

## Research Articles

Journal of Pharmaceutical Research Vol. 13, No. 2, April - June 2014 : 34-39

# ANTIBIOTIC PRESCRIPTION PROFILES IN SOME HEALTH INSTITUTIONS IN KEBBI STATE, NIGERIA

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Received on: 07.04.2014

Revised: 29.04.2014

Accepted: 03.05.2014

## ABSTRACT

The study was undertaken to evaluate antibiotic prescription pattern and usage in some health institutions in Kebbi State. This retrospective analysis of antibiotic prescription was carried out by assessing patients' medical records in five general hospitals and a private hospital located in different regions in the state. Records such as age of patients, diagnosis, types of antibiotics prescribed & duration and type of test performed before antibiotics were prescribed were collated and analyzed. The result showed that 46.10% of the patients who visited those hospitals were prescribed antibiotics. Predominantly higher proportion of adults was prescribed antibiotics than children and more males were prescribed antibiotics than females. Culture and sensitivity tests were hardly performed in the hospitals. The predominant infection requiring antibiotic prescription was gastrointestinal in nature accounting for over 25% of infections in which antibiotics were prescribed. Regrettably however, majority of prescriptions containing antibiotics did not show any specific diagnosis rather only symptoms were recorded. The vastly employed antimicrobial agents across the six health institutions were  $\beta$ -lactams and metronidazole; and about half of the total number of cases did not show a treatment regimen of up to five days. However, combination therapy is very common with an average overall percentage of 62.89%.

**Keywords:** *Infection; antibiotic; prescription; culture & sensitivity test; combination therapy.*

## INTRODUCTION

An antibiotic is an agent that either kills or inhibits the growth of a microorganism.<sup>1,2</sup> The term *antibiotic* was first used in 1942 by Selman Waksman and his collaborators in journal articles to describe any substance produced by a microorganism that is antagonistic to the growth of other microorganisms in high dilution.<sup>3</sup> This definition excluded substances that kill bacteria but that are not produced by microorganisms (such as gastric juices and hydrogen peroxide). It also excluded synthetic antibacterial compounds such as the sulfonamides. Many antibacterial compounds are relatively small molecules with a molecular weight of less than 2000 atomic mass units.

Antibiotics have a policy which refers to the set of principles to which the use of antibiotics is based.<sup>4</sup> The principal reason for adoption of an antibiotic policy is due to the development of resistance by microorganisms and this arise due to: ubiquity of microbes, use of antibiotics in trivial practices like animal husbandry, inappropriate prescriptions, non-compliance on the side of the patient and R-plasmid which is the genetic basis of resistance.<sup>5,6</sup>

The aim of this research was to find out whether in the event of prescribing and using antibiotics in the sampled health institutions adherence to standard ethics is

followed. This included the use of indicators such as laboratory tests carried out to determine sensitivity of causative organism to the selected antibiotics, and use of the right drug(s) with respect to knowledge of culture & sensitivity test (CST) result obtained. Moreover, use of antibiotics for the right duration and combination therapy for synergism and effective treatment was also evaluated.

In pursuance of this aim, hospitals with the most patronage, qualified personnel, and in possession of modern equipment were selected for data collation. Patient medical records for the year 2007-2009 in the selected hospitals were assessed on parameters such as date of prescription, age, gender of the patient, diagnosis, treatment and its duration as well as further follow up to the hospital was collected and analyzed.

Antibiotic prescription studies, earlier carried out in about ten states across Nigeria showed that there is gross inappropriate use of antibiotics in treating various types of human infection.<sup>7</sup> However, the results of these previous studies cannot be said to represent the entire nation or extrapolated to places where this kind of research was not conducted. No data on the situation in Kebbi State, located in the North-Western region of Nigeria exist therefore; the situation in Kebbi State was unknown.

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### MATERIALS AND METHODS

The choice of hospitals for conducting this research was based on the following parameters:

1. Most patronage by citizens of Kebbi State in the chosen region
2. Hierarchical nature of the hospital
3. Availability of modern/laboratory equipment
4. Availability of skilled personnel
5. Location of the hospitals

Eventual selection was made following consultation with the Directors of Pharmaceutical, Medical and Nursing Services in the State Ministry of Health. By virtue of the requirements mentioned above, the following hospitals were chosen.

