Prescription Pattern And Knowledge Of Antimicrobial Agent Use In Paediatric Ward Of A Tertiary Hospital In Sahara Africa

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Abstract: Antimicrobials represent one of the greatest discoveries of the 21st century. The introduction of penicillin in 1914 extended human life expectancy by 2years (Rustan 2010). Antibiotics are frequently used in the therapy of numerous infectious diseases in Children and Neonates. Therefore, from the aspect of safety, neonates and children comprise a particular so called risk or vulnerable patient group (Bajcetic and Jovanovich, 2012). This study on the pattern of antimicrobials among children in tertiary hospital was aimed at evaluating the current antimicrobial use and identified the pattern of prescription comparing with the knowledge of the Physicians practice in respect to the recommended guidelines. 75 Physicians participated in the study, only 37% of the physicians have had training on antimicrobial stewardship while 70% have poor standard guideline practice compliance and the years of experience by the physicians did not have statistical significance on the antimicrobial guideline practice.

Keyword: pattern, antimicrobial, prescription, knowledge.

I. INTRODUCTION

Antimicrobial agents are the most commonly prescribed medications among physicians. Studies have shown that up to 50% of antimicrobial agents prescriptions are inappropriate (Odusanya and Oyediran 2000, Goodyear Smith 2000). The rate of inappropriate prescription of these agents may exceed even 50% in many hospitals in Sub-Sahara Africa (Akinyele et.al 2000, Puccini et al 2007). Misuse of antibiotics i.e. unnecessary prescription as well as inappropriate use (inadequate dosing and wrong duration) are frequently up to half of both in the community and in the hospital which are unjustifiable (Dellit et al 2007).

The problems associated with the inappropriate use of antimicrobial agents are caused by emergence of drug resistance microorganisms, increase rate of Clostridium difficile injection, antimicrobial agent toxicity, drug-drug interactions, Catheter related infections and other hospital acquired infections (Albrich et al 2004).

A lack of knowledge of infectious diseases and antibiotics may seriously hamper the quality of prescription. In this situation, the prescribing physicians may prefer to err on the safe side that is, prescribing maximal broad spectrum treatment instead of making a well-known informed guess. A negative attitude based on lack of agreement with the protocol and guidelines will also affect prescription pattern (Cabaña et al. 1999). In a survey done in France and Scotland among junior doctors on knowledge and perception on antimicrobial prescription, overall 30% of those participants stated that they had no training in antibiotics prescribing in the past year (Pulcini *et al.*, 2011).

In general, physicians prescribing decisions are influenced by a number of factors which could be direct (formularies, prescribing restrictions, required consultations) and indirect (advertisement, visit by Pharmaceutical sales

person, option of colleagues, scientific data from randomised control trials and medical training (Rausch 1990).

This study aimed at assessing the prescription pattern and the Knowledge of antimicrobial use among Physicians managing Children in the tertiary hospital setting and to evaluate the current use in the paediatric ward in compliance with standard antimicrobial guidelines.

II. MATERIAL AND METHOD

This a retrospective, descriptive and cross sectional study of paediatrics patients managed by the physicians in Federal Medical Centre, Owo between June 2015 and May 2016. The medical case files of the total of 214 children managed during the period under review were retrieved and relevant information were extracted comprised of Age, gender, diagnosis, indications for antibiotics use, comorbid conditions, duration of antibiotics, dosage and outcome of patients care were analysed. A semi structural questionnaire based on the standard antimicrobial guideline on prescriptions, knowledge and perception of the usefulness of the antimicrobial stewardship training were distributed to 75 Physicians managing paediatric in the hospital. Linker scale of strongly agreed (5), agreed (4), not sure (3), disagree (2), strongly disagree (1) were used to assess the knowledge and practice of antimicrobial prescriptions among the physicians. The data collected from the case note structured guided questionnaire and that questionnaire from managing physicians/paediatricians were analysed using Scientific Package for Social Sciences (SPSS) 22. Descriptive statistics including frequency in percentage, means and standard deviation were used to summarize the data. Chi square was used to test the level of significance and the level was be at 0.05.

