ORIGINAL ARTICLE

Nosocomial and Community Acquired Urinary Tract Infections at a Teaching Hospital in North Central Nigeria: Findings from a Study of 12,458 Urine Samples

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ABSTRACT

Background: *Urinary tract infection (UTI) is still a problem not infrequently encountered in the course of clinical practice. This study was designed to ascertain its prevalence among both the in and out-patients and the antibiotic susceptibility pattern of the isolates.*

Method: *A retrospective analysis of data from all the urine samples processed at Jos university teaching hospital microbiology laboratory was undertaken for a period of 36 months (January 2000-December2002). Samples had been collected, stored and processed by standard laboratory procedures. Results obtained were analysed using SPSS 11 statistical software and P values <0.05 were considered significant.*

Results*: Of the 12,458 urine samples studied comprising 43% males and 57% females: the overall prevalence of UTI was found to be 22%; 7.4% among males and a higher figure of 14.6% among females, this was statistically significant (p<0.05). The rate of nosocomial UTI was significantly higher than the community acquired type: 12.3% and 9.3% respectively (p<0.05). The commonest nosocomial isolate was Klebsiella spp while Escherichia coli were for community acquired group. Staphylococcus aureus, Coagulase negative Staphylococcus, Proteus spp and Pseudomonas aeruginosa were also common isolates. The most effective antibiotics were Ofloxacin, Ciprofloxacin and Cefuroxime.*

Conclusion: *In-patients especially should be encouraged to drink adequate water daily and practice "double urination" to reduce incidence of UTI. Ofloxacin, Ciprofloxacin and Cefuroxime should be considered first in the treatment of UTI in the absence of a susceptibility test.*

KEYWORDS: Nosocomial; Community; Acquired urinary tract infection; Nigerian Hospital

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INTRODUCTION

Urinary tract infection (UTI) is infection involving part or all of the urinary tract[1]. It can be upper UTI (pyelonephritis, ureteritis) or lower UTI (cystitis, urethritis) with symptoms such as chills and rigours where it is symptomatic[2]. The infection usually enters the system by an ascending route via the urethra in over 98% of cases[3,4].

Patients with upper UTI present with symptoms such as fever (usually >38^{0}C), chills and rigours, vomiting and pains in the loins[5,6]. On the other hand patients with lower UTI present with features such as frequency, urgency, dysuria, haematuria and suprapubic pain[3,5]. The exact data on the incidence of UTI in Nigeria is inconclusive. In other parts of the world studies showed that UTI was responsible for over one million hospital admissions in one year[7,8]. Studies have shown that about 1% of school girls aged 5-14 years have bacteriuria and this figure increases to 4% by young adulthood[9]. Also it has been found that 25-30% of women between the ages of 20-40 years have had UTIs and 10% of men over 65 years of age have bacteria in the urine[10]. Bacteria are by far the commonest causes of UTI compared to other agents such as Fungi (*Candida, Blastomyces, Coccidioidomyces*); parasites (*Trichomonas, Schistosoma, Plasmodium,* Threadworm) and viruses (Herpes simplex virus 2)[11-14].

The rate of progression of any UTI depends on a number of variables, these among others include: the status of infected urinary tract; the immune status of the patient; virulence of the organism and the effectiveness or not of treatment that has been initiated[15-17].

Several risk factors have been linked with the onset and progression of UTI. This consists of general factors such as: extremes of age; diabetes; impaired immunity (malnutrition, HIV/AIDS, cancer, chemotherapy)[18-20]. The local factors include: stones, benign prostatic enlargement, spinal cord injury, vesico ureteric reflux and foreign bodies in the urinary tract[21-23].

The unrestricted use of antibiotics in our environment has led to the treatment of UTI being more difficult due to the emergence of resistant bacteria[24-25]. This difficulty is being noticed in the management of bacterial infections in other parts of the body as well. There is therefore the need for a periodic update of the knowledge of the health professional (who is continuously involved in the management of those patients) about the common and emerging bacterial agents of UTI with their antibiotic susceptibility patterns.

