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Research Article

PRESCRIPTION PATTERN OF ANTIBIOTICS IN UNIVERSITY OF UYO TEACHING HOSPITAL

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ABSTRACT

Combined antibiotics are useful for empirical therapy of an infection in which the cause is unknown, treatment of polymicrobial infections, enhance antibiotic activity for specific infections and prevent the emergence of resistance. The disadvantage of combined therapy include increased risk of toxicity, selection of multiple- drug resistance microorganisms, eradication of normal host flora with super-infection and increased cost to the patient.

Ethical approval was obtained from the Hospital Research Ethics Committee at University of Uyo Teaching Hospital, Akwa-Ibom State in Nigeria. A total of two hundred (200) folders of patients who were admitted in the hospital from January 2008 to January 2009 were collated for the research. The result showed that among the reported diseases in the surveyed patients' folders diagnosed by physicians, pneumonia (24.4%) ranked the highest in proportion followed by sepsis (16.31%), malaria (15.26%) and diarrhea (7.89%) respectively. Dosage formulation errors (55.76%) had highest frequency among the prescription errors discovered in the patients' folders followed by adverse drug interaction (17.30%), dosage error (9.61%), incomplete prescription (9.61%) and exceed duration limit (7.69%) respectively. Gentamicin (28.62%) ranked the highest among antibiotics prescribed followed by cefuroxime (21.73%) and ceftriaxone (14.31%) respectively.

The prescription errors discovered (26%) in the surveyed folders was of concern, out of which dosage formulation (55.76%) appeared highest. The pattern of antibiotics utilized in the hospital was highest for gentamicin (28.62%) followed by cefuroxime (21.73%) respectively among the study population of which infants and neonates contributed greater proportion (71%).

Key words: prescription, pattern, antibiotics, error, drug-interaction, infant

INTRODUCTION

Antibiotics represent a class of drugs used in the treatment of infectious diseases caused by bacteria. These bacteria possess unique features like cell wall, proteins etc that distinguish them from animal cells. Antibiotics interfere with these bacterial characteristics resulting in selective killing or growth inhibition of susceptible microorganisms. Antibiotics belong to a group of antimicrobial compounds used to treat infectious diseases caused by microorganisms such as fungi and protozoa. Penicillin e.g. amoxicillin binds to the cell wall of bacteria causing it to weaken and leak consequently leading to the death of the bacteria without causing harm to the host human cells[1]. Antibiotics are substances that inhibit the growth of microorganisms or kill them. These agents are produced wholly or partially from microorganisms to inhibit the growth or affect the growth by killing other species of microorganism [1, 2].

Antibiotics are classified base on chemical structure, proposed mechanism of action, spectrum of antimicrobial activity but generally antibiotics with similar chemical structures are grouped together. Classification of antibiotics based on mechanism of action are as follow agents that inhibit synthesis of bacterial cell wall e.g. penicillin, agents that act directly on the cell membrane of microorganism resulting in increasing permeability and eventual leakage of intracellular materials e.g. polymyxin, agents that disrupt the function of 30S or 50S ribosomal subunit and alter protein synthesis e.g. aminoglycoside, agents that inhibit bacterial nucleic acid metabolism e.g. rifamycin, the antimetabolites agents e.g. sulphonamides. There are others as antiviral and antifungal agents [2].

Antibiotics are potentially toxic and promote resistance among microorganism when it is not properly taken. The definitive identification of a bacterial infection before treatment is initiated is very important. In the absence of a clear indication, antibiotics may be used if the disease is severe and if it seems likely that withholding therapy will result in failure to manage a potentially serious or life threatening infection. The efficacy of the therapeutic regimen depends on how well the drug is absorbed into the bloodstream, how much of the drug reaches the site of the infection in the body and how readily the body is able to eliminate the drug. These factors may vary from person to person depending on other drugs taken, other disorders present and the person's age among others. In selecting an antibiotic, clinicians should consider the nature and seriousness of the infection, the drug's possible side effects, possibilities of allergies or other serious reactions to the drug and the cost of the drug [3, 4]. Using polypharmacy for empirical therapy of an infection in which the cause is unknown or treatment of polymicrobial infections, enhance antibiotic activity for specific infections and prevent the emergence of resistance. The disadvantage of combined therapy include increased risk of toxicity, selection of multiple- drug resistance microorganisms, eradication of normal host flora with super-infection and increased cost to the patient. Antibiotics are frequently prescribed for indications in which their use is not warranted[5].

METHOD

This descriptive, retrospective study was carried out in the Medical Records Department of the University of Uyo Teaching Hospital, Uyo. It is a tertiary healthcare facility which serves as a referral centre for people living in the South-South Region of Nigeria. Ethical approval was obtained from the Research Ethics Committee.