1. Sir Yahaya Memorial Hospital, Birnin Kebbi: This facility is the state's-only specialist hospital; it has a bed size of 100, 21 medical doctors, and 1 pharmacist and is equipped with a functional microbiology laboratory.
2. General Hospital Zauro: There is availability of state of the art laboratory equipment for diagnosis, total of 50 beds, 2 medical doctors, no pharmacist and no trained laboratory scientist to man the laboratory.
3. General Hospital Argungu: Is the only secondary health institution in the entire length & breath of this community. It has 50 beds for in-patients, functional microbiology laboratory, 4 medical doctors and 1 pharmacist.
4. General Hospital Jega: This hospital has a partially functional microbiology laboratory, 50 beds and 3 medical doctors.
5. General Hospital Aliero: Like the secondary health facilities in other regions, it has a bed size of 50, and has 2 medical doctors with a partially functional microbiology laboratory.
6. Godiya Hospital, Birnin Kebbi: This is a private hospital. It has 2 medical doctors. There is no functional laboratory in this hospital.

Having selected the hospitals, medical records of each hospital were accessed for analysis. Records analyzed ranged from year 2007-2009. Medical records were in all except one instance well-kept and this facilitated examination of patient medical files. Selection of all files for a particular year was done at random and all records of antibiotics use in treatment of infections were collected.

The data collected was entered in a pre-planned data sheet as shown below.

NAME OF HOSPITAL: \_\_\_\_\_  
YEARS COVERED: \_\_\_\_\_

STATUS: \_\_\_\_\_

S/N	DATE	GENDER	AGE	CST	1 <sup>st</sup> DIAGNOSIS	TREATMENT	DURATION OF THERAPY	DATE	CST	2 <sup>nd</sup> DIAGNOSIS	TREATMENT	DURATION OF THERAPY

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All the information collected from the various health institutions was entered into Microsoft Office Excel; data for each hospital was entered separately in each sheet. Different statistical formulae of the software such as 'COUNTIF' were employed in the analysis of data and presented as percentages and averages.

### RESULTS

#### Prevalence of microbial infection

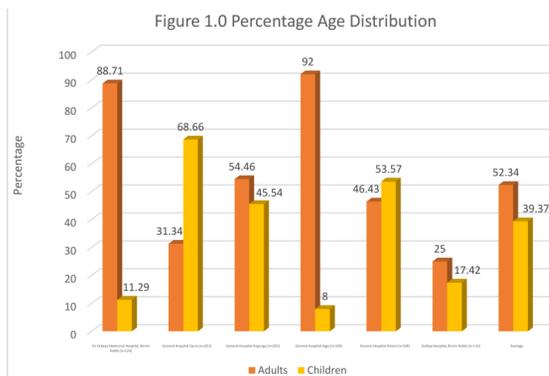
Table 1 gives a general overview of the number of health facilities visited, medical records analyzed and the frequency of microbial infections. A total of 2008 files were analyzed in this research, 927 were found to contain prescriptions for antibiotics. However, of the 988 files available in Godiya hospital, more than 500 were without any medical records in them while only 132 of them contained prescriptions with antibiotics. This proportion is very low compared to the figures of other hospitals.

Table 1: Frequency of Microbial Infections

S/N	NAME OF HOSPITAL	NO. OF MEDICAL RECORDS COLLECTED	% OF RECORDS WITH ANTIBIOTIC PRESCRIPTION
1	Sir Yahaya Memorial Hospital, Birnin Kebbi	150	82.67
2	General Hospital Zauro	300	67.00
3	General Hospital Argungu	250	80.80
4	General Hospital Jega	120	83.33
5	General Hospital Aliero	200	84.00
6	Godiya Hospital, Birnin Kebbi	988	13.36
TOTAL		2008	927 (46.17%)

