ISSN No:-2456-2165

Logical use of Dispensed Antibiotics

Kailong J.M.[1], Ali T.[2] and Ongachi faith[3]
Technical University of Mombasa

Abstract:- According to WHO (2001) more than 50% of all medicines are prescribed, dispensed inappropriately and 50% of the patients fail to take medicines correctly. Inappropriate use of antibiotics during prescribing could be due to lack of skills and guidelines on optimal diagnostic approaches (Costelloe *et al*; 2010). Uncontrolled use of antibiotics leads to overuse, inappropriate self medication and poor adherence to dosing regimens (Kar *et al*; 2010). The objective of the study was to evaluate the use of dispensed antibiotic prescriptions among the patients and pharmacist. The purposive non random sampling was used to recruit both the patients presenting at the pharmacies and pharmacies working in the community pharmacies. Then simple random sampling was used to recruit the subjects willing to participate by taking consent. The subjects were interviewed during dispensing of antibiotics and post dispensing time (10 days). All collected data was cleaned before entered into SPSS version 21 software for analysis. The analyzed data was interpreted using tables, pie charts and graphs. Results found out that 68.4% of the dispensed antibiotic prescriptions at the community pharmacies were from the nearby clinics and hospitals. About 77.6% of generated prescriptions by the prescribers were based on the presenting patient history and prescribing guidelines available. The bivariate analysis found out that rampant use of antibiotics (p=0.000), adherence to antibiotic use (p=0.000), patient counseling during dispensing (p=0.000) and lose of resources (p=0.000) due to inappropriate use of antibiotics were statistically significant. The multivariate logistic regression findings show that rampant use of antibiotic (AOR 1.821; CI 1.651,2009) and respondents age (AOR 1.380; CI 1.380, 3.497) were likely to compromise appropriate use of antibiotics. Thus the study recommends on continuous education of patients on rationale use of antibiotics, prescribers and pharmacist to accord adequate counseling to their patients on antibiotics use and the cost of prescribed be made affordable.

I. INTRODUCTION

Antibiotics are medicines used to treat or manage bacterial infections (Napolitano *et al*; 2010). A number of antibiotics are sourced from natural sources and were introduced in 1940's (WHO, 2001). Antibiotics manifest their pharmacological effects via inhibition or killing micro-organisms (Kardas, 2006). These medicines are used for treatment as well as prophylaxis against infections (Pechère *et al*; 2007). It is crucial to always carry out comprehensive investigations on the patient in order to determine if they need antibiotics or not (Mekonnene *et al*; 2017). Cases of misuse or irrational use have been reported and it threatens infection management (Kardas, 2006).

According to WHO (2001) more than 50% of all medicines are prescribed, dispensed inappropriately and 50% of the patients fail to take medicines correctly. Inappropriate use of antibiotics during prescribing could be due to lack of skills and guidelines on optimal diagnostic approaches (Costelloe *et al*; 2010). The rise in marketing of pharmaceutical products by pharmaceutical companies' representatives is a good practice but when done unethical may misguide the prescriber not to adhere to provided prescribing guidelines on drug selection (Okechukwu, 2020). In developing countries, less than 40% of patients in the public sector and 30% in the private sector are treated according to clinical guidelines (Mekonnen *et al*; 2017).

The WHO advocates that rational dispensing principles should be followed at all times to ensure that patients receive adequate information regarding the use of dispensed medicines, so as to achieve the desired benefits (MMS and MPHS, 2010). For instance, if dispensing practices such as counting, packaging, and labeling are poorly executed; they are likely to impact the patient's confidence in the dispensed products and subsequently improve on adherence, compliance and concordance to antibiotics.

Resistance to antimicrobial drugs by the microorganism is increased now as days due to improper use of antibiotics (Roque *et al*; 2015). Self-medication and inappropriate use of antibiotics is now in the rise one of the emerging factors to cause this condition. It is important to educate the patients on the dangers of self medication and its consequences (Gualano *et al*; 2015). The pharmacist have a huge role in reduces antibiotic misuse to an extend of 85% via providing key information or counseling to the patient as well as adhering to strict issuance guidelines of antibiotics thus preventing microbial resistance (Costelloe *et al*; 2010). Unrestricted availability of antibiotics leads to overuse, inappropriate self-medication and non-adherence to dosing regimens (Kar *et al*; 2010).

