Update on Antibiotic Activity on Bacterial Strains Isolated from Urine Samples at Butare University Teaching Hospital (Buth) Laboratory in Rwanda

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Abstract

Urinary tract infection is one of the most common infections next to respiratory and gastrointestinal infections and it affects all people worldwide. This is a retrospective study conducted on all bacterial strains isolated from all patients suspected to develop UTIs including inpatients and outpatients attending BUTHL from the 1st January 2011 to the 31ST December 2014. A total of 1656 (100%) uropathogens have been detected. The most commonly isolated bacteria were *Escherichia coli* with 931(56.08 %), *Klebsiella Species* 213(12.83 %), *Neisseria gonorrhea* 94(5.66%), *Coagulase negative Staphylococcus* 99(5.96%), *Streptococcus species* 108(6.50%), *Staphylococcus aureus* 55(3.31%), *Proteus species* 60 (3.61%), *Enterobacter species* 41(2.48%) *and Enterococcus species* 33(2.00%). In general all isolates were resistant to Amoxicillin, Trimethoprim- Sulfamethoxazole (TMP/SMZ) and Tetracycline. The study has shown a decrease of activity among Aminoglycosides groups exclude Amikacin. Furthermore, most of isolates tested were still susceptible to Meropenem, Fluoroquinolone and Cephalosporin's group antibiotics. This study proposes that the appropriate use of antimicrobial drugs by medical staff and increasing awareness among the population to the risks of inappropriate antimicrobial use are recommended to reduce the emergence and spread of bacterial resistance. There is a need also of new generic antibiotics used for empirical treatment of UTIs at CHUB.

KEYWORDS: Update, Antibiotics, Activity, Bacteria, BUTHL.

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1. INTRODUCTION

After the introduction of Penicillin by Alexander Fleming into human therapeutics in 1940, antibiotics were used and misused in treating human infections. Nowadays, many antibiotics are used in many domains like animal, veterinary and agricultural which can cause the existence and high extension of resistant bacteria (1). This bacterial resistance menaces the achievement of medical interventions at all levels of health care (2).

Urinary Tract Infections (UTIs) are infections that affect many people at all ages. Approximately, one- half of all people are affected by UTIs in their lifetime. Next to Respiratory infection, it is one of the most frequent bacterial infections found in the primary health care (3). Inappropriate use of antibiotics when treating patient with UTIs has generated the spread of microbial resistance and existence of multidrug resistance among uropathogens (4).

A retrospective study carried out at Butare University Teaching Hospital (CHUB) on all bacterial strains isolated from urine culture between January 2006 and December 2010 found that commonly used antibiotics for the treatment of UTI were not very effective (5). The purpose of this study was to update on the evolution of drug resistance at CHUB on species isolated from urine from the 1st January 2011 to the 31ST December 2014 and therefore will help in treatment and management of UTIs.

2. METHODS

This was a retrospective study conducted on all bacterial strains isolated from all patients suspected to develop UTIs including inpatients and outpatients attending BUTHL from the 1st January 2011 to the 31ST December 2014. Disk diffused method was used to test bacterial susceptibilities. Data were collected from registers of antibiogram of Bacteriology Service of Butare University Teaching Hospital Laboratory (BUTHL). Microsoft Excel 2010 was used to enter and analyze the data.

3. RESULTS

- Prevalence of Bacteria species isolated and identified from urine culture

A total of 1656 isolates were found and their frequencies are shown in table 1.*E. coli* occupied the first place with 931(56.08 %) of all germs isolated, followed by *Klebsiella spp,* accounting for 213(12.83%) and *Neisseria gonorrhea* with 94(5.66%). Among Gram positive bacteria *Coagulase negative staphylococcus* had 99(5.96%), *Streptococcus spp* 108(6.50%) and *Staphylococcus aureus* 55(3.31%).

