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Retrospective evaluation of Multiple Resistant Patterns of Urinary Tract Infections in Patients at KIU-TH and Ishaka Adventist Hospital

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ABSTRACT

Urinary tract infections (UTI) remain a global health dilemma and it accounts for the majority of reasons for hospital visiting globally. Sound knowledge of factors associated with UTI may allow timely intervention that can easily bring the disease under control. The aim of this study was to evaluate the common urinary tract infection causing pathogens isolated among UTI patients with the common prescribed antibiotics and to establish multiple antibiotic resistance patterns to commonly prescribed antibiotics among patients with urinary tract infections attending KIU-TH and Ishaka Adventist Hospital during period from August 2018 to July 2019 in Bushenyi district of Uganda. In this cross-sectional study, 106 (54 females and 52 males) UTI patients were obtained from KIU-TH while 108 (68 females and 40 males) UTI patients were obtained from Ishaka Adventist hospital using microbiological laboratory results and medical records. Data generated were tested for statistical significance and scientific relevance. In KIU-TH, *Escherichia coli* was the most common isolated bacterial pathogen with 46/106 (43.4%) followed by *Staphylococcus aureus* 34/106 (32.1%). *Klebsiella pneumoniae* 20/86 (18.9%), *Pseudomonas* species 4/106 (3.8%), *Proteus* species 1/106 (0.9%) and *Coccobacilli* species 1/106 (0.9%). In Ishaka Adventist Hospital, *Escherichia coli* was also mostly isolated with 51/108(47.2) followed by *Staphylococcus aureus* 27/108 (25.0%). Proteus species 12/108 (11.1%), Pseudomonas species 11/108(10.2), *Klebsiella pneumoniae* 7/108(6.5%). This study revealed that Azithromycin was the most prescribed antibiotic in Ishaka Adventist with 18.3% while Ciprofloxacin was the most prescribed antibiotic with 19.4% in KIU-TH. *E. coli* species showed 5.8% resistance to Azithromycin while other pathogens did not show any resistance to it in Ishaka Adventist Hospital. E. coli had 33.3% resistance to Ciprofloxacin followed by *S.aureus* with 23.5%, Klebsiella species 20.0%, Proteus species 100% while Pseudomonas species and Coccobacilli species showed no resistance in KIU-TH. This study also demonstrated that in KIU-TH the age <30 had statistically significant relationships ($p<0.05$) with UTI Bacteria while marital status, occupation, gender and religion were not statistically significant ($P>0.05$). In Ishaka Adventist Hospital, no socio-demographic factor was statistically significant ($P>0.05$). In conclusion, Age≥30 significantly ($p<0.05$) influenced UTI distribution in KIU-TH. Resistance to Azithromycin and Ciprofloxacin may affect their use in UTI management. Antibacterial misuse is highly discouraged.

Keywords: Urinary Tract Infections, Prescribed antibiotics, Escherichia coli, Staphylococcus aureus, infections.

INTRODUCTION

Urinary tract infections (UTIs) are commonly encountered diseases in developing countries with an estimated annual global incidence of at least 250 million, responsible for the emergence and spread of multi-drug resistant [1]. Antibiotic resistance in key pathogens is now widespread in most parts of the world being recognized as a global health threat [2]. Antibiotic resistance is a natural phenomenon but currently represents a very serious problem and a significant threat because of the widely spread resistant bacteria in healthcare settings and infections caused by these microbes, its antibiotic resistance has probably developed as a mechanism of self-protection of antibiotic-producing microbes to avoid self-destruction during the production of agents with