Inappropriate use of drugs harms people and wastes resources (Gualano *et al*; 2015), increase the cost of healthcare system and side effect (Napolitano et al; 2013), microbial resistance to the patients receiving antibiotics leading to therapeutic failure (Kandakai *et al*; 1996), adverse drug reactions, medication errors and hence eroded patient confidence due to poor or negative health outcomes (Maragakis *et al*; 2008).

The present study was designed to investigate appropriate use of antibiotics by the patients visiting community pharmacies shops for prescription refill.

ISSN No:-2456-2165

II. RESEARCH STUDY DESIGN

The study employed a descriptive cross sectional study design. The study was relevant in monitoring antibiotic use and other variables of interest as they exist in a defined population at a single point in time. The fisher's et al formula was used to calculate the study sample size of 196. Five community pharmacies with over 20 years practice experience and registered with the pharmacy and poisons board within Mombasa town were chosen. The purposive non random sampling was used to recruit both the patients presenting at the pharmacies and pharmacies working in the community pharmacies. A simple random sampling was later used to recruit the subjects willing to participate in the study by assigning natural numbers to all prescriptions and pharmacists then all odd numbers were selected. The participants were taken through the study objectives and provided written informed consent to sign as an indicator of willingness to participate. Data was collected by conducting interviews to the subjects pre-dispensing and post dispensing. All collected data was cleaned before entered into SPSS version 21 software for analysis. The analyzed data was interpreted using tables, pie charts and graphs. The research observed total ethical considerations on the collected data and subjects in all stages.

III. RESULTS

Variable	Category	Frequency
Sex	Male	105(53.6%)
	Female	91(46.4%)
Age	20-40 years	85(43.4%)
	>40 years	111(56.6%)
Source of prescription	Hospital or clinic	134(68.4%)
	Self medication	62(31.6%)
Prescription indicator	Laboratory investigations	12(6.1%)
	History taking	152(77.6%)
	Patient request	32(16.3%)
Dispensed drug	One prescribed	142(72.4%)
	Alternative	54(27.6%)
Dose dispensed	Full	116(59.2%)
	Half	80(40.8%)
Drug instructions given	Adequate	128(65.3%)
	In adequate	68(34.7%)
Rampant use of antibiotics	Yes	17(8.7%)
	No	179(91.3%)
Laboratory cultures	Done	12(6.1%)
	Not done	184(93.9%)

Table 1: Appropriate prescribing and dispensing of antibiotics

Variable	Category	Frequency
Drug use	Correct use	142(72.4%)
	Over use	20(27.6%)
	Underuse	34(17.3%)
Dose	Finished	115(82.7%)
	Un finished	81(41.3%)
Adherence	Good	112(57.1%)
	Poor	84(42.9%)
Prescribed drug (s)		
Cost	Affordable	78(39.8%)
	Costly	118(60.2%)
Prescriber		
Time	Adequate	143(73%)
	Minimal	53(27%)
Training and supervision	Sufficient	172(87.8%)
	Insufficient	24(12.2%)
Pharmacist time	Adequate	188(95.9%)
	Minimal	8(4.1%)
Drug counseling	Adequate	168(85.7%)
	Inadequate	28(14.3%)