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This will put them in a better position of decision making in the course of managing these patients[26-30].

MATERIALS AND METHODS

Study Area: The study was carried out at Jos University Teaching hospital (JUTH), situated in Jos city, the capital of Plateau state. The state is located in the north central Nigeria and has abundant hills and rock formations as well as a suitable temperate climate. The teaching hospital serves predominantly, the needs of all the states located in the north central part of the country such as: Taraba, Niger, Benue, Nassarawa, Kogi, and FCT Abuja.

Study Design: The study was retrospectively undertaken. Data generated by the microbiology laboratory of JUTH was compiled for a period of 36 consecutive months (Jan 2000-Dec 2002). These urine samples constituted primarily of patients from the general out patient department (GOPD) of JUTH, accidents and emergency unit, those on admission in the hospital wards and few referred samples from other health centres. These samples were grouped into two categories- community acquired (CAU) and nosocomial (NCU) based on the clinical data on request forms accompanying the samples.

Community acquired UTI (CAU) - this consists of urine samples from patients attended to on out patient basis, those on admission for less than 24 hours without initial diagnosis of UTI and those with UTI at the time of admission.

Nosocomial UTI (NCU) - this consists of urine samples from patients on admission for more than 24 hours of which UTI was not diagnosed at the time of admission.

Urine samples were collected in sterile universal bottles (about 15millimetres) and processed immediately or stored in the laboratory refrigerator at 4^0C until the appropriate time[31,32]. Concentration procedure using centrifugation at 1500rpm was carried on every sample and sediment examined under X40 objective of the microscope for pus cells, red blood cells, casts, crystals, parasites and bacreria. The uncontaminated urine samples were inoculated into CLED (cysteine lactose electrolyte deficient), Mac-Conkey agar and Chocolate agar[33,34]. Sabouraud dextrose agar medium was included whenever there was suspicion of fungal involvement. The culture plates were incubated at 36.5^0C over night in atmospheric air. Biochemical tests were carried out based on the gram reactions of the bacterial agents while antibiotic susceptibility tests on the isolates was done based on modified Kirby-Bauer's method which is a diffusion method[35]. All the laboratory procedures were carried out by senior laboratory technologists experienced in bacteriological analysis while internal quality control measures were put in place.

ANALYSIS OF RESULTS

The results were analysed using statistical software SPSS 11.0 and P values < 0.05 were considered significant.

ETHICAL CONSIDERATION

Ethical approval for the study was sought for and obtained from the ethical committee of JUTH.

RESULTS

From January 2000 to December 2002, a total of 12,458 urine samples were collected and processed at the microbiology laboratory of Jos university teaching hospital (JUTH).

Table I shows the age and sex distribution pattern of the subjects from whom the urine samples were collected. The highest age range from whom samples were collected was 30-39 years (2,648; 21.2%), followed by 20-29 years range (2,305; 18.5%), and thirdly, 40-49 years old (2,018; 16.2%); and the least age range was 70 years and above (697; 5.6%). There were 5,357 (43%) males and 7,101 (57%) females. The overall rate of infection was found to be 22% (n=2741): 7.4% (n=919) among males and 14.6% (n=1,822) among females. This higher figure among females was found to be statistically significant, p=0.0000000; OR=1.82 and RR=1.61.

Table II shows the rate of urinary tract infection among the nosocomial group as compared to the community acquired group. The rate of nosocomial UTI was found to be higher (12.3%; n=1,535) than the community acquired group of 9.3% (n=1,158) and unclassified group 0.4% (n=48). This was found to be statistically significant, p=0.0000000; OR= 0.85; RR= 0.91.