#### Age distribution

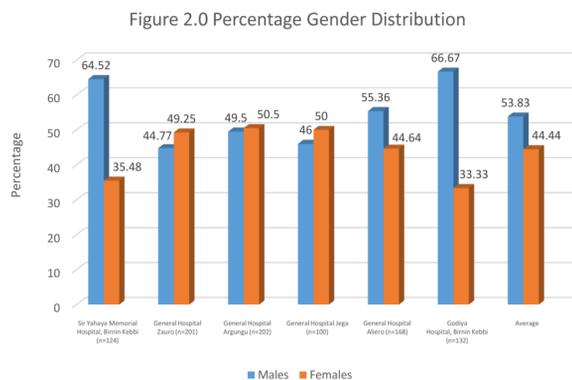
In Figure 1, it is clear that majority of patients treated with antibiotics were adults with a percentage of 52.34 as against children with 39.37%. There is variation however when individual hospitals are analyzed for example, Sir Yahaya Memorial Hospital, Birnin Kebbi and General Hospital Jega had very high figures for adults as much as 88.71 and 92.00% respectively compared to 31.34% and 25% for General Hospital Zauro and Godiya Hospital where more children were prescribed antibiotics than adults. However, most records in Godiya Hospital did not indicate age of patients.



(\*n represents the no. of prescriptions containing antibiotics)  
Gender distribution

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Figure 2 gives relative analysis between number of males and females that were treated with antibiotics in the selected facilities. In general, more males were prescribed antibiotics than females, particularly in Sir Yahaya Memorial Hospital and Godiya Hospital but the proportion was narrowly different in General Hospital Argungu and Jega.



(\*n represents the no. of prescriptions containing antibiotics)

### Infections requiring antibiotic therapy

Table 2 describes human infections reported to hospitals that require treatment with antibiotics. These infections have been classified based on the part of the body they affect. The most common infections requiring antibiotic therapy are those affecting the gastro-intestinal tract, ranging from 18.81% in General Hospital Argungu to 40.00% in General Hospital Jega. Majority of cases in which antibiotics were used were not diagnosed and in many such cases, only symptoms of the diseases were recorded by the doctor. These accounted for 24.27% of all the records assessed. Antibiotics were hardly used in infections involving cardiovascular system.

Table 2: Percentage Distribution of Infections Requiring Antibiotics Therapy in Hospitals

Infection/antibiotic indication	SYMH (n=124)	GHZ (n=201)	GHA (n=202)	GHJ (n=100)	GHA (n=168)	GDH (n=132)	AVG.
Cardiovascular system	0.81	0.00	0.99	0.00	0.00	0.76	0.43
Respiratory tract infection	11.29	11.43	1.98	4.00	8.93	8.33	8.16
Reproductive system	0.00	1.49	2.97	2.00	5.38	5.30	2.91
Gastro-intestinal tract infection	29.84	27.36	18.81	40.00	23.21	22.73	26.00
Urinary tract infection	5.65	4.98	0.00	6.00	0.00	6.06	3.56
Accident cases	4.03	0.00	5.94	10.00	3.57	0.00	3.56
Malaria	3.23	21.89	0.00	9.00	12.50	2.27	9.17
Ear, nose & throat	5.65	0.00	2.97	0.00	3.57	3.03	2.48
Dermatological	3.23	4.48	0.00	2.00	5.38	6.82	2.91
Central nervous system	4.84	19.40	17.82	8.00	12.50	2.27	12.19
Undiagnosed cases	21.75	0.00	47.53	17.00	21.41	37.13	24.27

SYMH - Sir Yahaya Memorial Hospital, Birnin Kebbi  
 GHZ - General Hospital Zauro  
 GHA - General Hospital Argungu  
 GHJ - General Hospital Jega  
 GHA - General Hospital Aliero  
 GDH - Godiya Hospital, Birnin Kebbi

### Culture and sensitivity tests (CST)

Table 3 gives a picture of conducting culture and sensitivity tests prior to prescribing antibiotics. Except for Sir Yahaya Memorial Hospital which recorded one test and General Hospital Zauro with 27 tests, all other hospitals do not have records of CST prior to antibiotic prescription.

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Table 3: Conduct of CST in Hospitals

S/N	NAME OF HOSPITAL	CST CONDUCTED (%)
1	Sir Yahaya Memorial Hospital, Birnin Kebbi (n=124)	0.81
2	General Hospital Zauro (n=201)	13.43
3	General Hospital Argungu (n=202)	0.00
4	General Hospital Jega (n=100)	0.00
5	General Hospital Aliero (n=168)	0.00
6	Godiya Hospital, Birnin Kebbi (n=132)	0.00
TOTAL		3.02

### Frequency of prescription of antibiotics

Table 4 presents records of the classes of antibiotics prescribed. As shown, the most commonly prescribed antibiotics in the hospitals are the  $\beta$ -lactam antibiotics. These accounted for 78.32% of all antibiotics prescribed. This is followed by the Nitroimidazoles, specifically Metronidazole with percentage occurrence of 43.15%. Other antibiotics were less frequently prescribed.