Table 1: Prevalence of Bacteria species isolated and identified from urine culture

BACTERIA	YEAR 2011	YEAR 2012	YEAR 2013	YEAR 2014	TOTAL	PERCENTAGE (%)
E.coli	246	259	270	156	931	56.08
Klebsiella spp	57	73	64	19	213	12.83
Streptococcus spp	36	31	25	16	108	6.50
Coagulase Negative staphylococcus	29	23	23	24	99	5.96
Neisseria gonorrhea	24	26	17	27	94	5.66

Proteus spp	18	20	15	7	60	3.61
Staphylococcus aureus	24	14	6	11	55	3.31
Enterobacter spp	14	18	9	0	41	2.48
Enterococcus	9	17	4	3	33	2
Acinetobacter spp	1	3	2	3	9	0.54
Citrobacter spp	3	1	0	0	4	0.24
Pseudomonas spp	2	0	1	3	6	0.36
Serratia spp	1	0	0	0	1	0.06
Salmonella typhi	1	0	0	0	1	0.06
Eduardsiella	0	0	1	0	1	0.06
Total	465	485	437	269	1656	100

- Antibiotic susceptibility patterns of *E.coli* spp

Different antibiotics were tested and the results of antimicrobial susceptibility are shown in table 2. In general, after Meropenem (96.55%) which was very active; Cephalosporin showed a good activity against *E. coli* (Ceftazidime with 84.82%, Cefuroxime with 81.94% and Cefotaxime with 81.56%), Quinolones (Levofloxacin, 78.92%, Norfloxacin, 75.86% and Ciprofloxacin, 73.18%), Vancomycin (75%), Nitrofurantoin (74.18%), Nethlimycin, (71.41%) and Amikacin with 70%. Moreover, Ceftriaxone, Chloramphenicol, Penicillin, and Nalidixic acid showed an intermediate activity with 66.67%, 65.25%, 64.52% and 60.60 % respectively.

High resistance rates were observed to Ampicillin with 92.41% of resistance, Amoxicillin (89.46%), TMP/SMZ (81.86%), Tetracycline (73.28%), Cephalothin (73.00%), Clindamycin (70.59%), Augmentin (62.58 %) and Rovamycin (60%).

TABLE 2: Antibiotic susceptibility patterns of *E.coli* spp

Antibiotics	Isolates (N)	Sensitivity N (%)	Resistant N (%)	Intermediates N (%)
Chloramphenicol	615	389(65.25)	202(32.84)	24(3.90)
Tetracycline	363	80(22.03)	266(73.28)	17(4.68)
TMP/SMZ	685	124(18.10)	558(81.86)	3(0.40)
Amoxicillin	294	27(9.18)	263(89.46)	4(1.36)
Augmentin	473	143(30.23)	296(62.58)	34(7.19)

Nalidixic acid	825	500(60.60)	316(38.30)	9(1.1)
Nitrofurantoin	740	549(74.18)	120(16.22)	71(9.6)
Amikacin	50	35(70)	11(22)	4(8)
Gentamicin	501	125(24.95)	316(63.07)	60(11.98)
Cephalothin	163	26(15.95)	119(73)	18(11.05)
Ciprofloxacin	563	412(73.18)	147(26.11)	4(0.71)
Cefotaxime	526	429(81.56)	96(18.25)	5(0.19)
Vancomycin	8	6(75)	2(25)	0(0)
Meropenem	116	112(96.55)	3(2.59)	1(0.86)
Levofloxacin	185	146(78.92)	37(20)	2(1.08)
Ampicillin	514	33(6.42)	475(92.41)	6(1.17)
Penicillin	31	20(64.52)	8(25.80)	3(9.68)
Oxacillin	37	11(29.73)	22(59.46)	3(10.81)
Rovamycin	5	2(40)	3(60)	0(0)
Clindamycin	17	2(11.76)	12(70.59)	3(17.65)
Tobramycin	26	15(57.69)	7(26.92)	4(15.39)
Erythromycin	16	9(56.25)	5(31.25)	2(12.5)
Ceftazidime	303	257(84.82)	37(12.21)	9(2.97)
Norfloxacin	261	198(75.86)	56(21.46)	7(2.68)
Ceftriaxone	108	72(66.67)	36(33.33)	0(0)
Cefuroxime	72	59(81.94)	10(13.89)	3(4.17)
Lincomycin	21	12(57.14)	9(42.86)	0(0)
Kanamycin	3	1(33.33)	1(33.33)	1(33.33)
Cloxacillin	18	5(27.78)	9(50)	4(22.22)
Bacitracin	4	2(50)	2(50)	0(0)
Netilmicin	7	5(71.41)	1(14.28)	1(14.28)