III. RESULTS

Gender, Age and Educational status		Frequency (N)	Percentage (%)
Gender	Male	129	60.3
	Female	85	39.7
Age	0-12 month	80	37.4
	13-24 months	36	16.8
	2-5years	98	45.8
Educational status	Schooling	144	67.3
	Non schooling	70	32.7

Table 1.1: Gender, Age and Educational status of children

Table 1.1 shows the Gender, age and educational status of the children reviewed for the study. The male account for 129(60.3%) and female 85(39.7%) of the total of 214 children with male preponderance of ratio. The majority 98(45.8%) of the children are between 2 and 5 years while those on age 12months and below and ages 13 to 24 months account for 80(37.4%) and 36(16.8%) respectively. Most 144(67.3%) of the children have commenced schooling144 (67.3%).

Medical diagnosis	Frequency (N=214)	Percentage (%)
Sepsis/septicaemia	67	31.3
Bronchopneumonia	35	16.4
URTI	34	15.9
Meningitis	11	5.14
Otitis media/sinusitis	16	7.48
Birth asphyxia/jaundice	11	5.14
Bronchitis	12	5.6
Gastroenteritis	7	3.3
Hbss/ heamoglobinopathy	9	4.2
Tonsillitis	5	2.34
Tuberculosis	1	0.47
Tetanus	1	0.47
Conjunctivitis	3	1.42
Malaria - Like illness	2	0.93
Total	214	100

Table 2: Medical Diagnosis

Table 2 shows various medical diagnosis that was made which warrant the use of antimicrobial agents during the study. Sepsis/septicaemia was the commonest diagnosis made which accounted for 67(31.3%) followed by bronchopneumonia and Upper respiratory tract infection (URTI) which account for 35(16.4%) and 34(16.4%) respectively. The least medical diagnosis that requires antibiotics during the study are tuberculosis and tetanus which account for 0.47% each.
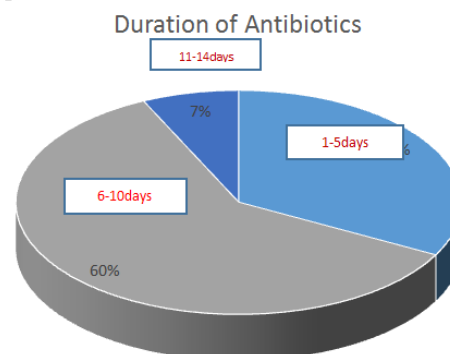

Figure 1: Duration of antibiotics prescribed to the children

Figure1 shows the duration of antibiotics that the children received during the period of study. Majority 129(60%) received antibiotics for 6 to 10 days while those who had antibiotics for 1-5days account for 69(33%) and those between 11-15days were 15(7%).

Number of generic	Frequency	Percent
None	2	0.9
One	16	7.5
Two	88	41.1
Three	99	46.3
Four	9	4.2
Total	214	100

Table 3: Number of generic antimicrobial agents prescribed

Table 3. shows the number of generic antibiotics prescribed per prescription during the study. 99(46.3%) had three generic antimicrobial agents per prescription and 88(41.1%) had two generic drugs prescribed while only 2(0.9%) had branded prescribed. It ranges between 1-4 generic antibiotics per prescriptions.

Prescription error	Frequency	Percentage (%)
None	136	63.6
Wrong dosage	75	35.0
Wrong duration	3	1.4
Total	214	100

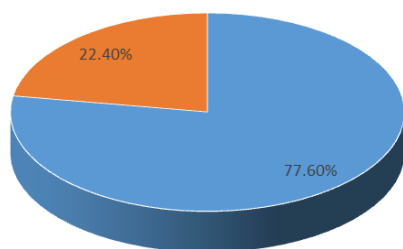*Table 4: Type of prescription error*

Table 4 shows the types of prescription error found during the study. 75(35%) of the prescription were wrong dosage while 3(1.4%) account for wrong duration. Majority 136(63.6%) had normal prescription.

Dosage forms	Frequency (N)	Percent (%)
Injectable	51	23.8
Syrup	151	70.6
Tablets/capsules	12	5.6
Total	214	100

Table 5: Forms of Antimicrobial agents

Table 5 shows forms of antimicrobial agents prescribed during the study. Majority 151(70.6%) of the 214 children use syrup as a form of treatment while 51(23.8%) are injectable and tablets/capsule form account for 12(5.6%).

Figure 2: Appropriate Antimicrobial Prescription for Medical Diagnosis

Figure 2 shows the appropriateness of antibiotics used against the medical diagnosis. 48(22.4%) were not appropriate for medical diagnosis while 166(77.6%) was appropriate for medical diagnosis.