Table 4: Frequency of Prescription of Antibiotics (by classification)

ANTIBIOTICS	SYMH (n=124)	GHZ (n=201)	GHA (n=202)	GHJ (n=100)	GHA (n=168)	GDH (n=132)	AVG.
Aminoglycosides	14.52	19.40	2.97	4.00	16.07	23.48	13.48
Antituberculosis	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$\beta$ -lactams	47.58	85.57	95.05	50.00	77.98	92.42	78.32
Chloramphenicol	8.06	5.97	0.99	7.00	0.00	3.97	3.88
Macrolides	1.61	0.00	1.97	0.00	5.36	0.00	1.62
Nitroimidazoles	50.81	33.83	54.46	53.00	48.21	18.94	43.15
Quinolones	54.03	5.97	5.94	27.00	12.05	1.52	15.10
Tetracycline	1.61	2.99	0.00	1.00	0.00	15.91	3.24
Co-trimoxazole	3.23	1.49	0.00	1.00	8.93	29.55	6.69

### Infections in which CST was performed

In Table 5, categories of infections for which CST was performed have been described. Though the overall performance of CST was very low, infections in which CST was performed were mostly respiratory tract infections, infections of the gastro-intestinal tract, Urinary Tract Infections and Malaria.

Table 5: Frequency of Infections in which CST was performed

INFECTION/ANTIBIOTIC INDICATION	SYMH (n=124)	GHZ (n=201)	GHA (n=202)	GHJ (n=100)	GHA (n=168)	GDH (n=132)	AVG.
Cardiovascular system	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Respiratory tract	0.00	2.99	0.00	0.00	0.00	0.00	0.65
Reproductive system	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gastro-intestinal tract	0.00	5.97	0.00	0.00	0.00	0.00	1.29
Urinary tract	0.81	1.49	0.00	0.00	0.00	0.00	0.43
Accident cases	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Malaria	0.00	2.99	0.00	0.00	0.00	0.00	0.32
Blood	0.00	4.48	0.00	0.00	0.00	0.00	.97
Central nervous system	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### Antibiotics following CST

For the limited number of infections in which CST was conducted, Table 6 gives idea of antibiotics that were prescribed after seeing the result of the CST. Except for macrolides, anti-TB and tetracyclines, all other antibiotics were either single or in combination prescribed after performing CST.

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**Table 6:** Percentage Frequency of Prescribed Antibiotics in which CST was performed

ANTIBIOTICS	SYM (n=124)	GHZ (n=201)	GHA (n=202)	GHJ (n=100)	GHA (n=168)	GDH (n=132)	AVG.
β-lactams	0.81	7.46	0.00	0.00	0.00	0.00	1.72
Quinolones	0.00	2.99	0.00	0.00	0.00	0.00	0.65
Nitroimidazoles	0.00	4.48	0.00	0.00	0.00	0.00	0.97
Co-trimoxazole	0.00	1.49	0.00	0.00	0.00	0.00	0.32
Aminoglycosides	0.00	1.49	0.00	0.00	0.00	0.00	0.32
Chloramphenicol	0.00	2.99	0.00	0.00	0.00	0.00	0.65
Macrolides	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antituberculosis	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetracycline	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### Antibiotic prescription for less than five days

During this study, it was observed that in some instances, antibiotics were prescribed for less than five (5) days as against recommendation by antibiotic policy. Table 7 shows the extent to which antibiotics were prescribed for less than five days. In general, on an average 48.98% of antibiotics were prescribed for less than five days. General Hospitals Argungu and Aliero are the major facilities in which this is common and have recorded incidence of 69.59 and 58.93% respectively.