- Antibiotic susceptibility patterns of *klebsiella spp*

The most effective antibiotics to Klebsiella isolates was Meropenem with 100% of sensitivity. An activity of more than sixty percent was observed to the following antibiotics: Ciprofloxacin (76.97%), Norfloxacin (73.44%), Levofloxacin (72.72%), Nitrofurantoin (64.22%) and Nalidixic acid (61.32%).

A highly level of resistance was detected to Lincomycin (100%), Clindamycin (100%), Ampicillin (97.74%),Amoxicillin (97, 18%), TMP/SMZ (79.19%), Cloxacillin (77.78%), Augmentin (77.12%), Gentamycin (71.85%), Cephalothin (71.43%), Erythromycin (71.42%) and Netilmicin with 66.67%.

Table 3: Antibiotic susceptibility patterns of Klebsiella species

Antibiotics	Isolates (N)	Sensitivity N (%)	Resistant N (%)	Intermediates N(%)
Chlomphenicol	158	66(41.77)	83(52.53)	9(5.7)
Tetracycline	73	29(39.73)	41(56.16)	3(95.89)
TMP/SMZ	173	36(20.81)	137(79.19)	0(0)
Amoxicillin	71	1(1.41)	69(97.18)	1(1.41)
Nitrofurantoin	218	140(64.22)	65(29.82)	13(5.96)
Nalidixic acid	202	124(61.39)	69(34.16)	9(4.45)
Amikacin	18	9(50)	5(27.78)	4(22.22)
Cloxacillin	9	2(22.22)	7(77.78)	0(0)
Gentamicin	135	29(21.48)	97(71.85)	9(6.67)
Cephalothin	56	12(21.43)	40(71.43)	4(7.14)
Ciprofloxacin	152	117(76.97)	27(17.76)	8(5.27)
Cefotaxime	143	70(48.95)	69(48.25)	4(2.8)
Augmentin	118	20(16.95)	91(77.12)	7(5.93)
Levofloxacin	44	32(72.72)	11(25)	1(2.28)
Ampicillin	133	2(1.50)	130(97.74)	1(0.76)
Penicillin	7	2(28.57)	3(42.86)	2(28.57)
Oxacillin	9	4(44.44)	3(33.33)	2(22.22)
Cefuroxime	19	10(52.63)	8(42.10)	1(5.27)
Norfloxacin	64	47(73.44)	15(23.44)	2(3.12)
Tobramycin	12	6(50)	6(50)	0(0)
Erythromycin	7	1(14.29)	5(71.42)	1(14.29)
Ceftazidime	77	48(62.34)	28(36.36)	1(1.3)
Ceftriaxone	59	29(49.15)	27(45.76)	3(5.09)
Lincomycin	5	0(0)	5(100)	0(0)
Streptomycin	2	1(50)	1(50)	0(0)
Rovamycin	2	1(50)	1(50)	0(0)
Clindamycin	1	0(0)	1(100)	0(0)
Vancomycin	5	2(40)	3(60)	0(0)

Netilmicin	3	0	2(66.67)	1(33.33)
Meropenem	22	22(100)	0(0)	0(0)

- Antibiotic susceptibility patterns of Streptococcus spp

Streptococcus species showed a high susceptibility to Amikacin with 100%. A good activity was observed also to Meropenem (90%), Bacitracin (84.61%), Lincomycin (84.61%), Augmentin (84.44%), Cefuroxime,(80%), Cefotaxime (80.96%), Penicillin (75.86%), Clarithromycin (75%), Ciprofloxacin (73.53%), Chloramphenicol (72%) and Nitrofurantoin (72.72%). Intermediate activity was observed to Ceftazidime, Levofloxacin and Ceftriaxone with 67.86%, 68.18% and 60% respectively.