Table 2: Appropriate use of dispensed antibiotics

ISSN No:-2456-2165

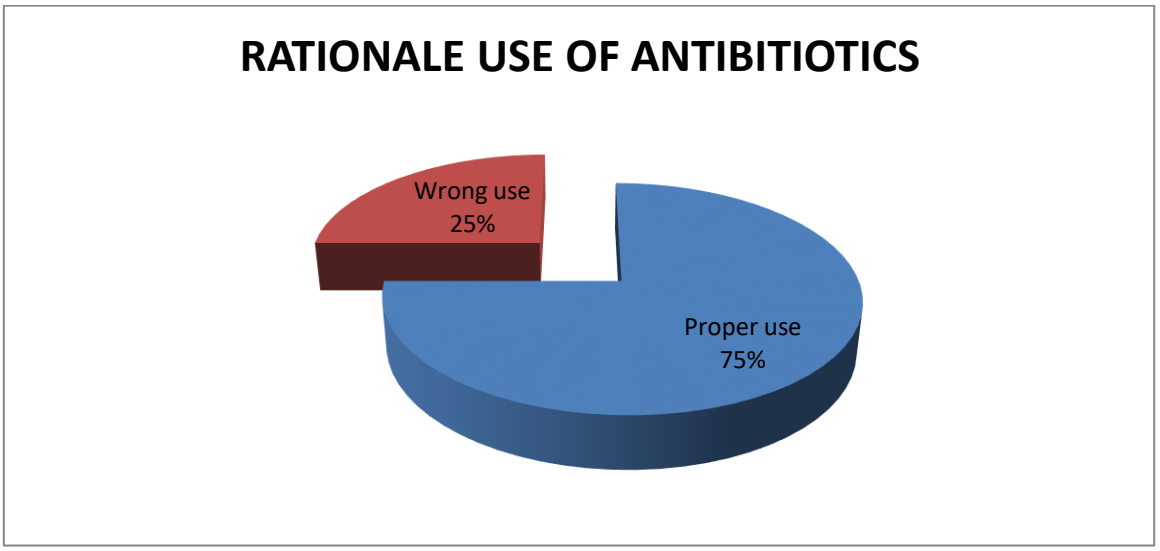

Fig. 1: Rationale use of dispensed antibiotics in community pharmacies

Variable	Category	Frequency
Consequences		
Antimicrobial resistance	Yes	193(98.5%)
	No	3(1.5%)
ADRs	Yes	196(100%)
	No	0(0%)
Medication errors	Yes	175(89.3%)
	No	21(10.7%)
Lost of resources	Yes	192(98%)
	No	4(2%)
Lack of trust to health care	Yes	194(99%)
	No	2(1%)

Table 3: Antibiotic use outcome

Variable	Category	Frequency	Rationale use (n=147)	Irrational use (n=49)	Df	Chi square	P - value
Sex	Male	105(53.6%)	65(44.2%)	40(81.6%)	1	20.684	0.000
	Female	91(46.4%)	82(55.8%)	9(18.4%)			
Age	20-40 years	85(43.4%)	38(25.9%)	47(95.9%)	1	32.763	0.000
	>40 years	111(56.6%)	109(74.1%)	2(4.1%)			
Source of prescription	Hospital or clinic	134(68.4%)	88(59.9%)	46(93.9%)	1	19.66	0.000
	Self medication	62(31.6%)	59(40.1%)	3(6.1%)			
Prescription indicator	Laboratory investigations	12(6.1%)	12(8.2%)	0(0%)	2	88.868	0.000
	History taking	152(77.6%)	132(89.8%)	20(40.8%)			
	Patient request	32(16.3%)	3(2%)	29(59.2%)			
Dispensed drug	One prescribed	142(72.4%)	123(83.7%)	19(38.8%)	1	51.99	0.000
	Alternative	54(27.6%)	14(16.3%)	30(61.2%)			
Dose dispensed	Full	116(59.2%)	102(69.4%)	14(28.6%)	1	25.345	0.000
	Half	80(40.8%)	45(30.6%)	35(71.4%)			
Drug instructions given	Adequate	128(65.3%)	116(78.9%)	12(24.5%)	1	2.366	0.124
	In adequate	68(34.7%)	31(21.1)	37(75.5%)			
Rampant use of antibiotics	Yes	17(8.7%)	0(0%)	17(34.7%)	1	55.844	0.000
	No	179(91.3%)	147(100%)	32(65.3%)			
Laboratory cultures	Done	12(6.1%)	12(8.2%)	0(0%)	1	4.261	0.039
	Not done	184(93.9%)	135(91.8%)	49(100%)			

Table 4: Bivariate analysis appropriate prescribing and dispensing of antibiotics