antimicrobial activity [3]. Resistance of microorganisms to antibiotics is now a global concern and variations in resistance pattern of different antibiotics are known to occur in different geographical area as well as in the same country [4][5][6][7]. Antibiotic resistance in key pathogens is now widespread in most parts of the world being recognized as a global health threat [2]. An alarming occurrence of resistant patterns is evident throughout the European countries. Examples of such resistance phenotypes are strains of Klebsiella pneumoniae and Escherichia coli resistant to 3rd generation Cephalosporins in the Czech Republic, 13.1% for E. coli and 52% for K. pneumoniae through the production of broad-spectrum beta-lactamases or quinolones 47.7% and 20.8%, respectively [3][8][9][10]. There are various causes of increasing antibiotic resistance among bacteria such as indiscriminate use of antibiotics, inappropriate dosing, and incomplete treatment in both humans hence bacterial infections are now becoming quite common, not only in hospital settings but also in the community [5]. Because of uncontrolled and widespread use of antibiotics, the resistance pattern of microorganisms is changing drastically, especially in developing countries [4]. Antibiotic resistance of urinary Eserichchia coli isolates from patients with upper Urinary Tract Infections (UTIs) to Fluoroquinolones and third-generation Cephalosporins is a pressing problem in the Asia Pacific region in the Study for Monitoring Antimicrobial Resistance Trends (SMART) [2][11][12][13][14]. Escherichia coli is the most common bacteria accountable for UTI and assumes for 85-90% of cases [6][7][15][16][17]. From these review above it was observed that there are some other problems associated with empirical treatment with broad spectrum antibiotics worldwide such as (1) lack of data on antibiotic resistance prevalence to inform empirical treatment choice in many regions, because of limited surveillance capacity. (2) lack of comprehensive documentations on the antibiotic resistance among patients with urinary tract infections attending KIU-TH and Ishaka Adventist Hospital and yet according to the preliminary information from the laboratory department there is antibiotic resistance from different UTI causing pathogens to more than two antibiotics.

This research work will significantly be helpful to compel rational antibiotic use for urinary tract infections as well as provoke further investigations. The information that will be obtained during this research will encourage other units to examine their data and develop local recommendation for empiric treatment of urinary tract infections in both outpatients and inpatients since in some hospital settings laboratory services are very expensive and cannot be assessed by low-income earners.

The main Objectives of this research are to (1) Evaluate the common urinary tract infection causing pathogens isolated among UTI patients during the period of August 2018 to July 2019 in KIU-TH and Ishaka Adventist Hospital. (2) Evaluate the common prescribed antibiotics among patients with urinary tract infections in KIU-TH and Ishaka Adventist Hospital during the period of August 2018 to July 2019. (3) Establish multiple antibiotic resistance patterns to commonly prescribed antibiotics among patients with urinary tract infections attending KIU-TH and Ishaka Adventist Hospital during period from August 2018 to July 2019.

RESEARCH MATERIALS AND METHODS

A research questionnaire will be developed and used as a data-collection tool for this research. The research questionnaire will be organized and tabulated and issued to the targeted patient niche to respond to it. The questionnaire item questions are:

(1) What are the common urinary tract infections causing pathogens isolated during the period of August 2018 to July 2019 attending KIU-TH and Ishaka Adventist Hospital?

(2) Were there common prescribed drugs among patients with UTIs attending KIU-TH and Ishaka Adventist Hospital during the period of August 2018 to July 2019?

(3) Are there antibiotic resistance patterns to commonly prescribed antibiotics among

patients with UTIs attending KIU-TH and Ishaka Adventist Hospital during the period of August 2018 to July 2019?

Area of Study

This study was conducted in Ishaka Bushenyi District. Geographically, Bushenyi District is located in the Western Region of Uganda. The district is composed of 9 sub counties, 3 divisions, 76 parishes, and 529 villages. According to the 2014 Uganda National Population Census, the population of Bushenyi district is 23,562. The population is served majorly by two hospitals: Kampala International University-Teaching Hospital (KIU-TH) which serves as a referral hospital in the district and Ishaka Adventist Hospital. These hospitals were chosen as the study sites because they are major health care providers for both outpatients and inpatients in the district. They handle conditions of adult males and females as well as children. However, Ishaka Adventist Hospital is preliminary cheaper than KIU-TH in terms of services provided hence more low-income earners attended to it.

Study Design

It was a retrospective cross-sectional survey conducted using microbiology laboratory records of culture and sensitivity as well as medical records from August 2018 to July 2019. Both out and inpatients having UTIs diagnosis with culture and sensitivity results were included in the study. Only patients having UTI, living in Bushenyi district and attending treatment at Kampala International University-Teaching Hospital (KIU-TH) and Ishaka Adventist Hospital were considered. Any patient who did not show any growth on culture was excluded from the study. Data including age, gender, region, marital status, serial numbers, occupation, antibiotic prescribed, micro-organism isolated, culture and sensitivity results were collected from the records.

Sample Size Determination

The sample size of 106 from each hospital was arrived by use of the survey formula by Kish Leslie method P (1-P)/e where z -Z score for 95% confidence interval = 1.96, p-prevalence, and e- acceptable error (5%).