**Table 7:** Frequency of Prescribing Antibiotics for less than 5 Days

S/N	NAME OF HOSPITAL	% NO. OF CASES TREATED IN LESS THAN 5 DAYS
1	Sir Yahaya Memorial Hospital, Birnin Kebbi (n=124)	43.55
2	General Hospital Zauru (n=201)	43.28
3	General Hospital Argungu (n=202)	69.59
4	General Hospital Jega (n=100)	32.00
5	General Hospital Aliero (n=168)	58.93
6	Godiya Hospital, Birnin Kebbi (n=132)	30.88
	<b>TOTAL</b>	<b>48.98</b>

### Classes of antibiotics prescribed for less than 5 days

Table 8 describes the classes of antibiotics for which a prescription of less than five days was given. The largest percentage of antibiotics prescribed for less than five days as shown in Table 8 were the β-lactam antibiotics with 36.46%. Nitroimidazoles were next, 25.89%. Other antibiotics had much lower figures.

**Table 8:** Frequency Distribution of Antibiotics Prescribed for less than five days

ANTIBIOTICS	SYM (n=124)	GHZ (n=201)	GHA (n=202)	GHJ (n=100)	GHA (n=168)	GDH (n=132)	AVG.
Aminoglycosides	0.00	16.42	0.68	0.00	8.93	0.00	5.39
Quinolones	44.35	2.99	2.70	20.00	12.50	0.74	11.65
Nitroimidazoles	33.06	16.42	41.22	37.00	19.64	9.56	25.89
Co-trimoxazole	0.81	0.00	0.00	0.00	0.00	19.12	2.80
Chloramphenicol	5.56	8.96	0.68	5.00	5.00	0.00	2.91
Macrolides	0.00	2.99	0.68	2.00	2.00	0.00	1.19
β-lactams	14.52	43.28	61.49	29.00	29.00	13.24	36.46

### Infections treated with antibiotics for less than 5 days

Infections for which a prescription for less than 5 days was given have been described in Table 9. Gastro-intestinal tract infections recorded the highest incidence of occurrence for which antibiotics were used for less than five days. They recorded 11.00% while all other categories of infections have incidences of less than 7%.

**Table 9:** Frequency Distribution of Infections Treated with Antibiotics for less than five days

Infection	SYM (n=124)	GHZ (n=201)	GHA (n=202)	GHJ (n=100)	GHA (n=168)	GDH (n=132)	AVG.
Accident cases	0.81	0.00	2.70	10.00	1.79	0.00	0.97
Gastro-intestinal	13.71	7.46	18.92	22.00	3.57	2.94	11.00
Respiratory tract	4.03	4.48	2.70	1.00	7.14	1.47	3.67
Malaria	1.61	19.40	0.68	4.00	8.93	0.00	6.58
Reproductive system	0.00	1.49	1.35	0.00	0.00	0.74	0.76
Blood	3.23	7.49	0.68	0.00	3.57	2.94	3.24

### Antibacterial combination therapy

As part of antibiotics policy, combination therapy is highly recommended to increase efficacy of antibiotics and delay development of resistance. Table 10 explains that five of the six hospitals recorded more than 50% incidences of prescription involving antibiotic combinations ranging from 61.19 to 72.06%. Only General Hospital Jega had a record of less than 50% (46.00%).

**Table 10:** Frequency of Prescription of Antibacterial Combination Therapy

S/N	Name of hospital	% Combination therapy
1	Sir Yahaya Memorial Hospital, Birnin Kebbi (n=124)	72.06
2	General Hospital Zauru (n=201)	61.19
3	General Hospital Argungu (n=202)	62.16
4	General Hospital Jega (n=100)	46.00
5	General Hospital Aliero (n=168)	67.86
6	Godiya Hospital, Birnin Kebbi (n=132)	64.71
	<b>TOTAL</b>	<b>62.89</b>

### Therapy with antibiotic combination

Table 11 groups classes of antibiotics that were commonly combined for treating infections. The most common antibiotic combination was β-lactams and nitroimidazoles. This accounts for 25.46% of all antibiotic combination therapy analyzed. Combination of β-lactams and aminoglycosides ranked second with 9.17%. Other combinations included: quinolones+ nitroimidazole and co-trimoxazole + nitroimidazoles with percentages of 8.63 and 1.83% respectively.