Table III shows the organisms isolated from the 12,458 urine samples studied. The commonest nosocomial isolate was *Klebsiella spp*(435; 28%), while that of community acquired was *Escherichia coli* (379; 32.4%). Other organisms that were also prevalent in the study include: *Staphylococcus aureus* (NCU=182, 11.7%; CAU= 132, 11.3%); Coagulase negative *Staphylococci* (NCU=154, 9.9%; CAU=106, 9.1%); *Proteus spp* (NCU= 168,10.8%; CAU= 74, 6.3%); *Pseudomonas aeruginosa* (NCU= 72, 4.6%); CAU= 55, 4.7%); *Streptococcus faecalis* (NCU=63, 4.1%; CAU=22, 1.9%). Other organisms encountered with lesser frequency were: *Trichomonas vaginalis* (NCU=52,

3.3%; CAU= 19, 1.6%); *Streptococcus pyogenes* (NCU=21, 1.4%; CAU=42, 3.6%); *Enterobacter spp* (NCU= 26, 1.7%; CAU=22, 1.9%), and *Citrobacter spp* (NCU=19, 1.2%; CAU=18, 1.5%). Multiple infections were found to be commoner among the nosocomial isolates of UTI however, the difference was found to be statistically insignificant (p>0.05).

Table IV and V shows antibiotic susceptibility patterns of the bacterial isolates from the urine samples under study. All the nosocomial isolates of *Streptococcus faecalis* were found to be resistant to Penicillin, Tetracycline, Ampicillin and Cloxacillin. The sensitivity pattern of other antibiotics against *S. faecalis* was similarly low (less than 50%) except for Ofloxacin, Ciprofloxacin and Cefuroxime which had sensitivities of 66%, 57% and 68% respectively. A higher sensitivity pattern of 86%, 67% and 86% respectively for the same drugs was recorded with the community acquired isolates of the same organism. This difference was found to be statistically significant (p<0.05). *Pseudomonas aeruginosa* was also found to be highly resistant to the majority of the antibiotics tested among both the nosocomial and community acquired isolates. Less than 50% of the isolates of *P. aeruginosa* were sensitive to Ampicillin, Co-trimoxazole, Gentamicin, Augmentin, and Chloramphenicol among the nosocomial isolates while triple 88% sensitivity was recorded respectively among the community acquired isolates with Ofloxacin, Ciprofloxacin and Cefuroxime. This difference was also found to be statistically significant (p<0.05). All the community acquired isolates of *P. aeruginosa,* similar to their nosocomial counterpart, were resistant to Ampicillin, Nitrofurantoin, Penicillin, Nalidixic acid, Tetracycline and Cloxacillin (p>0.05).

Over 50% of the nosocomial isolates of *Escherichia coli* were sensitive to Gentamicin, Nitrofurantoin, Augmentin, Chloramphenicol and Cefuroxime, while a sensitivity of over 80% was recorded with Ceftriaxone and Ofloxacin. Less than 50% of the same organisms were found to be sensitive to Ampicillin, Penicillin, Tetracycline, Co-trimoxazole, Nalidixic acid and Cloxacillin. Higher sensitivity patterns were recorded with community acquired isolates with Ofloxacin, Ciprofloxacin and Cefuroxime showing 100% sensitivity. This difference was found to be statistically significant, (p<0.05).

All the community acquired isolates of *Klebsiella spp* were sensitive to Ofloxacin, Cefuroxime and Ciprofloxacin: this was with a corresponding sensitivity of 87%, 65% and 65% respectively among the nosocomial isolates of the same organism. This difference was similarly found to be statistically significant, (p<0.05).

The nosocomial isolates of *Staphylococcus aureus* were highly resistant (over 50%) to many antibiotics such as the Penicillins, Tetracycline and Chloramphenicol while the highest sensitivity of 68% was recorded with Ofloxacin. Higher sensitivities were however recorded with the community acquired isolates: 82%, 83%, 87% and 83% respectively for Ofloxacin, Augmentin, Ciprofloxacin and Cefuroxime.

These differences were also found to be statistically significant, (p<0.05). A similar pattern of sensitivity was recorded among both the community acquired and nosocomial isolates of coagulase negative *Staphylococcus* except for Augmentin which showed significantly lower sensitivity among the nosocomial isolates.

There were no dramatic differences in the sensitivity patterns of the nosocomial and community acquired isolates of *Streptococcus pyogenes* in the study. However, the Penicillins and Tetracycline recorded higher sensitivities among the community acquired isolates of the organism as compared to the nosocomial counterpart but with no significant difference (p>0.05).