High resistance were detected to Tetracycline (99.69%), TMP/SMZ (79.22%), Gentamicin (65.45%), Oxacillin (65.33%), Nalidixic acid (65%) and Cloxacillin (60%) (See Table 4).

Table 4: Antibiotic susceptibility patterns of Streptococcus

Antibiotics	Isolates (N)	Sensitivity N (%)	Resistant N (%)	Intermediates (%)
Chlomphenicol	100	72(72)	25(25)	3(3)
Tetracycline	29	9(0.31)	20(99.69)	0(0)
TMP/SMZ	77	15(19.48)	61(79.22)	1(1.3)
Amoxicillin	47	23(48.94)	22(46.81)	2(4.25)
Nitrofurantoin	11	8(72.72)	1(9.09)	2(18.19)
Nalidixic acid	20	6(30)	13(65)	1(5)
Vancomycin	24	12(50)	12(50)	0(0)
Gentamicin	55	16(29.1)	36(65.45)	3(5.45)
Cefotaxime	63	51(80.96)	6(9.52)	6(9.52)
Ciprofloxacin	68	50(73.53)	14(20.59)	4(5.88)
Penicillin	87	66(75.86)	18(20.69)	3(26.55)
Augmentin	45	38(84.44)	7(15.56)	0(0)
Ceftazidime	28	19(67.86)	6(21.43)	3(10.71)
Ampicillin	41	26(63.41)	12(29.27)	3(7.32)
Cloxacillin	10	4(40)	6(60)	0(0)
Oxacillin	75	24(32)	49(65.33)	2(2.67)
Erythromycin	82	42(51.22)	27(32.93)	13(15.85)
Ceftriaxone	15	9(60)	5(33.33)	1(6.67)
Lincomycin	54	45(83.33)	8(14.81)	1(1.86)
Bacitracin	13	11(84.61)	2(15.39)	0(0)
Norfloxacin	20	8(40)	10(50)	2(10)
Clindamycin	12	6(50)	6(50)	0(0)
Levofloxacin	22	15(68.18)	6(27.27)	1(4.55)
Cefuroxime	10	8(80)	2(20)	0(0)
Tobramycin	5	3(60)	2(40)	0(0)

Clarithromycin	4	3(75)	1(25)	0(0)
Meropenem	10	9(90)	1(10)	0(0)
Cephalothin	6	2(33.33)	2(33.33)	2(33.33)
Amikacin	1	1(100)	0(0)	0(0)
Netilmicin	4	2(50)	2(50)	0(0)

- Antibiotic susceptibility patterns of coagulase negative staphylococcus species.

Meropenem and Clindamycin were 100% active. Other antibiotics showed a good activity such as: Lincomycin (95.35%), Augmentin (81.82%), Cefuroxime (81.82%), Ciprofloxacin (80.30%), Cephalothin (76.47%), Cefotaxime (74.51%), Nitrofurantoin (73.68%), Cloxacillin (72.73%), and Chloramphenicol (71.43%). Intermediate activities of tested antibiotics was observed on Erythromycin, Levofloxacin, Bacitracin, Gentamycin and Clarithromycin with 68.18; 68; 66.67; 62.26 and 60% respectively. However, Tetracycline and TMP/SMP had a high resistance with 66.67% and 61.67% respectively (See Table 5).