**Table 11:** Percentage Incidence of Therapy with Antibiotic Combination

ANTIBIOTIC COMBINATION	SYM (n=124)	GHZ (n=201)	GHA (n=202)	GHJ (n=100)	GHA (n=168)	GDH (n=132)	AVG.
Quinolone + Nitroimidazole	34.68	2.99	4.73	19.00	0.68	0.74	8.63
β-lactam + Nitroimidazole	10.48	28.57	47.97	14.00	26.79	7.35	25.46
β-lactam + Aminoglycoside	6.45	19.40	10.14	0.00	10.71	0.00	9.17
Co-trimoxazole + Nitroimidazole	0.81	1.49	0.00	1.00	1.79	6.62	1.83

### Antibiotics used in the treatment of diarrhea

Data presented in Table 12 shows that metronidazole and amoxicillin were mostly prescribed for diarrhea. In general, antibiotics were avoided in the management of diarrhea.

### Commonly prescribed β-lactam antibiotics

Owing to the fact that β-lactam antibiotics are the most prescribed, Table 13 gives break down of β-lactam antibiotics prescribing incidence. Amoxicillin was the most frequently prescribed antibiotic. This was followed by Cephtriaxone and Ampicillin+Cloxacillin with 16.61 and 10.90% respectively. Though, Penicillin G was prescribed only once in Sir Yahaya Memorial Hospital, Godiya Hospital recorded 68.18% usage of the drug in comparison to the total number of antibiotics prescribed.

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**Table 12:** Types and Frequency of Antibiotics used in the Treatment of Diarrhea

ANTIBIOTICS	SYM <sup>H</sup> (n=124)	GHZ (n=201)	GHAr (n=202)	GHJ (n=100)	GHAI (n=168)	GDH (n=132)	AVG.
Metronidazole	6.45	0.00	16.89	9.00	3.57	1.47	6.36
Tetracycline	0.81	0.00	0.00	0.00	0.00	0.74	0.22
Ampicillin + Cloxacillin	0.00	0.00	0.00	1.00	1.79	0.00	0.43
Ciprofloxacin	3.23	0.00	0.68	4.00	1.79	0.00	1.29
Co-trimoxazole	0.81	0.00	0.00	0.00	5.36	1.74	1.29
Gentamicin	0.00	1.49	0.68	0.00	1.79	0.00	0.76
Amoxicillin	2.42	0.00	13.51	2.00	3.57	0.00	3.88
Cephtriaxone	0.00	1.49	1.35	0.00	8.93	0.00	2.27

**Table 13:** Commonly prescribed  $\beta$ -lactam antibiotics

$\beta$ -lactam	SYM <sup>H</sup> (n=124)	GHZ (n=201)	GHAr (n=202)	GHJ (n=100)	GHAI (n=168)	GDH (n=132)	AVG.
Ampicillin	2.42	0.00	1.98	0.00	0.00	0.00	0.76
Amoxicillin	13.71	46.26	69.31	34.00	32.14	3.03	36.89
Ampicillin + Cloxacillin	6.45	8.96	10.98	10.00	8.93	21.21	10.90
Penicillin G	0.81	0.00	0.00	0.00	0.00	68.18	9.82
Cephtriaxone	6.45	26.37	12.87	4.00	37.50	0.00	16.61
Cephuroxime	3.23	2.49	0.00	2.00	5.36	0.00	2.16
Others	1.61	1.49	0.00	4.00	0.00	0.00	0.97

## DISCUSSION

Analysis of data collected in this study clearly shows that there are series of unethical practices as regards antibiotic prescription and use which points to some salient inadequacies in the management of infections in Kebbi State of Nigeria.

Out of the 2008 medical records collected, 927 were found to contain prescriptions with antibiotics, a figure which probably could have been higher because about 500 files in Godiya Hospital do not contain any medical record on the patients. This figure implies that one out of every two patients that seek medical attention in Kebbi State is likely afflicted with infection requiring antibiotic therapy.

One parameter that determines the dose of a drug to be used in a patient is age and therefore the distribution of age in the analyzed prescriptions shows that majority of reported cases were of adults. While in some of the hospitals, this proportion of adults and children are close but in Sir Yahaya Memorial Hospital and General Hospital Jega, the differences are large. This probably may be due to the fact that most infections in children are often under-reported by parents, and in some cases, traditional medicine is tried first and only when it fails the orthodox treatment is sought.

More males sought treatment in the hospital than the females, a reality that may be attributed to the fact that women in this locality are confined indoors due to cultural practices, hence less number of them visit hospitals.