Less than 50% of the nosocomial isolates of *Proteus spp* were sensitive to the Penicillins, Tetracycline, Co-trimoxazole, Nitrofurantoin, Augmentin, Nalidixic acid and Chloramphenicol. The sensitivity pattern among the community acquired isolates was comparatively higher as 65%, 73%, 92%, 78%, 78% and 90% sensitivity was recorded with Gentamicin, Ceftriaxone, Ofloxacin, Augmentin, Ciprofloxacin, and Cefuroxime respectively.

Both *Enterobacter spp* and *Citrobacter spp* from the nosocomial and community acquired isolates showed similar sensitivity patterns with the majority of the antibiotics. A low sensitivity of 19% was recorded with Tetracycline, Nitrofurantoin, Nalidixic acid and Chloramphenicol against the nosocomial isolates of *Enterobacter spp*: while 21% sensitivity was the lowest recorded with *Citrobacter spp* against Penicillin, Tetracycline and Chloramphenicol. Community acquired isolates of these organisms showed comparatively higher sensitivity patterns but with no significant difference (p>0.05): a sensitivity of 100% was recorded with Ceftriaxone, Ofloxacin and Cefuroxime against *Citrobacter spp* while 100%, 98%, 96%, and 98% was respectively recorded for Ofloxacin, Ceftriaxone, Augmentin and Cefuroxime against *Enterobacter spp.*

Table I. Age and Sex Distribution of Urinary Tract Infection (UTI) among the Urine Samples Studied in North Central Nigeria

Age		M		F	
Years	No Isolate	Isolate	No Isolate	Isolate	TOTAL
<1-9	321(2.6)	52(0.4)	374(3.0)	71(0.6)	818(6.6)
10-19	507(4.1)	87(0.7)	586(4.7)	96(0.8)	1276(10.3)
20-29	750(6.0)	153(1.2)	883(7.1)	519(4.2)	2305(18.5)
30-39	838(6.7)	198(1.6)	1126(9.0)	486(3.9)	2648(21.2)
40-49	741(6.0)	164(1.3)	802(6.4)	311(2.5)	2018(16.2)
50-59	442(3.5)	89(0.7)	633(5.1)	92(0.7)	1256(10.0)
60-69	377(3.0)	54(0.5)	444(3.6)	83(0.6)	958(7.7)
70 & Above	289(2.3)	87(0.7)	225(1.8)	96(0.8)	697(5.6)
Unclassified	173(1.4)	35(0.3)	206(1.7)	68(0.5)	482(3.9)
TOTAL	4438(35.6)	919(7.4)	5279(42.4)	1822(14.6)	12458(100)

$X^2 = 128.65$; df = 1; p = 0.0000000; OR = 1.82; RR = 1.61
Parenthesis = percent

Table II. The Rate of Nosocomial Urinary Tract Infection as Compared to Community Acquired Urinary Tract Infection in North Central Nigeria

Infection		M		F	
(Type)	No Infection	Infection	No Infection	Infection	TOTAL
NCU	1767(14.2)	563(4.5)	1432(11.5)	972(7.8)	4734(38.0)
CAU	2568(20.6)	327(2.6)	3675(29.5)	831(6.7)	7401(59.4)
UCU	103(0.8)	29(0.3)	172(1.4)	19(0.1)	323(2.6)
TOTAL	4438(35.6)	919(7.4)	5279(42.4)	1822(14.6)	12,458(100)

$X^2 = 60.12$; df = 1; p = 0.0000000; OR = 0.85; RR = 0.91

Key
Parenthesis = percent
NCU – Nosocomial UTI
CAU – Community acquired UTI
UCU – Unclassified UTI

Table III. Organisms Isolated from Nosocomial and Community Acquired Urinary Tract Infection in North Central Nigeria