Table 5: Antibiotic susceptibility patterns of Coagulase Negative Staphylococcus

Antibiotics	**Isolates (N)**	**Sensitivity N (%)**	**Resistant N (%)**	**Intermediates N (%)**
Chlomphenicol	70	50(71.43)	19(27.14)	1(1.43)
Tetracycline	27	9(33.33)	18(66.67)	0(0)
TMP/SMZ	60	21(31.82)	37(61.67)	2(6.51)
Amoxicillin	28	11(39.29)	15(53.57)	1(7.14)
Nitrofurantoin	19	14(73.68)	4(21)	1(5.32)
Nalidixic acid	17	8(47)	9(53)	0(0)
Amikacin	3	1(33.33)	1(33.33)	1(33.33)
Bacitracin	6	4(66.67)	2(33.33)	0(0)
Gentamicin	55	33(62.26)	16(29)	6(8.33)
Cephalothin	17	13(76.47)	4(23.53)	0(0)
Ciprofloxacin	66	53(80.30)	12(18.18)	1(1.52)
Cefotaxime	51	38(74.51)	9(17.65)	4(7.84)
Augmentin	44	36(81.82)	5(11.36)	3(6.82)
Meropenem	8	8(100)	0(0)	0(0)
Levofloxacin	25	17(68)	7(28)	1(4)
Ampicillin	37	14(37.84)	21(56.76)	2(5.4)
Penicillin	76	41(53.95)	33(43.42)	2(2.63)
Oxacillin	66	31(46.97)	34(51.51)	1(1.52)
Cefuroxime	11	9(81.82)	2(18.18)	0(0)
Norfloxacin	32	22(68.75)	10(31.25)	0(0)
Vancomycin	7	4(57.14)	3(42.86)	0(0)
Erythromycin	66	45(68.18)	19(28.79)	2(3.03)

Ceftazidime	25	14(56)	9(36)	2(8)
Ceftriaxone	25	12(48)	8(32)	5(20)
Lincomycin	43	41(95.35)	2(4.65)	0(0)
Clindamycin	14	14(100)	0(0)	0(0)
Cloxacillin	11	8(72.73)	3(27.27)	0(0)
Clarithromycin	5	3(60)	2(40)	0(0)

- **Antibiotic susceptibility patterns of *Neisseria gonorrheae***

The most active antibiotics were Cefuroxime (100%), Amikacin (100%), Kanamycin(100%), Bacitracin(100%), Ceftriaxone(96.43%), Cefotaxime(91.67%), Levofloxacin(86.36%), Chloramphenicol(83.67%), Meropenem(83.33%), Erythromycin (82.26%), Ceftazidime (81.82%), Augmentin (79.17%), Cephalothin (75%) and Ciprofloxacin (75.38%).

Furthermore, intermediate activities were observed on Lincomycin and Nitrofurantoin with 65.12 and 63.64% respectively. The high level of resistance were detected to TMP/SMZ (81.92%), Oxacillin (83.05%), Clindamycin (80%), Nalidixic acid (78.57%),Cloxacillin (71.43%) and Amoxicillin (73.08%) (See Table 6).

Table 6: Antibiotic susceptibility patterns of *Neisseria gonorrhea* species

Antibiotics	Isolates (N)	Sensitivity N (%)	Resistant N (%)	Intermediates N (%)
Chlomphenicol	49	41(83.67)	8(16.33)	0(0)
Tetracycline	41	15(36.58)	22(53.66)	4(9.76)
TMP/SMZ	72	9(12.5)	59(81.92)	4(5.58)
Amoxicillin	26	6(23.08)	19(73.08)	1(3.84)
Nitrofurantoin	11	7(63.64)	3(27.27)	1(9.09)
Nalidixic acid	14	3(21.43)	11(78.57)	0(0)
Vancomycin	10	5(50)	4(40)	1(10)
Gentamicin	40	18(45)	13(32.5)	9(22.5)
Cephalothin	4	3(75)	1(25)	0(0)
Ciprofloxacin	65	49(75.38)	13(20)	3(4.62)
Cefotaxime	48	44(91.67)	3(6.25)	1(2.08)
Augmentin	48	38(79.17)	6(12.5)	4(8.33)
Meropenem	12	10(83.33)	2(16.67)	0(0)
Ampicillin	34	12(35.29)	19(55.88)	3(8.83)
Penicillin	77	36(46.75)	38(49.35)	3(3.9)
Oxacillin	59	4(6.78)	49(83.05)	6(10.17)
Norfloxacin	34	20(58.82)	8(23.53)	6(17.65)
Cloxacillin	14	3(21.43)	10(71.43)	1(7.14)
Erythromycin	62	51(82.26)	7(11.29)	4(6.45)