S/N	VARIABLES	CATEGORY	FREQUENCY (N=75)	PERCENT (%)	REMARK
1	Gender	Male	54	72.0	M:F ratio 2.7:1
		Female	21	28.0	
2	Age (years)	18-25	2	2.7	Mean age 37.5years
		26-35	28	37.3	
		36-45	40	53.3	
		46-55	5	6.7	
3	Area of Specialisation	Paediatrician	21	28	
		Surgeons	33	44	
		Family Medicine	15	20	
		Gen. Practitioner	6	8	
4	Designation	Consultants	13	17.3	
		Residents	21	28.0	
		Medical Officers	32	42.7	
		House Officers	9	12.0	
5	Years of Experience	1-3	20	26.7	
		4-6	18	24.0	
		7-9	16	21.3	
		10-12	12	18.0	
		>12	9	12.0	

Table 5: Socio Demographic Distributions for 75 Physicians In The Study

Table 5 showed the demographic distributions of 75 medical doctors who were prescribing antimicrobial agents to paediatric patients in the hospital. The respondents comprises of male 54(72%) and female 21(28%) with male: female ratio 2.7:1. The age ranges between 18 to 55years, while age group 36-45 years account for the majority 40(53.3%) of the respondents.

Surgeons (Orthopaedic, paediatrics and ENT surgeons) 33(44%) account for majority of physicians that frequently prescribe antimicrobial agents to children of which most of the physicians 32(42.7) are medical officer cadre. Those with 1-3years of antimicrobial prescribing experience account for 26.7% while 12% are above 12 years in the practice.

Variable	Category	Frequency (N=75)	Percentage (%)
Antimicrobial Stewardship Training	Yes	27	36
	No	48	64

Table 6: Antimicrobial Stewardship Training Experience

Table 6 showed antimicrobial stewardship training experience among 75 respondent physicians. 27(36.7%) reported to have had training on antimicrobial stewardship training while 48(64%) never had any form of training on antimicrobial stewardship training.

	Frequency	Percent	Valid Percent
130-175 good standard guideline practice	22	29.3	29.3
129 and below -poor standard guideline practice	53	70.7	70.7
Total	75	100.0	100.0

Table 7: Level of Compliance with Standard Antimicrobial Practice Guideline

Table 7 showed the level of compliance of prescribing physicians with the standard antimicrobial practice guideline based on response to the questionnaire, the maximum score is 175 and minimum score 35. Among the respondent 22(29.3%) possessed good antimicrobial standard guideline practice compliance while 53(70.7%) had poor standard guideline practice compliance.

S/N	Particulars	Strongly agree/ Agree (5-4) (%)	Neutral (3) (%)	Strongly disagree/ Disagree (2-1) (%)
1	My knowledge of antimicrobial will increase through antimicrobial training	77.8	2.6	2.6
2	Antimicrobial guidelines will make me work better	82.7	12.0	5.3
3	Inclusion of	77.3	18.7	4.0

	pharmacists in antimicrobial stewardship group will make the group work better.			
4	I will get feedback on how I perform in antimicrobial use if there is antimicrobial audit programme or stewardship group	74.7	21.3	4.0
5	The antimicrobial stewardship team should have a system for timely identification of patients who are receiving or likely to require antimicrobial therapy	78.7	20.0	1.3
6	The antimicrobial stewardship team in the hospital should have a system of regular surveillance and audit of antimicrobial use	73.3	5.3	1.4
7	All empirical antimicrobial therapy should be reviewed on a daily basis by clinicians responsible for the patients' care	86.7	9.3	4.0
8	Regular (yearly or 6monthly) point prevalence studies of antimicrobial use should be undertaken and further in-depth audit performed.	92.0	2.6	5.4

Table 8: Perceived usefulness of antimicrobial training by doctors prescribing antimicrobial agents Score of 5-4 and 2-1 were combined for simplicity

Table 8 showed the responses of doctors as they perceived the usefulness of antimicrobial training on the clinical practice. 77.8% of the respondents agreed that training will enhance their practice and 77.3% will want inclusion of pharmacists in antimicrobial stewardship group for better practice.

IV. DISCUSION

In this study, male and female children were similarly represented and both received profile of antimicrobial agents which were prescribed for 60.3% and 39.7% of male and female respectively (Table 1). This also have been observed in previous studies that relatively higher proportion of males than female received antimicrobial prescription. (Fehintola *et al*, 2006, Fadare *et al*, 2015).