A total of two hundred (200) folders of patients who were admitted in the hospital from January 2008 to January 2009 were collated for the research study. Information obtained from the folders was filled into predesigned format shown below. Careful analysis of information obtained on the database for prescription pattern of antibiotics was done. Assessment of potential adverse effects in the prescriptions was done. Death cases would not be inferred in this study as regulation of the hospital requires a special approval to access the files which was not included in the application for ethical approval.

RESULTS

Two hundred (200) patient folders containing biomedical details and over four hundred (400) prescriptions given to patients from January 2008 to January 2009 were obtained and analyzed.

In Table 1, the proportion of folders belonging to infants appeared most, 103 (51.5%) followed by neonates with 39 (19.5%), children 30 (15%), adults 15 (7.5%) and older patients 7 (3.5%). The least was folders belonging to adolescent group with 3 (1.5%). Three (1.5%) patients' folders did not specify the patient's age.

Table 1: Age Distribution of Patients

S/n	Age of patients	Frequency (percentage)
1	Neonates (0-28 days)	39 (19.5)
2	Infants (28 days- 2 years)	103 (51.5)
3	Children (2- 11 years)	30 (15)
4	Adolescents (12- 18 years)	3 (1.5)
5	Adults (18- 40 years)	15 (7.5)
6	Older patients (> 40 years)	7 (3.5)
7	Age not specified	3 (1.5%)
	Total	**200**

In Table 2, the proportion of concordance between the Physicians' and Laboratory diagnosis was highest for Pneumonia with 54 (24.4%) followed by Sepsis 31 (16.31%), Malaria 29 (15.26%), Diarrhea 15 (7.89%) and Meningitis 13 (6.84%) respectively. The proportion of contradiction between the Physicians' diagnosis and Laboratory diagnosis was highest for Malaria with 57 (30%), Sepsis 39 (20.52%), Pneumonia 18 (9.47%) and Septicemia 16 (8.42%).

Table 2: Comparison of Physician's And Laboratory and Diagnosis.

S/n	Disease	Compliance (percentage)	Contradictory (percentage)
1	Pneumonia	54 (24.4)	18 (9.47)
2	Meningitis	13 (6.84)	8 (4.41)
3	Diarrhea	15 (7.89)	10 (5.26)
4	Septicemia	4 (2.10)	16 (8.42)
5	Sepsis	31 (16.31)	39 (20.52)
6	RTI	9 (4.73)	11 (5.78)
7	Malaria	29 (15.26)	57 (30)
8	Broncholitis	5 (2.63)	4 (2.10)
9	Dysentery	7 (3.68)	9 (4.73)
10	Gastroenteritis	6 (3.15)	11 (5.78)
11	Otitis media	3 (1.57)	4 (0.52)
12	Tonsillitis	1 (0.52)	1 (0.52)
13	UTI	4 (2.10)	3 (1.57)
14	Jaundice	3 (1.57)	0
15	Staphylococcus Food Poisoning	1 (0.52)	0
16	Skin infection	2 (1.05)	0
17	PROM	1 (0.52)	1 (0.52)
18	Pneumonitis	1 (0.52)	1 (0.52)
19	Burns	1 (0.52)	0
	Total	**190**	**190**

Table 3 showed the period of termination of treatment which is assumed as the recovery period having highest proportion for patients on treatment for 0- 7 days with 95(48.96%) followed by 8- 15 days with 74 (38.14%) and 16- 23 days with 21 (10.82%). Table 4 showed that the most frequently prescribed class of antibiotics in the health institution is Cephalosporin 244 (31.64%) followed by Antiprotozoal 239 (30.99%), Aminoglycosides 162 (21.01%) and Penicillin 52 (6.74%). Table5 showed the prescription error distribution to be highest for dosage Formulation error 29 (55.76%) followed by Adverse Interaction 9 (17.30%) and both Dosage error and Incomplete prescription with 5 (9.61%).

Table 3: Recovery Period of Patients.

S/n	Recovery period/ hospital duration (in days)	Number of patients (percentage)
1	0- 7	95 (48.96)
2	8- 15	74 (38.14)
3	16- 23	21 (10.82)
4	24- 31	2 (1.03)
5	>31	2 (1.03)
	Total	**194**

In Table 6, the distribution of antibiotic used was highest for Gentamicin 162 (28.62%), followed by Cefuroxime 123 (21.73%), Ceftriaxone 81 (14.31%), Metronidazole 34 (6%), Ceftazidime 33 (5.83%), Co-trimoxazole 25(4.41%) and Penicillin G 24 (4.24%).