Sampling Technique

A consecutive enrollment of microbiology laboratory records of all patients diagnosed with urinary tract infections during the period of August 2018 to July 2019 was done.

Data Collection

Data collection involved retrieved data from two sites. First were microbiology laboratory records for common UTI isolated causing pathogens and antibiotic resistance from culture sensitivity records. Secondly was medical records department for patient files who had a positive urine culture, in order to check for the common antibiotics that were prescribed for them.

Tools Used in Data Collection

For laboratory department, a data collection tool was used and it included the following. Patient code number, gender, age, type of sample analyzed, name of pathogen isolated, and name of antibiotics where pathogens were sensitive and resistant as recorded in the microbiology laboratory culture sensitivity reports. For medical records department, a data collection tool was also used and it included the following. Patient code numbers, gender, age (adults and children), occupation, marital status, religion as well as diagnosis and antibiotics that were prescribed. Only patients who had a UTI diagnosis with a positive urine culture were considered.

Selection of Criteria

Inclusive criteria

Only patients with UTI diagnosis were considered during the period of August 2018 to July 2019
in the microbiology laboratory records. Both inpatients and out-patients were considered.

A micro-organism was considered to be resistant if found to be resistant to at least two antibiotics of different classes. Both inpatients and outpatients shall be considered.

Exclusive criteria

Patients without urinary tract infection diagnosis were not being chosen. Patients with UTI diagnosis but with negative urine culture being recorded were not considered.

Data Analysis

- Descriptive statistics (monovarietal analysis) was be done. For this study we used mode.
- Descriptive statistics (monovarietal analysis) was done. For this study we used mode.
- Names of pathogens resistant to at least two antibiotics were indicated. Bivariate analysis, association between demographic data and resistance patterns.

Ethical Approval

The ethical approval of the study was sought from Dean of Pharmacy, Executive director of KIU-TH, District Health Officer of Bushenyi district, permission from the head of department of microbiology laboratory and permission from head of department of the medical records.

RESULTS

Table. 1: Prevalence of bacteria pathogen isolates from KIU-TH among 106 patients. Common UTI causing pathogens Isolated at KIU- TH (106 patients).

Pathogens	Male, n (%)	Female, n (%)	Total, n (%)
E. coli	17(32.7)	29(53.7)	46(43.4)
S. aurous	20(38.5)	14(25.9)	34(32.1)
Proteus species	0(0.0)	1(1.8)	1(0.9)
Pseudomonas	1(1.9)	3(5.6)	4(3.8)
species	13(25)	7(13)	20(18.9)
K. pneumonia	1(1.9)	0(0.0)	1(0.9)
Coccobacilli	52(100)	54(100)	106(100)
Total			

Table. 2: Common UTI causing pathogens isolated at Ishaka Adventist hospital (108 patients).

Pathogens	Male, n (%)	Female, n (%)	Total, n (%)
E. coli	37(55.2)	14(34.1)	51(47.2)
S. aurous	16(23.9)	11(26.8)	27(25)
Proteus species	7(10.4)	5(12.2)	12(11.1)
K. pneumonia	4(6)	3(7.3)	7(6.5)
Pseudomonas	3(4.5)	8(19.5)	11(10.2)
species	67(100)	41(100)	108(100)
Total			

Table. 3: Prescribing frequency (%) of antibiotics against in the pathogens during the period of August 2018 to July 2019. Commonly prescribed Antibiotics among UTI patients at Ishaka Adventists Hospital.

ANTIBIOTICS	PRESCRIBIMG FREQUENCY (%)
Azithromycin	26(18.3)
Cefixime	24(16.9)
Nitrofurantoin	22(15.5)
Ciprofloxacin	20(14.1)
Doxycycline	13(9.2)
Ceftriaxone	10(7.0)
Levofloxacin	7(5.0)
Gentamicin	4(2.8)
Erythromycin	5(3.5)
Ampiclox	4(2.8)
Cephalexin	4(2.8)
Amoxicillin	3(2.1)
Total	**142(100)**

Table. 4: Common prescribed antibiotics among UTI patients at KIU-TH.