ISSN No:-2456-2165

Variable	**Category**	**Frequency (%)**	Rationale use =147	Irrational use =49	Df	Chi square	P - value
Drug use	Correct use	142(72.4%)	147(100%)	0(0%)	2	196	0.000
	Over use	20(27.6%)	0(0%)	22(44.9%)			
	Underuse	34(17.3%)	0(0%)	27(55.1%)			
Dose	Finished	115(82.7%)	113(76.9%)	2(4.1%)	1	80	0.000
	Un finished	81(41.3%)	34(23.1%)	47(95.9%)			
Adherence	Good	112(57.1%)	107(72.8%)	5(10.2%)	1	58	0.000
	Poor	84(42.9%)	40(27.2%)	44(89.8%)			
Prescribed drug (s)							
Cost	Affordable	78(39.8%)	42(28.6%)	36(73.5%)	1	0.257	0.612
	Costly	118(60.2%)	105(71.4%)	13(26.5%)			
Prescriber							
Time	Adequate	143(73%)	138(93.9%)	5(10.2%)	1	130.417	0.000
	Minimal	53(27%)	9(6.1%)	44(89.8%)			
Training and supervision	Sufficient	172(87.8%)	146(99.3%)	26(53.1%)	1	78.173	0.000
	Insufficient	24(12.2%)	1(0.7%)	23(47.1%)			
Pharmacist time	Adequate	188(95.9%)	144(98%)	44(89.8%)	1	6.255	0.012
	Minimal	8(4.1%)	3(2%)	5(10.2%)			
Drug counseling	Adequate	168(85.7%)	147(100%)	21(42.9%)	1	98	0.000
	Un adequate	28(14.3%)	0(0%)	28(57.1%)			

Table 5: Bivariate analysis on appropriate use of antibiotics

Variable	Category	Appropriate use of antibiotics by patients		AOR (CI 95%)	P – value
		Rationale (n=147)	Irrational (n=49)		
Sex	Male	105(53.6%)	65(44.2%)	1.456 (0.947,2.237)	0.000
	Female	91(46.4%)	82(55.8%)		
Age	20-40 years	85(43.4%)	38(25.9%)	2.197 (1.380, 3.497)	0.000
	>40 years	111(56.6%)	109(74.1%)		
Source of prescription	Hospital or clinic	134(68.4%)	88(59.9%)	1.449 (0.27, 2.265)	0.000
	Self medication	62(31.6%)	59(40.1%)		
Prescription indicator	Laboratory investigations	12(6.1%)	12(8.2%)	-	0.000
	History taking	152(77.6%)	132(89.8%)		
	Patient request	32(16.3%)	3(2%)		
Dispensed drug	One prescribed	142(72.4%)	123(83.7%)	0.299 (0.159, 0.565)	0.000
	Alternative	54(27.6%)	14(16.3%)		
Dose dispensed	Full	116(59.2%)	102(69.4%)	0.64 (0.407, 1.005)	0.000
	Half	80(40.8%)	45(30.6%)		
Rampant use of antibiotics	Yes	17(8.7%)	0(0%)	1.821 (1.651, 2.009)	0.000
	No	179(91.3%)	147(100%)		
Drug use	Correct use	142(72.4%)	147(100%)	-	0.000
	Over use	20(27.6%)	0(0%)		
	Underuse	34(17.3%)	0(0%)		
Dose	Finished	115(82.7%)	113(76.9%)	0.427 (0.265, 0.688)	0.000
	Un finished	81(41.3%)	34(23.1%)		
Adherence	Good	112(57.1%)	107(72.8%)	0.498 (0.315, 0.790)	0.000
	Poor	84(42.9%)	40(27.2%)		
Time	Adequate	143(73%)	138(93.9%)	0.176 (0.084, 0.390)	0.000
	Minimal	53(27%)	9(6.1%)		
Training and supervision	Sufficient	172(87.8%)	146(99.3%)	0.491 (0.227, 1.060)	0.000
	Insufficient	24(12.2%)	1(0.7%)		
Policy on promotion of drugs	Aware	168(85.7%)	147(100%)	0.533 (0.481, 0.591)	0.000
	Not aware	28(14.3%)	0(0%)		
Antimicrobial resistance	Yes	193(98.5%)	147(100%)	0.568 (0.517, 0.623)	0.000
	No	3(1.5%)	0(0%)		
Loss of resources	Yes	192(98%)	147(100%)	0.566 (0.516, 0.622)	0.000
	No	4(2%)	0(0%)		