Levofloxacin	22	19(86.36)	3(13.64)	0(0)
Ceftazidime	22	18(81.82)	4(18.18)	0(0)
Ceftriaxone	28	27(96.43)	1(3.57)	0(0)
Lincomycin	43	28(65.12)	10(23.26)	5(11.62)
Clindamycin	5	1(20)	4(80)	0(0)
Cefuroxime	7	7(100)	0(0)	0(0)
Bacitracin	2	2(100)	0(0)	0(0)
Amikacin	1	1(100)	0(0)	0(0)
Kanamycin	1	1(100)	0(0)	0(0)
Clarithromycin	9	6(66.67)	3(33.33)	0(0)
Tobramycin	8	5(62.5)	2(25)	1(12.5)
Netilmicin	2	1(50)	1(50)	0(0)

4. DISCUSSION AND CONCLUSION

The purpose of this study was to update on the evolution of drug resistance at CHUB on species isolated from urine from the 1st January 2011 to the 31ST December 2014. Among 1660 uropathogens isolated from patients with UTIs, the most predominant isolate was *E. coli* (56.08%) followed by *Klebsiella spp*. (12.83%). Deshpande et al. reported high incidence of 50.2% for *E. coli* followed by 24.6% for *Klebsiella spp* in hospitalized patients (6). *E. coli* was sensitive and effective to antibiotics like Carbapenem (Meropenem), Fluoroquinolone (Norfloxacin, levofloxacin and Ciprofloxacin), Cephalosporin (Ceftazidime, Cefuroxime, Ceftriaxone and Cefotaxime) and Netilmicin. Although the isolates of *E.coli* were susceptible to the above mentioned antibiotics, declined susceptibilities were detected among them: A retrospective study done in the same laboratory in Rwanda showed that Carbapenems (Meropenem) was 98.52 % active Vs 96.55% in this study, Nitrofurantoin was 78.44% active Vs 74.18% in this study, Ciprofloxacin 75.8% Vs 73.18%; Levofloxacin 94.28% Vs 78.92% and Cefotaxime 89.06% Vs 81.56% (5).

In addition in this study, a higher proportion of strains of *E.coli* were resistant to Ampicillin (92.41%), Amoxicillin (89.46%), TMP/SMZ (81.86%), Tetracycline (73.28%), Cephalothin (73%) and Clindamycin with 70.59%. Similar results were observed in Nigeria (7). The high resistance of the above antibiotics is due to the extensive use of these drugs in the country. Comparatively to our previous study in the same laboratory, *E.coli* inactivity increased to some antibiotics (Gentamycin was 43.4% resistant vs 63.07% in this study, Ciprofloxacin 23.63% Vs 26.11%, and Cefotaxime was 10.35% Vs 18.25% in this study) (5). Similar results were found in Central Africa Republic in 2009, where the resistance level increased for Gentamycin (9 to 33%), Ciprofloxacin(16 to 44%) and Cefotaxime(4 to 22%) (8).

Isolates of *Klebsiella species* were among the causative agent of UTI at high prevalence in this study after *E. coli*. The most effective were Bacitracin (100%), Meropenem (100%), Ciprofloxacin (76.97%), Norfloxacin (73.44%), Levofloxacin (72.72%), Nitrofurantoin (64.22%) and Nalidixic acid (61.32%). A high level of resistance was detected to Lincomycin (100%), Clindamycin (100%), Ampicillin (97.74%), Amoxicillin

(97.18%), TMP/SMZ (79.19%), Cloxacillin (77.78%), Augmentin (77.12%), Gentamycin (71.85%), Cephalothin (71.43%) and Erythromycin (71.42 %). There was no much difference with the previous study done in the same laboratory where Vancomycin (100%) of resistance, Lincomycin (71.43%), Amoxicillin (86.3%), Ampicillin (97.59%), Erythromycin (87.5%), TMP/SMZ (71.68%) and Cephalothin (78.05 %) (5).