ANTIBIOTICS	PRESCRIBIMG FREQUENCY (%)
Ciprofloxacin	24(19.4)
Cefixime	21(16.9)
Nitrofurantoin	19(15.3)
Azithromycin	15(12.1)
Levofloxacin	14(11.3)
Ceftriaxone	7(5.6)
Amoxicillin	7(5.6)
Ampiclox	5(4.0)
Gentamicin	5(4.0)
Erythromycin	4(3.2)
Ampicillin	2(1.6)
Cephalexin	1(0.8)
Total	**124**

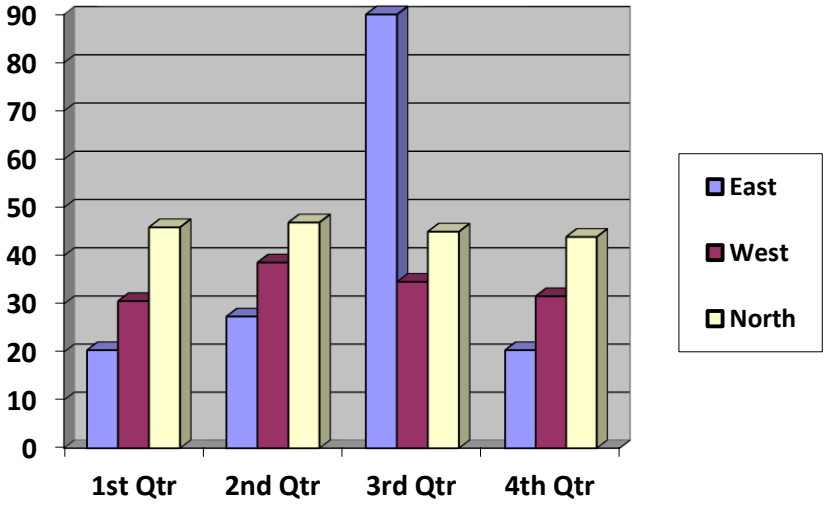

Figure. 1: Multiple antibiotic resistance paterns of pathogens to common prescribed antibiotics in KIU-TH during the period from August 2018 to July 2019.

Table. 5: Resistance to commonly prescribed antibiotics at KIU-TH.

Pathogen	CFX (%)	GTM (%)	ERM (%)	LVX (%)	NTF (%)	CTFX (%)	AMX (%)	CPX (%)
E. coli (n=46)	18(39.1)	21(46.6)	4(15.5)	7(8.8)	0(0.0)	19(42.2)	10(22.2)	15(33.3)
S. aureus (n=34)	10(29.4)	16(47.0)	0(0.0)	5(14.7)	2 (5.9)	4(11.8)	4(11.8)	8 (23.5)
Klebsiella pneumoniae (n=20)	4(20)	5(25)	3(15)	1(5)	0(0.0)	9(45)	1(5)	4(20.0)
Pseudomonas ssp (n=4)	1(25)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(50)	0(0.0)	0(0.0)
Proteus spp (n=1)	1(100)	1(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(100)
Coccobacilli (n=1)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(100)	0(0.0)	0(0.0)

Footnote: CFX= cefixime, GTM= Gentamicin, ERM= Erythromycin, NTF= Nitrofurantoin, CTFX=Ceftriaxone, AMX= Amoxicillin, CPX= Ciprofloxacin.

Table. 6: Resistance to commonly prescribed antibiotics at Ishaka Adventists hospital.

Pathogen	CFX (%)	GTM (%)	ERM (%)	LVX (%)	NTF (%)	CTFX (%)	AMX (%)	CPX (%)	AZT (%)
E. coli (51)	18(35.3)	21(41.2)	13(25.5)	19(37.2)	2(3.9)	17(33.3)	5(9.8)	20(39.2)	3(5.8)
S. aureus (34)	9(57.1)	12(35.3)	6(17.6)	9(26.47)	2(5.88)	11(27.5)	5(14.7)	12(35.7)	0(0.0)
Klebsiella pneumoniae (n=7)	4(57.1)	1(1.42)	2(28.5)	3(42.8)	0(0.0)	0(0.0)	0(0.0)	0(0.05)	0(0.0)
Pseudomonas ssp (n=11)	6(54.5)	5(45.5)	4(36.6)	4(36.6)	0(0.0)	5(45.5)	3(27.3)	6(54.4)	0(0.0)
Proteus spp (n=12)	4(33.3)	8(66.7)	4(25.0)	4(25.0)	0(0.0)	5(41.7)	3(25.0)	6(50)	0(0.0)

Footnote: CFX= cefixime, GTM= Gentamicin, ERM= Erythromycin, NTF= Nitrofurantoin, CTFX=Ceftriaxone, AMX= Amoxicillin, CPX= Ciprofloxacin, AZT= azithromycin.

