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Publications 2023

OPEN ACCESS
ONLINE ISSN: 2992-5797
PRINT ISSN: 2992-6122

NEWPORT INTERNATIONAL JOURNAL OF BIOLOGICAL AND APPLIED SCIENCES (NIJBAS)
Volume 3 Issue 2 2023

Antimalarial Drug Utilization and Adherence to Treatment Guideline in a Secondary Hospital in Sheema District Western Uganda

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ABSTRACT

There is great concern about the impact of malaria among the estimated 247 million cases reported in 2022. Rational drug use and adherence to treatment guidelines are major interventions to the eradication of malaria globally. Therefore, the purpose of this study was to determine the antimalarial drug utilization and adherence to treatment guidelines at Kitagatta Hospital in Sheema District, Western Uganda. A retrospective cross-sectional study using malaria medical records of 280 malaria patients was adopted. Folders of patients diagnosed with malaria, from January 2021 – March 2023 were assessed. Data were analyzed with SPSS using simple descriptive statistics. Of the 490 patient records assessed 280 patients had either uncomplicated or complicated malaria during the study period. It was found that 140 (50%) of patients were females 19-31 years (31.1 %) presenting with fever (100%), 79.3% with uncomplicated malaria, and 20.7% with complicated malaria. A total of 38.2% of the patients were on three different pills with an average number of drugs per prescription of 2.0 (optimal value=1.6-1.8), the percentage of encounters with antibiotics 46.8%, the percentage of drugs prescribed by generic name 100% (Optimal value=100), the percentage of encounter with injection 30.7% (optimal value=13.4%-24.1%), percentage of patient with uncomplicated treated with AL 79.3%, percentage of patient with complicated treated with artesunate injection 20.7%. The most commonly used antibiotic was ceftriaxone (27.9%). This study shows some levels of irrational use of the drugs in the course of malaria treatment in the studied facility however, prescribers strictly adhered to the use of artemether-lumefantrine and artesunate injection for the treatment of uncomplicated and complicated malaria as recommended by the guideline.

Keywords: Malaria, Antimalarial drug, Adherence, Mosquitoes, Sheema District.

INTRODUCTION

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable [1-3]. In 2020, there were an estimated 241 million cases of malaria worldwide. The estimated number of malaria deaths stood at 627 000 in 2020. The WHO African Region carries a disproportionately high share of the global malaria burden [4-6]. In 2020, the region was home to 95% of malaria cases and 96% of malaria deaths. Children under 5 accounted for about 80% of all malaria deaths in the Region 7, 8]. Pregnant women are also at high risk of malarial infection. Malaria during pregnancy can result in low birth weight, miscarriage, maternal, and fetal anemia [9-11]. Antimalarials are drugs used to prevent and treat malaria [6, 12]. Almost all of these agents are effective against the asexual erythrocytic stages of the malarial