Organisms	NCU (%)	CAU (%)
Klebsiella species	435(28.0)	268(23.0)
Escherichia coli	332(21.4)	379(32.4)
Staphylococcus aureus	182(11.7)	132(11.3)
Coag. Negative *Staphylococcus*	154(9.9)	106(9.1)
Proteus species	168(10.8)	74(6.3)
Streptococcus pyogenes	21(1.4)	42(3.6)
Streptococcus faecalis	63(4.1)	22(1.9)
Pseudomonas aeruginosa	72(4.6)	55(4.7)
Enterobacter species	26(1.7)	22(1.9)
Citrobacter species	19(1.2)	18(1.5)
Yeast cells	17(1.1)	25(2.1)
Trichomonas vaginalis	52(3.3)	19(1.6)
Others	12(0.8)	7(0.6)
TOTAL	*1553(100)	**1169(100)

Key
Parenthesis = percent
NCU – Nosocomial UTI
CAU – Community acquired UTI
* - 18 urine samples had multiple infections
** - 11 urine samples had multiple infections

Table IV. Antibiotic Susceptibility Pattern of the Bacterial Isolates from the Urine of Nosocomial Urinary Tract Infection (NCU) in North central Nigeria.

	Percentage susceptibility patterns*																		
ISOLATES	N	AMP	P	A TET	N RF	T CEFZ	I COT	B GEN	I CFTR	O NIT	T OFLX	C AUG	S NAL	CLX	LIN	CIPRO	CHL	CFUR	OB
Escherichia coli	**332**	43	21	36	-	-	47	56	89	58	85	69	36	43	-	77	51	63	-
Klebsiella species	**435**	56	24	28	-	-	49	61	93	54	87	77	48	39	-	65	49	65	-
S. aureus	**182**	27	5	3	-	-	35	47	67	-	68	56	-	18	-	55	28	58	-
Coag. Neg. Staph.	**154**	19	7	9	-	-	38	44	75	-	76	42	-	20	-	58	31	56	-
S. pyogenes	**21**	52	26	26	-	-	61	66	71	-	89	71	-	23	-	74	44	71	-
S. faecalis	**63**	0	0	0	-	-	5	18	47	-	66	37	-	0	-	57	18	68	-
P. auroginosa	**72**	0	0	0	-	-	23	22	56	0	64	46	0	0	-	64	18	66	100
Proteus species	**168**	34	17	13	-	-	42	53	73	38	71	48	34	16	-	73	27	54	0
Enterobacter species	**26**	50	25	19	-	-	50	69	73	19	73	50	19	23	-	76	19	50	0
Citrobacter species	**19**	37	21	21	-	-	63	58	68	37	68	37	37	32	-	72	21	58	

Key
* = Calculated to the nearest whole numbers; N = Number of Isolates recovered; 0 = All resistant; - = Not tested
NIT Nitrofurantoin — CFTR Ceftriaxone
AMP Ampicillin — OFLOX Ofloxacin — RF Rifampicin
CLX Cloxacillin — AUG Augmentin — CFUR Cefuroxime
TET Tetracycline — NAL Nalidixic acid — CIPRO Ciprofloxacin
CEFZ Ceftazidime — CHL Chloramphenicol — GEN Gentamicin
COT Co-trimoxazole — P Penicillin — LIN Lincomycin

Table V. Antibiotic Susceptibility Pattern of the Bacterial Isolates from the Urine Samples of Community acquired Urinary Tract Infection (CAU) in North Central Nigeria.

	Percentage Susceptibility Patterns*																		
ISOLATES	N	AMP	P	A TET	N RF	T CEFZ	I COT	B GEN	I CFTR	O NIT	T OFLX	C AUG	S NAL	CLX	LIN	CIPRO	CHL	CFUR	OB
Escherichia coli	**379**	58	43	55	-	-	67	83	96	88	100	89	78	67	-	100	87	100	-
Klebsiella species	**268**	63	45	58	-	-	75	89	98	94	100	86	74	63	-	100	93	100	-
S. aureus	**132**	48	33	43	-	-	42	65	76	-	82	83	-	53	-	87	56	83	-
Coag. Neg. Staph.	**106**	44	41	57	-	-	39	69	74	-	84	86	-	56	-	84	53	74	-
S. pyogenes	**42**	48	49	63	-	-	54	88	98	-	100	95	-	62	-	95	68	98	-
S. faecalis	**22**	5	0	5	-	-	10	47	55	-	86	67	-	0	-	67	10	86	-
P. auroginosa	**55**	0	0	0	-	-	18	52	67	0	88	66	0	0	-	88	18	88	100
Proteus species	**74**	26	16	32	-	-	52	65	73	16	92	78	16	16	-	78	52	90	0
Enterobacter species	**22**	40	18	18	-	-	50	55	98	98	100	96	68	68	-	94	92	98	0
Citrobacter species	**18**	38	33	17	-	-	54	61	100	89	100	94	83	61	-	96	88	100	