Table 4: Antibiotic Classes Used.

S/n	Class of antibiotic	Frequency (percentage)
1	Cephalosporin	244 (31.64)
2	Aminoglycoside	162 (21.01)
3	Antifungals	10 (1.29)
4	Antiprotozoal	239 (30.99)
5	Quinlones	16 (2.07)
6	Penicillins	52 (6.74)
7	Tetracyclines	1 (0.29)
8	Sulphonamides	25 (3.24)
9	Macrolides	9 (1.16)
10	Others	13 (1.68)
	Total	**771**

Table 5: Analysis Of The Prescription Errors.

S/n	Type of prescription error	Frequency (percentage)
1	Dosage error	5 (9.61)
2	Exceed duration limit (toxicity)	4 (7.69)
3	Dosage formulation error	29 (55.76)
4	Adverse drug interaction	9 (17.30)
5	Incomplete prescription	5 (9.61)
	Total prescription error	52 (26%)
	Total prescription folders	**200**

Table 6: Antibiotics Used.

S/n	Antibiotics	Frequency (percentage)
1	Gentamicin	162 (28.62)
2	Cefuroxime	123 (21.73)
3	Ceftriaxone	81 (14.31)
4	Ceftazidime	33 (5.83)
5	Cephalexin	5 (0.88)
6	Cefotaxime	2 (0.35)
7	Azithromycin	6 (1.06)
8	Erythromycin	3 (0.35)
9	Ciprofloxacin	13 (2.29)
10	Ofloxacin	2 (0.35)
11	Levofloxacin	1 (0.17)
12	Doxycycline	1 (0.17)
13	Penicillin G	24 (4.24)
14	Amoxicillin	19 (3.35)
15	Ampicillin/ Cloxacillin	9 (1.59)
16	Nystatin	5 (0.88)
17	Clotrimazole	3 (0.35)
18	Tioconazole	1 (0.17)
19	Fluconazole	1 (0.17)
20	Co-trimoxazole	25 (4.41)
21	Metronidazole	34 (6.00)
22	Chloramphenicol	13 (2.29)
	Total	**566**

DISCUSSION

The research showed that the proportion of both infants (51.5%) and neonates (19.5%) appeared highest in the age distribution of the patients selected for the study which implies that more care is given to this particular age group. The provision of free consultation to infants below six months in the tertiary health institution may also be responsible for their high proportion. The adolescent (1.5%) age group had the least proportion probably as a result of good personal hygiene .

The level of concordance between the Physicians' diagnosis and the laboratory investigations was highest was predominant for pneumonia (24.4%) and sepsis (16.3%) probably due to the importance of detecting the sensitivity of isolated pathogenic microorganism before commencement of treatment[5]. The level of contradiction between the Physicians' diagnosis and laboratory investigations was highest for malaria (30%) probably as a result of the hospital policy to treat malaria in every patient that attended the health institution and followed by sepsis (20.52%) as Physicians

often commence treatment prior to the outcome of laboratory investigations.

The distribution pattern of recovery period from the research study showed that greater percentage of patients recovered within seven days (48.96%) hospitalization followed by two weeks of hospitalization (38.14%) as many infectious diseases were clinically cured within two weeks of radical therapeutics management. However, some patients would not like to stay more than two weeks in the hospital because of cost and psychological effects of lying so long on hospital bed. Some patients stay longer than three weeks in the hospital because of retractable illness caused by resistant microorganisms and lack of fund to provide adequate therapeutic management.

A prescription by a Doctor may be taken as an indication of the Doctor's attitude towards a disease and the role of drugs in its treatment[5,6]. The most frequently prescribed antibiotic class observed in the study is cephalosporins (31.64%) followed by the antiprotozoals (30.99%) and aminoglycoside (21.01%).

Cephalosporin was widely prescribed because of its broadspectrum of activity and tolerance across age groups. Antiprotozoals rank among the most frequently prescribed class of drugs because of the endemic infection of malaria in the region and the policy of treating every patient in the hospital for malaria even when it was not part of the complaint of the patients. Aminoglyccoside is radically prescribed in this hospital in combination with the cephalosporins for infants and adults because of synergistic effects on resistant microorganisms. These antibiotics are bactericidal against common pathogens, penetrate into the central nervous system are relatively safe with proven clinical efficacy. The aminoglycoside provide synergy with the cephalosporins and penicillin against some organisms like Listeria and Streptococcus[4].