Table. 7: Association between socio- demographic factors and multiple drug resistance present versus multiple drug resistance absent in the study population of KIU-TH (n=106).

Variable	Multiple drug Resistance (MDR)		X^2	df	P value
	Yes (%) (n=25)	No (%) (n=81)			
Marital status					
Married	12 (48.0)	38(46.9)			
Not married	13(52.0)	43(53.1)	0.0003	1	0.986662
Occupation					
Peasant	10(40.0)	22(27.2)	0.2747	2	0.8716
Self employed	1(4.0)	11(13.6)			
Business	5(20.0)	17(21.0)			
Student	2(8.0)	13(16.0)			
Civil servant	7(28.0)	18(22.2)			
Age					
≤30	14(56.0)	51(63.0)			
≥30	11(44.0)	30(37.0)	5.18	1	0.022889
Gender					
Male	12(48.0)	40(49.4)			
Female	13(52.0)	41(50.6)	0.0123	1	0.911513
Religion					
Protestant	8(30.8)	27(33.3)			
Catholic	7(26.9)	25(30.9)	0.41	2	0.815033
Others	10(40.0)	29(38.8)			

Others*Adventist 5(MDRP) and 17(MDRA) Pentecostal 2(MDRP) and 3(MDRA), moslem 3 (MDRP) and 9(MDRA). Percentages given are for the column totals.

Table. 8: Association between socio- demographic factors and multiple drug resistance present versus multiple drug resistance absent in the study population of Ishaka Adventist hospital(n=108).

Variable	Multiple drug Resistance (MDR)		X^2	df	P value
	Yes (%) (n=56)	No (%) (n=52)			
Marital status					
Married	32(57.1)	20(38.5)			
Not married	24(42.9)	32(61.5)	3.81	1	0.050981
Occupation					
Peasant	19(33.9)	12(23.1)	8.141	4	0.0865
Self employed	8(14.3)	11(21.2)			
Business	11(19.6)	13(25.0)			
Student	10(17.9)	6(11.5)			
Civil servant	8(14.3)	10(19.2)			
Age					
≤30	29(51.8)	25(48.1)			
≥30	27(48.2)	27(51.9)	0.16	1	0.691959
Gender					
Male	22(39.3)	18(34.6)			
Female	34(60.7)	34(65.4)	0.25	1	0.61749
Religion					
Protestant	12(21.4)	9(17.6)			
Catholic	18(32.7)	15(29.4)	2.51	3	0.474153
Others	26(46.4)	28(53.8)			

Others* Pentecost 4(MARP) and 5(MARA), Adventist8(MARP) and 13 (MARP)and Muslim (MARP) 14 and 10(MARA). Percentages given for the column totals.

DICUSSION

The study concerning the assessment of multiple resistance patterns of urinary tract pathogens among patients has been carried out successfully in KJU-TH and Ishaka Adventist hospital in period of August 2018 to July 2019. The discussion in this study is as follows and the pattern is objective by objective. The first objective was to evaluate the common urinary tract infection causing pathogens located during the period of August 2018 to July 2019 in KIU-TH and Ishaka Adventist Hospital a retrospective study was done. These included Escherichia coli, Staphylococcus aureus, Proteus species, Pseudomonas species, klebsiella pneumonia, Coccobacilli species in KIU-TH while Escherichia coli, Staphylococcus aureus Protea's species. Klebsiella pneumoniae and Pseudomonas species in Ishaka Adventist Hospital. Escherichia coli was the most prevalent bacterial pathogen with 46/106 (43.4%) in KIU-TH followed by Staphylococcus are 34106 (321) Klebsiella pneumonia 20/106 (18.9), Pseudomonas species 4/106 (38), Proteus species 1/106 (39%) and Coccobacilli species 1/106 (0.9%). On the other hand, Ishaka Adventist Hospital also had Escherichia coli as the most prevalent with 51/108 (472) followed by Staphylococcus aureus 27/108 (25.0%). Proses species 12/108 (11.1%), Pseudomonas species 11/10 (10.2%) and Klebsiella species 7/108 (6.5%). Our study demonstrated a high prevalence of E. coli in the females with 29/106 (53.7%) in KIU-TH and 37/108 (55.2%) in Ishaka Adventist Hospital due to the close proximity of the anus to the vagina. The possibility of the UTI in females may be due to the ability of E. coli to adhere to the urinary tract and colonies it. This was comparable with the previous study done in Bushenyi district Uganda indicating 36 86 (41.9%) isolation