Table 6: Bivariate analysis on antibiotic use outcome

Variable	Category	Frequency (%)	Rationale use (n= 147	Irrational use (n=49)	Df	Chi square	P – value
Consequences							
Antimicrobial resistance	Yes	193(98.5%)	147(100%)	46(93.9%)	1	9.14	0.000
	No	3(1.5%)	0(0%)	3(6.1%)			
ADRs	Yes	196(100%)	147(100%)	49(100%)	-	-	-
	No	0(0%)	0(0%)	0(0%)			
Medication errors	Yes	175(89.3%)	127(86.4%)	48(98%)	1	5.138	0.023
	No	21(10.7%)	20(13.6%)	1(2%)			
Loss of resources	Yes	192(98%)	147(100%)	45(91.8%)	1	12.25	0.000
	No	4(2%)	0(0%)	4(8.2%)			
Lack of trust to health care	Yes	194(99%)	145(98.6%)	49(100%)	1	0.674	0.412
	No	2(1%)	2(1.4%)	0(0%)			

Table 7: Multivariate logistic regression of appropriate use of antibiotics

ISSN No:-2456-2165

IV. DISCUSSIONS

The study found out that 68.4% of the dispensed prescriptions at the community pharmacies were originating from the hospitals and clinics. According to Mattia (2003) findings, 67% prescriptions were from doctors clinics. Based on laboratory investigations; 77.6% of the total diagnosed cases were based on patient history while 6.1% were from laboratory cultures. High utilization of microbiological cultures (29.4%) were recorded by Erick *et al* (2018) findings.

About, 72.4% of the dispensed drugs were the originally prescribed drugs and others were substituted by the pharmacist after consultation by the prescribers. From the patients that were issued drugs from the pharmacy outlets, 65% believed had received adequate instructions on medicine use. Based bivariate analysis, drug instructions given during dispensing (p=0.124) was not statistically significant. The studied community pharmacies could not allow issuing of antibiotics without a prescription and this was contrary to 88.8% purchase of antibiotics at the community pharmacies without prescriptions (Erick *et al*; 2018).

On evaluation of the patient knowledge on dispensed antibiotics; 72.4% were able to recall the correct use of the medicines while 27.6% were likely to over use and 17.3% under use. About 82.7% understood the importance of finishing antibiotic dose, 57.1% demonstrated confidence of good adherence to drugs. However, 39.8% were not able to secure the prescribed antibiotic dose due to the cost of medicines (unaffordable). On attitude; 73% believed the prescribers accorded them adequate time and 87.8% received sufficient time to explain their conditions. Up to 95.9% accept that the pharmacists accorded them adequate time and 85.7% got adequate counseling on medication use. The bivariate analysis findings found out that the cost of antibiotics (p=0.612) wasn't statistically significant.

Once the patients had completed their doses they were to come back to the community pharmacies and record their experience on antibiotic use according to research design (monitoring). The recorded findings show that 75% of the responded had adhered to the pharmacists' instructions on medicine use while the rest had missed some doses and others failed to finish their doses. Lack of trust to health care (p=0.412) was not statistically significant. On multivariate logistic regression findings found out that rampant use of antibiotics (AOR 1.821; CI 1.651, 2.009) and respondents age (AOR 2.197; CI 1.380, 3.497). The reasons inappropriate uses of antibiotics were being too busy at work and forgetfulness. According to Endalew *et al* (2015), inappropriate use of antibiotics was 30.9% and self medication (18%). The reasons for inappropriate use of medications were low education status, age, unsatisfaction with the health care services, engagement in job and low knowledge on antibiotic use (Endalew *et al*; 2015).

V. CONCLUSION

The study recorded low utilization of microbiological culture results in the choice of antibiotic. The prescribers should accord adequate time to the patients during diseases investigation process in order to enhance client satisfaction. There was need to educate patients more on antibiotics use in order to improve on adherence and reduce any eventuality of antimicrobial resistance. The essential drugs like antibiotics need to be subsidized by the government in order to improve on patient affordability and acquisition.