There were fifty-two (26%) folders containing various prescription errors (fig. 1). Dosage formulation errors (55.76%) and adverse drug interaction (17.30%) were the leading prescription errors observed in the folders used for the study. Appropriate dosage formulation was not used in some prescriptions and there was no comment from the dispensing Pharmacist to correct the abnormality. Combination of frusemide, gentamicin and cephalosporin were often prescribed to infants below one month old without drug monitoring[7,8]. Pharmacists in the hospital were having separate ward round but these repeated errors observed were not identified or documented on the patients' folders.

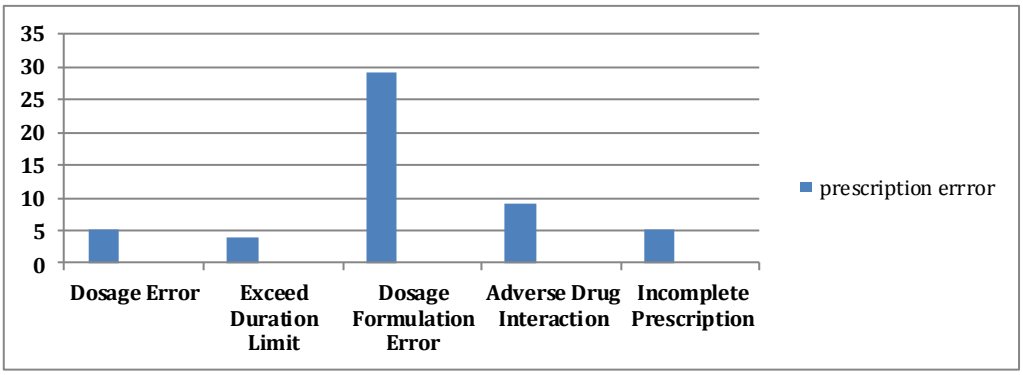

Figure 1: Types of Prescription Error.

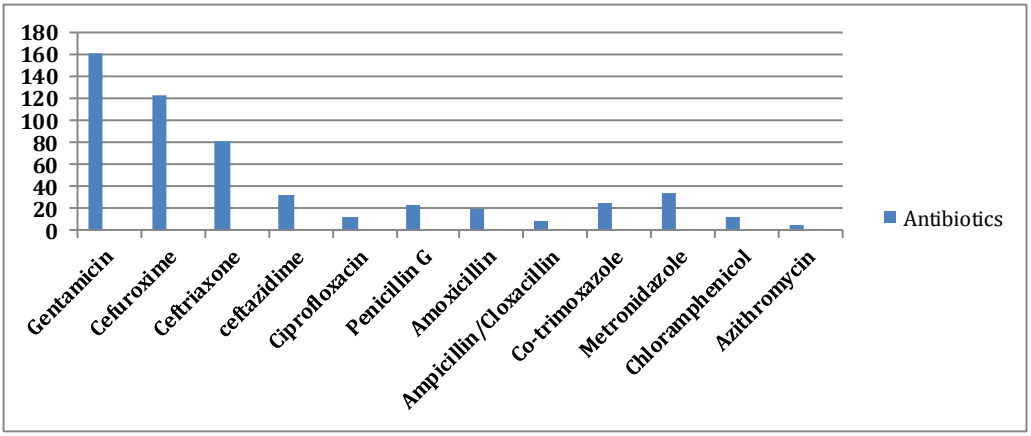

Figure 2: Prescribed Antibiotics

Proportion of prescription of antibiotics rank highest for gentamicin (28.62%) followed by cefuroxime (21.73%) and ceftriaxone (14.31%) in this teaching hospital (fig. 2). Gentamicin has been often prescribed with cephalosporin and penicillin because of synergic effect on resistant microorganisms[8]. Proper documentation of the cost of treatment was not done in the folders probably because patients in the hospital were responsible for the procurement of their medicine in the hospital Pharmacy units or outside.

In conclusion, the majority of the folders (71%) used in this research study was on management of infections in both infants and neonates with the most prevalent disease condition being pneumonia (36.02%), sepsis (21.50%) and diarrhea (10.21%).The discrepancies in the physicians' diagnosis and laboratory investigations were insignificant using the student T-test statistical analysis . The recovery period observed in the folders used was highest for seven day hospitalization (48.96%). The proportion of prescription error discovered in more than one-quarter (26%) of the surveyed folders was of concern, out of which dosage formulation (55.76%) appeared highest. The pattern of antibiotics utilized in the hospital was highest for gentamicin (28.62%) followed by cefuroxime (21.73%) and ceftriaxone (14.31%) respectively among the study population of which infants and neonates contributed greater proportion (71%).

The participation of Pharmacists in the clinical ward round and documentation of Pharmacist observation on prescription in patient folder is highly recommended for safety and drug monitoring.

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