of Ecole among UTI patients. Escherichia coli and S. aureus were the major causes of both among patients attending hospitals in Bushenyi District, Uganda. The prevalence of 27/66 (40.9%) of E. coli in female gender under this study [8][18][19][20][21][22][23]24][25][26]. The high prevalence of E. coli was the same because female gender which is at a high risk of UTI was involved and also because of the association of E. coli with other microorganisms moving from the perineum areas contaminated with fecal microbes to the moist warmth environment of the female genitalia. The policy implication of this finding is that laboratories in both hospitals should be advised to begin indicating the microorganism being isolated, the antibiotics each patient is resistant and sensitive to on the laboratory results of the patient so that the prescribers are informed before prescribing. This also helps in early identification of patients at high-risk of infection thus optimizing initial antibiotic treatment strategies for severe. In addition, the microbiology laboratory should be advised to identify each species of the microorganism being isolated for easy identification. The second objective of this study focused on the common prescribed antibiotics among patients with urinary tract infections who attended KIU-TH and Ishaka Adventist Hospital during the period of August 2018 to July 2019. Antibiotics prescribed included the following as shown in Table 3 and 4. Cefixime, Gentamicin, Ceftriaxone, Azithromycin,Erythromycin,Ciprofloxacin, Nitrofurantoin, Doxycycline, Ampiclox, Levofloxacin, Cephalexin, Ampicillin and Amoxicillin were prescribed in Ishaka Adventist hospital in table 3 while KIU-TH prescribedCiprofloxacin,Levofloxacin,Nitrofurantoin, Ampiclox, Cephalexin, Amoxicillin, Azithromycin, Erythromycin, Gentamicin, Cefixime, Ampicillin and Ceftriaxone in table 4. Azithromycin was the most prevalent prescribed antibiotic among UTI patients in Ishaka Adventist Hospital with 18.3% followed by Cefixime 16.9%, Nitrofurantoin 15.5%, Ciprofloxacin 14.1%, Doxycycline 9.2%, Ceftriaxone 7.0%, Levofloxacin 5.0%, Gentamicin 2.8%, Erythromycin 3.5%, Ampiclox 2.8%, Cephalexin 2.8% and Amoxicillin 2.1%. KIU-TH had Ciprofloxacin as the most prescribed antibiotic among the UTI patients with 19.4% followed by Cefixime 16.9%, Nitrofurantoin 15.3%, Azithromycin Levofloxacin 11.3%, Ceftriaxone 5.6%, Amoxicillin 5.6%, Gentamicin 4.0%, Ampiclox 4.0%, Erythromycin 3.2%, Ampicillin 1.6% and Cephalexin 0.8% being prescribed among UTI patients during period of August 2018 to July 2019. This study noticed that some of these antibiotics were prescribed irrationally not in agreement with the laboratory results since they were not consulting the laboratory findings. This is because in most cases the patient was resistant to one or more antibiotics but the prescribers went ahead to prescribe those same antibiotics the patient was resistant to. It was also because some antibiotics were relatively expensive compared to others, therefore were prescribed for profit benefit. For example; on average the price of azithromycin is within the range of 4000-20000 shillings depending on the brands. In a similar study done in Bushenyi District Uganda, it that the indiscriminate use of antibiotics due to lack of prescription policies in an effort to treat symptomatic/asymptomatic UTI may explain the observed bacteria resistance to these antibiotics such as Ciprofloxacin, Nitrofurantoin, Ampicillin and Ceftriaxone [8][20][21][9]. This study done was similar because the recommended treatment among UTI patients is antibiotics according to the Uganda Clinical Guidelines. Therefore, similar antibiotics were being prescribed. The policy implication of this finding is that the hospital administration should strengthen the supervision of ensuring that laboratory results together with Uganda Clinical Guidelines are used to ensure rational prescribing of these antibiotics. The benefit of this is a reduction in antibiotic resistance, economic use of antibiotics and good recovery thus reducing morbidity. The hospital pharmacist of both hospitals should check prescriptions being prescribed with the laboratory results on a regular basis for irrational prescribing. The

