* responsible for urinary infections outside hospitals, in specialised hospitals and in general hospitals. *Path Biol Paris* 1984; 32(5): 389-395.

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