Streptococci species were sensitive to Meropenem (90%), Bacitracin (84.61%), Lincomycin (84.61%), Augmentin (84.44%), Cefuroxime, (80%), Cefotaxime (80.96%), Penicillin (75.86%), Clarithromycin (75%), Ciprofloxacin (73.53%), Chloramphenicol (72%) and Nitrofurantoin (72.72%). High resistance rates were detected to Tetracycline (99.69%), TMP/SMZ (79.22%), Gentamicin (65.45%), Oxacillin (65.33%), Nalidixic acid (65%) and Cloxacillin with 60 %. Compared to the previous study there was no decrease of sensitivity on the different antibiotics tested (5).

Coagulase Negative staphylococci were effective to Meropenem (100%), Clindamycin (100%), Lincomycin (95.35%), Augmentin (81.82%), Cefuroxime (81.82%), Ciprofloxacin (80.30%), Cephalothin (76.47%), Cefotaxime (74.51%), Nitrofurantoin (73.68%), Cloxacillin (72.73%), and Chloramphenicol (71.43%). These results show no difference with the previous study done in the same laboratory (5).

The most effective antibiotics to *Neisseria gonorrhea* were Cefuroxime (100%), Amikacin (100%), Kanamycin (100%), Bacitracin (100%), Ceftriaxone (96.43%), Cefotaxime (91.67%), Levofloxacin (86.36%), Chloramphenicol (83.67%), Meropenem (83.33%), Erythromycin (82.26%), Ceftazidime (81.82%), Augmentin (79.17%), Cephalothin (75%) and Ciprofloxacin (75.38%). High resistance were observed to Oxacillin (83.05 %) TMP/SMZ (81.92%), Clindamycin (80 %), Nalidixic Acid (78.57 %) and Cloxacillin (71.43%).

As conclusion: We found that among the causatives agents of UTI, the predominant agent was *E. coli* (56. 08%) followed by *Klebsiella* species (12.83%), *Streptococcus* species (6.50%), *Coagulase negative staphylococcus* (5.96%) and *Neisseria gonorrhea* (5.66%). The following antibiotics presented a large spectrum of sensibility on UTIs such as Meropenem, Ciprofloxacin, Levofloxacin, Norfloxacin, Cefotaxime, Cefuroxime, Ceftriaxone and Ceftazidime and therefore should be used empirically in treatment of UTIs.

The following antibiotics have denoted high resistance: Amoxicillin, TMP-SMZ, Tetracycline and Nalidixic acid and consequently should no longer be considered as first-line treatment of uncomplicated UTIs at BUTH. Aminoglycosides groups including Gentamicin, Amikacin and Kanamycin are among the antibiotics used in the treatment of serious UTIs at CHUB. This study has shown that their activity on the isolates has been decreased exclude Amikacin.

Nitrofurantoin is one of the antibiotics which are effectives to some isolates like *E. coli* and *Staphylococcus spp* and it is recognized to be safe in pregnancy woman with UTIs. Previously it was used in empirical treatment of UTIs but as this study showed; its activity is decreasing among the isolates comparatively to the previous study done in the same laboratory. Therefore it should be used after the Antibiogram results are available.

Globally, based on the present findings, the increasing of bacterial resistance is still a big concern. This study proposes that the appropriate use of antimicrobial drugs by medical staff and increasing awareness among the population to the risks of inappropriate antimicrobial use are recommended to reduce the emergence and spread of bacterial resistance. There is need of the new generic antibiotics used for empirical treatment in Rwanda.

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