VI. RECOMMENDATIONS

- The study recommends that;
  - The prescribers and pharmacists consistently accord the patients adequate time during diagnosis, investigation process, dispensing and counseling in order to improve on the compliance of medicines
  - The patients require continuous training on rationale use of antibiotics and the adverse effects of self medications
  - The government should explore options of enhancing affordability of essential drugs with the intention of improving health outcomes of all people

REFERENCES

[1.] Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. (2010). Effect of antibiotic prescribing in among primary care on antimicrobial resistance in individual patients: Systematic review and meta-analysis. *BMJ*; 340:c2096.

[2.] Endalew G., Laychiluh B., Muluken A. (2015). Inappropriate Use of Antibiotics and Its Associated Factors Urban and Rural Communities of Bahir Dar City Administration, Northwest Ethiopia. *PLOS*; 10, 1371

[3.] Erick A.M., Leah A.S. and James S.N. (2018). Irrational use of antibiotics in the Moshi Municipality Northern Tanzania: a cross sectional study. *PanAfrican Medical Journal*; 31:165.

[4.] Gualano MR., Gili R., Scaioli G., Bert F., Siliquini R. (2015). General population's knowledge and attitudes about antibiotics: A systematic review and meta-analysis. *Pharmacoepidemiol Drug Saf*; 24(1):2-10.

[5.] Kandakai TL, Price JH, Telljohann SK, Holiday-Goodman M. (1996). Knowledge, beliefs, and use of prescribed antibiotic medications among low-socioeconomic African Americans. *J Natl Med Assoc*; 88(5):289-94.

[6.] Kar, S.S1., Pradhan, H.S2. and Mohanta, G.P3. (2010). Concept of essential medicines and rational use in public health. *Indian Journal of Community Medicine*, 35(1), 10-13.

[7.] Kardas P. (2006). Noncompliance in current antibiotic practice. *Infect Dis Clin Pract*; 14(4):11-4.

[8.] Maragakis LL, Perencevich EN, Cosgrove SE. (2008). Clinical and economic burden of antimicrobial resistance. *Expert Rev Anti Infect Ther*; 6(5):751-63.

[9.] Mattias Larson (2003). Antibiotics use and resistance, assessing and improving utilization and provision of

antibiotics and other drugs in Vietnam. Karollinska institute, Stockholm, Sweden; 91 (7349), 630-638.

[10.] Mekonnen Sisay, Getnet Mengistu, Bereket Molla, Firehiwot Amare and Tesfaye Gabriel (2017). Evaluation of rational drug use based on World Health Organization core drug use indicators in selected public hospitals of eastern Ethiopia: a cross sectional study. *BMC Health Services Research*; 1**7**:161

[11.] Napolitano F, Izzo MT, Di Giuseppe G, Angelillo IF. (2013). Public knowledge, attitudes, and experience regarding the use of antibiotics in Italy. *PLoS One*; 8(12):e84177.

[12.] Ministry of medical services, ministry of public health and sanitation, Kenya. KEML 2010 [internet]. [cited 2013 November 20] available from: http://apps.who.medicinedocs.

[13.] Okechukwu Chioma (2020). Rational Use of Antibiotics – A Point Prevalence Study Carried out at a Tertiary Hospital in South-South Nigeria. *International Journal of TROPICAL DISEASE& Health;* 41(14): 39-47

[14.] Pechère JC, Hughes D, Kardas P, Cornaglia G. (2007). Non-compliance with antibiotic therapy for acute community infections: A global survey. *Int J Antimicrob Agents*; 29(3):245-53.

[15.] Roque F, Soares S, Breitenfeld L, Figueiras A, Herdeiro MT. (2915). Influence of community pharmacists? Attitudes on antibiotic dispensing behavior: A cross-sectional study in Portugal. *Clin Ther*; 37(1):168-177.

[16.] World Health Organization (2001). WHO Global Strategy for Containment of Antimicrobial Resistance. Geneva, Switzerland: Department of Communicable Disease Surveillance and Response 2001. Report No.: WHO/CDS/CSR/DRS/2001.2.