Key
* = Calculated to the nearest whole numbers; N = Number of Isolates recovered; 0 = All resistant; - = Not tested.
NIT Nitrofurantoin — CFTR Ceftriaxone
AMP Ampicillin — OFLOX Ofloxacin — RF Rifampicin
CLX Cloxacillin — AUG Augmentin — CFUR Cefuroxime
TET Tetracycline — NAL Nalidixic acid — CIPRO Ciprofloxacin
CEFZ Ceftazidime — CHL Chloramphenicol — GEN Gentamicin
COT Co-trimoxazole — P Penicillin — LIN Lincomycin

DISCUSSION

The study was carried out to ascertain the prevalence of urinary tract infection vis-à-vis the nosocomial and community acquired patterns and the antibiotic susceptibility of the respective isolates. A major limitation for the study was how to group the urine samples into nosocomial urinary tract infection (NCU) and community acquired urinary tract infection (CAU) based on the clinical data accompanying the samples. This data is subject to errors based on wrong diagnosis and incomprehensive information by the requesting physician which is a common phenomenon in our hospitals. This difficulty was however resolved by arbitrarily grouping all the urine samples from the hospital wards (without prior detection of urinary tract infection on admission) as nosocomial; although, it has been well established that nosocomial infections can be contracted from the out patient clinic, while community acquired infections could manifest 24 hours after admission in the hospital[36].

The overall prevalence of urinary tract infection (UTI) in the study was found to be 22%; 7.4% among males and 14.6% among females. This finding is lower than that of a previous study among AIDS patients in the same centre[37] where a prevalence of 24% was obtained. The higher figure in the previous study is expected since it was carried out among AIDS patients with obvious immunosuppression. The lower figure of 10.6% UTI[37] among non AIDS patients reported in the same centre earlier could also explain the higher figure in the present study: since the AIDS pandemic presently has taken a great toll on a large number of hospital visitations and admissions; this along with other immunosuppressive states such as: Diabetes mellitus, renal diseases, and

malnutrition could as well contribute to the higher figure in the present study[38]. Lower figures were reported by Onyemelukwe *et al*[10] and higher figures by Olowu *et al*[11]: the former due to the fact that the study was carried out on normal healthy pregnant women with no symptoms of UTI; while the later was on patients with pre-morbid renal pathological lesions.

The rate of nosocomial UTI (NCU) was found to be 12.3% as compared to that of community acquired UTI (CAU) which was lower(9.3%). The significantly higher rate of UTI ($P<0.05$) among the in-patients could be attributed to the UTI predisposing diseases including those earlier listed which might have been the cause of hospital admission in the first instance as well as some treatment procedures including drugs[38,39].

The commonest bacterium causing nosocomial UTI was found to be *Klebsiella spp* (28%), followed by *Escherichia coli* (21.4%) and *Staphylococcus aureus* (11.7%). This may be as a result of the ability of *Klebsiella spp* to survive better in immunosuppressed tissues. Olowu *et al*[11] had a similar finding. On the other hand the commonest cause of community acquired UTI was found to be *Escherichia coli* (32.4%), followed by *Klebsiella spp* (23%) and *Staphylococcus aureus* (11.2%). This finding is similar to that of Brown *et al*[12] and Okoeguale[9] in their separate studies. *E. coli* is known for specific adaptations in the urinary tract that enhance its virulence[40].