Among those children who received antibiotics prescription in this study, Children of ages 2-5years received antibiotics more frequently (45.8%) than 0- 12months and 13-24months of 37.4% and 16.8% respectively. This is in consonant with the study on prescription pattern done in under-five by Fadare *et al*. This showed more chances of infections in 2-5 years of age (Fadare *et al*, 2015).

Children usually present with series of medical conditions that require antimicrobial prescriptions. In this study, the commonest medical diagnosis is sepsis/septicaemia which account for 31.1%, followed by bronchopneumonia (16.4%) and Upper Respiratory tract infection URTI (15.7%). Similar study by Ogunleye in Lagos, Nigeria also agreed with this findings (Ogunleye *et al*, 2015). However, antimicrobial prescription for URTI as the third commonest indications for antimicrobial prescription in this study was also documented in other studies, which are almost always viral in origin resulting in an unnecessary antibiotics prescriptions. Hence, unnecessary antibiotic use for viral illness is common and has led to increasing rates of antibiotic resistance among Streptococcus pneumoniae and other community acquired pathogens (Belongia and Schwartz, 1998, Nyquist *et al*, 1997). This study showed that inappropriate prescription of antimicrobial agents are still common among physicians in our centre 22.5% (Figure 2). The finding is less than reported from previous study by Odusanya and Oyedele, 2000 which reported than less than 50% of antimicrobial agents prescribed were appropriate. This may be due to adhere to advice from the pharmacists during drug prescription. The most common form of inappropriate prescription is wrong dosage (Table 4). To curb this inappropriate use, guideline on antimicrobial therapy have been developed but compliance with the recommendation have be in doubt. In this study, physicians with good compliance with the hospital antimicrobial guideline practice account for 29.3% (table 7). This is in agreement with study done in Kuwait on auditing the adherence of Physicians' to antibiotics guideline policy which reported 30.4% (Aly *et al,* 2012). However, it is far less than 67% reported by Mol *et al,* 2005 on level of compliance with recommended antimicrobial guideline. This may be due to lack of antimicrobial stewardship training among the physicians in the centre.

The concept of antimicrobial stewardship has become the primary driving mechanism for the optimization of patients care and the preservation of our antimicrobial armament. Guideline for developing and enhancing antimicrobial stewardship from Infectious Disease society of America (Dellit *et al,* 2007) have highlighted the need for infectious disease trained Clinical pharmacists as a core component for the development and maintenance of an appropriate antimicrobial stewardship programme. In this study (Table 8) 77.3% agreed that the inclusion of pharmacists into the antimicrobial stewardship team will enhance effective monitoring of antimicrobial use. In previous studies by Charani *et al,* 2010 and Jarab *et al,* 2012 reported that clinical pharmacist intervention eliminate 37.4% of treatment problem related to efficacy and monitoring of medications thereby promoting efficacy of therapy and enhance desired health outcome.

A lack of knowledge of infectious disease and antimicrobial appropriate usage may hamper the quality of prescription. In this study, 36% of the participating physician have had training on antimicrobial stewardship (Table 6). A similar survey done in France and Scotland among physicians reported that 30% of the doctors have not had antimicrobial (Pulcini *et al,* 2011). Hence 94.8% of the physicians (Table 8) reported that more knowledge on antimicrobial stewardship training would enhance the clinical practice.

V. CONCLUSION

Antimicrobial management required effective teamwork between all health professions regardless of who writes the prescription. It is therefore crucial to educate not only prescribers, but all other healthcare professionals in contact with the patients who are prescribed an antimicrobial (e.g. Nurses and Pharmacists) since patients need to receive consistent counselling in order to adhere to correct and prudent antibiotic use. Therefore all the healthcare professionals must receive continuous training in rational antimicrobial prescribing, dispensing and administration and work as a team. The findings in this study shows that inappropriate prescription of antimicrobial agents exist. This makes the need to have an antimicrobial stewardship programme necessary. Antimicrobial stewardship is defined as the optimal selection, dosage and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal impact on subsequent resistance (Shira and Lisa, 2011). The aim of the stewardship team is to help each patient receive the most appropriate antimicrobial at the correct dose and duration; prevent antimicrobial agents overuse, misuse, and abuse; and to minimize the development of resistance by the currently available antimicrobial agents (Shira and Lisa, 2011).

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