The high incidence of gastro-intestinal tract (GIT) infection is an indication of poor hygienic practices and environmental condition. It could majorly be due to poor quality of drinking water available to the community. Among the various communities treated, water like pipe-borne water is hardly available and of the required standard. Water for domestic use in some communities is largely obtained from rivers/streams and wells which are often uncovered. Sachet water (popularly called 'pure water') that also serve as drinking water source all

over Nigeria are in most cases unprocessed and have been reported to be heavily laden with microorganisms<sup>8</sup>.

There was high number of undiagnosed cases (with only symptoms described) which points to the fact that the physicians who are few in number, spend less time with each patient due to high number of patients to see per day. All the hospitals except Sir Yahaya Memorial Hospital which has 21 medical doctors have less than 4 physicians including the Principal Medical Officer. Patient to doctor ratio is exceedingly high, hence less time is spent with each patient. Moreover, most of the hospitals lack the facilities to carry out further diagnostic tests that would have aided in proper diagnosis of the infections.

Only two hospitals, General Hospital Zauo and Sir Yahaya Memorial Hospital ever tried conducting CST. Godiya Hospital has no microbiology laboratory. There were no records of CST in General Hospitals Argungu, Jega and Aliero though they have laboratories but lack qualified personnel to conduct CST. Though Sir Yahaya Memorial Hospital has the capacity to conduct CST, only one record was seen. Since most prescriptions were not preceded by CST, there is high risk of developing resistance by some microbes and the spread of these mutant organisms in the community such that they will no longer remain sensitive to previously effective antimicrobial agents.

$\beta$ -lactams were the most frequently prescribed antibiotics. While General Hospital Argungu and Godiya Hospital mostly prescribed amino-penicillin's (Ampicillin and Amoxicillin), the other remaining four hospitals frequently prescribed the more expensive  $\beta$ -lactams: Cephtriaxone and Cephuroxime, probably due to the fact that the state government procured these drugs for a span of whole year to be given free to patients in these hospitals. The reason for the frequent prescription of amino-penicillin particularly amoxicillin is because they are cheap and readily available. The frequent use of metronidazole in the hospitals is due to the fact that the most prevalent infection in the hospitals is gastro-intestinal tract infection and metronidazole is the first line drug against anaerobic infections.

The relatively high number of cases in which antibiotics are prescribed for less than five days should be of concern, as the short duration of therapy may encourage resistance development and reduced success rate in the management of infection in the area.

Frequent use of combination therapy in the hospitals was to reduce the incidence of development of bacterial resistance. The use of combination therapy is also probably resorted to in these hospitals, as a way of extending the spectrum of antibacterial activities since in most cases, the hospitals lack facilities to actually identify the causative organisms. Most common use of combination therapy was between  $\beta$ -lactam and Metronidazole both of which are bactericidal in action, cheap and readily available.

Proper record keeping only seems to be a problem in Godiya Hospital. This is surprising as private hospitals

## ANTIBIOTIC PRESCRIPTION PROFILES

are supposed to be more meticulous in record and data keeping.

### CONCLUSION

Results of this study revealed that about one in every two patients that visited the hospitals for medical attention present symptoms requiring antibiotic use. A sizeable number of antibiotics were prescribed without any documented diagnosis to justify their indication.

Gastro-intestinal infections were the most prevalent infections requiring antibiotic therapy in the area.

Only an insignificant fraction of diagnosed infections were followed by CST, and CST was carried out only in two of the six hospitals indicating need for improvement in this aspect for ethical use of antibiotics.

$\beta$ -lactam antibiotics were the most prescribed drugs.

A significant proportion of antibiotics were prescribed for less than five days.

### ACKNOWLEDGEMENTS

I am highly obliged to extend thankfulness to Professor Y. K. E. Ibrahim for his scholarly training and demonstrating intelligent integration of ideas into this research work. His philosophy has made a lasting impression on me. I want to acknowledge the unreserved cooperation of Director of Pharmaceutical Services of Kebbi State, Permanent Secretary of Sir Yahaya Memorial Hospital, Principal Medical Officers of General Hospitals Zauo, Argungu, Jega and Aliero, and the Medical Director of Godiya Hospital.

My appreciation also adds in, record officers, administrative staff and all individuals who have facilitated the smooth conduct of this research.

Finally, I owe gratitude to anyone whose name or office has not been mentioned in this section and want to assure them that their contributions will always be remembered.

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