Urinary tract infection is therefore a common finding among both the out-patients and the in-patients. Investigations for pyrexia of unknown origin both in children and adults should consider the possibility of a UTI. Patients on admission in the hospital should be encouraged to drink at least 2 litres of water daily where clinical conditions warrant. This will encourage urination, reduce urinary stasis and subsequently wash the urinary passage ways of bacteria. Also patients as well as normal persons should be encouraged to empty bladder after urinating seems complete (double urination). Other practices such as urinating after sexual intercourse, avoiding nylon underwear and vaginal deodorants will also help reduce the incidence of UTIs drastically even among those at a higher risk of the disease.

Generally the antibiotic susceptibility patterns of the nosocomial isolates were lower than that of their community acquired counterpart. Both the community acquired and nosocomial isolates of *P. aeruginosa* were resistant to Ampicillin, Penicillin, Tetracycline, Nitrofurantoin, Nalidixic acid and Cloxacillin. The most sensitive antibiotics against the nosocomial isolates of *P. aeruginosa* were Cefuroxime (66%), Ciprofloxacin (64%) and Ofloxacin (64%); while those most sensitive against their community acquired counterpart were the same drugs each with 88% sensitivity. This significant difference in sensitivity is expected since the nosocomial isolates have repeated exposure to these drugs leading to the development of resistance against them[41].

This resistance by bacteria can be transferred from one drug to another in the same family after exposure to a single member in the family.

A similar high level of resistance was also recorded with *Streptococcus faecalis*: the most sensitive drugs among the nosocomial isolates were Ofloxacin (66%), Ciprofloxacin (57%) and Cefuroxime (68%), while a correspondingly higher sensitivity pattern was recorded from the community acquired isolates of *S. faecalis* as 86%, 67%, and 86% respectively and 55% for Gentamicin.

The sensitivity pattern of *Escherichia coli, Klebsiella spp, Staphylococcus aureus,* coagulase negative *Staphylococcus, and Proteus spp* from the nosocomial isolates was significantly lower than that of their community acquired counterparts for the majority of the drugs tested. Drugs such as Ampicillin, Penicillin, Tetracycline, Cloxacillin and Co-trimoxazole generally recorded low sensitivity among virtually all the isolates. The general abuse of these drugs by the public here comes to the open and the need to entrench proper legislation in the country on the sale, purchase and consumption of antibiotics becomes more necessary now than ever. This will help reduce the difficulty being encountered presently in the management of simple bacterial infections. This pattern of resistance has been found to be commoner and has been on the increase in the developing world for about two decades[42,43] now and abuse cannot be absolved from the blame. *Citrobacter spp* and *Enterobacter spp* however did not show significant differences in the sensitivities of the isolates of both the nosocomial and community acquired bacterial isolates against majority of the antibiotics in the study. This unexpected finding may be as a result of reduced rate of mutation of these bacteria as well as reduced cross transfer of resistant genes with other members of the Enterobacteriaceae. More work however, will be required in this direction to prove these hypotheses. The rate of development of penicillinase by *Streptococcus pyogenes* is generally slow[30]; this may account for the slow rate of induction of the nosocomial isolates of this bacterium towards the development of resistance as found in this study.

The drugs with the highest sensitivities on all the

isolates in the study but with a correspondingly significantly lower sensitivity for the nosocomial isolates were: Ofloxacin, Ciprofloxacin, Cefuroxime, Ceftriaxone and Augmentin. These drugs are less commonly abused; moreover their exorbitant cost to some extent controls their rate of abuse hence preserving their relatively higher efficacious states. This finding agrees with that of Dromigny *et al*[43] in Dakar, Senegal.

In conclusion, UTI is common among both the in-patients and out-patients but commoner among the former. Frequent ingestion of water, double urination and disuse of nylon pants could reduce its incidence among the two groups. A proper legislation on the sale and purchase of antibiotics in the country should be put in place to reduce the rate of antibiotics abuse. Finally, Ceftriaxone, Ofloxacin, Cefuroxime and Ciprofloxacin should be considered first in the treatment of UTI in the absence of a comprehensive sensitivity test.

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