third objective in this study focused on the multiple antibiotic resistance patterns to commonly prescribed antibiotics among patients with UTIs in KIU-TH and Ishaka Adventist Hospital during August 2018 to July 2019. The resistance patterns of UTI pathogens to Ciprofloxacinin KIU-TH included: Proteus species with a resistance pattern of 100% followed by 33.3% E. coli, 23.5% S. aureus, 20.0% Klebsiella species, 0.0% by Pseudomonas species and Coccobacilli species. The resistance patterns of UTI pathogens to Azithromycin in Ishaka Adventist Hospital included; E. coli with a resistance of 5.8% while other pathogens did not have any resistance. The resistance of Klebsiella species to selected antibiotics included: 100% to Erythromycin; 71.4% to Cotrimoxazole and 92.9% to Ampicillin respectively. Staphylococcus resistance to the penicillins and the cephalosporin (77.8% resistance to Ampicillin, 60% to Ceftazidime and 55% to Ceftriaxone). Resistance to the penicillin is a consequence of beta lactamase production and is common in developing country settings where uptake of hospital services is low and tendency for self-medication is high leading to antibiotic abuse [8]. Policy implication is that a guide should be developed in hospitals showing the resistance patterns of the different pathogens to antibiotics to assist prescribers during prescribing. The multiple antibiotic resistance pattern associations with socio-demographic factors were done in table 8 and there was no significant association between resistance patterns and age, marital status, religion as well as occupation ($P>0.05$) in Ishaka Adventist Hospital while multiple drug resistance patterns associations with socio-demographic factors had no significant associations ($P>0.05$) with occupation, marital status, gender and religion KIU-TH. However, age in KIU-TH had a significant association ($P<0.05$) among patients of 30 years of age with 28 (50.9%) for females and 27 (49.19%) for males while 230 years of age with 24 (47.1%) for females and 27 (52.9%) for males in table 7. The highest prevalence was in females of 30 years of age because the anatomy of the female Genito-urinary system remains outstanding among factors which predispose them to UTI especially in this setting with limited resources, poor hygiene, irrational prescribing, no compliance, self-medication and low socio-economic status. This also explains why females are more prone to UTI than their male counterpart. It is also due to irrational prescribing of the antibiotics which are not in agreement with the laboratory results as well as the Uganda Clinical guidelines which recommend Nitrofurantoin, Cefixime, Ciprofloxacin and Gentamicin as first line drugs for UTI patients hence contributing to the multiple antibiotic resistance patterns. Multiple resistance patterns of resistance to pathogens remain relatively similar irrespective of the locality. Prominent factor is antibiotic abuse due to lack of effective and implementable policies, enabling sick people to purchase small amounts of antibiotics from drug shops manned by unqualified health workers. This may give room for emergence of resistance strains due to low dose misuse of such antibiotics and poor adherence occasioned by the tendencies of the patients to back out from completing the dose when they get a little relief from the symptoms of the infection [9]. This study was similar because of the increased irrational prescribing combined with lack of communication between the prescribers and the laboratory results. This is also combined with self-medication since some unqualified health workers prescribe expensive drugs that are not affordable by the patients and they resort to purchasing cheaper small amounts of drugs hence contributing to multiple resistance. The policy implication of this study is that the health care providers should follow up the patients to ensure drug compliance and also advise them on benefits of it. To prevent the spread of multidrug-resistant microorganisms in UTI, medical institutions should make efforts to develop administrative and educational programs to provide appropriate guidelines for the prescription of antibiotics.

CONCLUSION

In this study, the common isolated pathogen among UTI pathogens was E. coli and S. aureus in both KIU-TH and Ishaka Adventist Hospital. The common prescribed antibiotic in KIU-TH was Ciprofloxacin 19.4% with a resistance of 100% by Proteus species followed by 33.3% E. coli, 23.5% S. aureus, 20.0% Klebsiella pneumoniae. Azithromycin 18.3% was most prescribed in Ishaka Adventist Hospital with a resistance of 5.8% by only E. coli. There was no significant association (P>0.05) between the multiple resistance patterns and socio-demographic factors such as gender, age, marital status, occupation and religion in Ishaka Adventist Hospital while KIU-TH only age <30 years had a significant association (P<0.05).

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