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PRINT ISSN: 2992-6122

parasites, which cause attacks of malaria. Drugs in this group include amodiaquine, chloroquine, quinine, mefloquine, halofantrine, lumefantrine, artemether, and proguanil [13]. Sheema District is a district in western Uganda with a population of 261,400 (2016) with an area of 942.3 km2. The world health organization (WHO) recommended a policy, shifting from presumptive treatment to mandatory testing of all suspected malaria cases [14]. Prescription of artemisinin-based combination therapy (ACT) was limited only to those with a positive malaria test and withheld for those with a negative malaria test. In 2011, the Ugandan Ministry of Health (MOH) followed WHO policy to mandate the testing of all fevers as part of malaria case-management guidelines and additionally approved amodiaquine-artesunate (AQ plus AS) and dihydroartemisinin-piperaquine (DP) as the alternative and line of treatment for uncomplicated malaria, respectively. Prompt diagnosis and treatment of complicated and uncomplicated *Plasmodium falciparum* malaria with artemisinin-based combination therapy (ACT) is a key malaria control and elimination strategy and treatment of complicated malaria with IV artesunate [15, 16]. If not treated promptly, uncomplicated *P. falciparum* malaria has the potential to progress to severe malaria and death. WHO following cases of resistance to first-generation antimalarial (chloroquine) and adverse events of some effective ones (quinine) has recommended oral artemether-lumefantrine and intravenous artesunate as first-line drugs for the treatment of uncomplicated malaria and complicated malaria respectively. Proper utilization of medicine is also a critical component of patient care and determines the rate and extent to which a desired outcome is achieved. However, initially, the limited supply and high costs of ACTs impeded the translation of policy to clinical practice, and adherence levels to the new guidelines remained low [17]. During that period the use of ineffective antimalarials, such as chloroquine, sulfadoxine-pyrimethamine, and artemisinin monotherapy remained prevalent. Currently, the drug utilization practices, especially in malaria treatment, and the level of adherence to the treatment guidelines by health facilities in Sheema district are not clearly known as there are no available data supporting it, hence the need for the study to assess the antimalarial drug utilization and adherence to treatment guidelines in a secondary Hospital in Sheema District Uganda.

METHODOLOGY

Study design

This study employed a retrospective cross-sectional study design.

Area of Study

The study was conducted in Sheema District at a Secondary Hospital. Sheema has an area: of 942.3 km² and is located in the Western region of Uganda with Area code 004. Sheema is found in southwestern Uganda and shares boundaries with districts such as Mitooma District, Rukungiri District, and Bushenyi District. The Sheema population entirely depends on subsistence farming of matooke, cattle rearing, and coffee growing.

Study population

The study used all available folders of patients diagnosed with complicated and uncomplicated malaria at Kitagatta Hospital.

Sample size determination

The sample size was determined using Kish Leslie's formula (1965)

$N = (Za/2)^2\ p(1-p)/e^2$

Where N is the required sample size, p is the approximate number of patients at Kitagata Hospital in Sheema District and e is the permissible error.

Sample size and sampling techniques

The study included only malaria patients at Kitagata Hospital utilized by patients in the Sheema district in accessing health care services.

A total of 490 patient files were assessed at Kitagata Hospital.

Sample processing procedure

A proforma containing the malaria case management practices was used to obtain the indicators.

The collected data was transported to the KIU-WC pharmacy school and analyzed.

Dependent Variables

Malaria testing and case management services.

Independent Variable

The independent variables included adherence to malaria treatment guidelines and other challenges faced by health workers.

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Data Collection Method and Tools

Data was collected using a proforma to obtain information from the patient files and from the medical records. The researcher obtained permission from the administration at the Health Centre to access data form from the medical records. The properly filled proforma was then collected and then data was taken for analysis.

Data entry and cleaning

The filled proforma and data collection form was checked for completeness, cleaned, and sorted to eliminate obvious inaccuracies and omissions. The data was then coded and entered into a computer.

Data analysis

The qualitative data collected were statistically analyzed and documented using SPSS version 25. Simple descriptive statistics such as frequencies, percentages, mean, median, and mode were used. The analyzed data was then presented in the form of tables and graphs which was a basis for the discussion and conclusion among others.

RESULTS

Demographic characteristics of the patients.

Table 1. Demographic characteristics of the Patients n =280

A total of 490 patient files were examined. Of the 280 patients, 140 patients were females and 140 were males. With age groups 1-5 years (22.1%), 6-18 years (20.4%), 19-30 years (31.1%), 31-45 years (19.6%), and 46 years and above (6.8%). Other characteristics are shown in Table 1

Table 1: Socio-demographic data of the respondents.

Characteristic	Response	Frequency (%)
Gender	Male	140 (50)
	Female	140 (50)
	Total	280 (100)
Age	1-5 Years	22.1 (62)
	6-18 Years	20.4 (57)
	19-30 Years	31.1 (87)
	31-45 Years	19.6 (55)
	>46 years	6.8 (19)
	Total	100

Clinical Data

The percentage number of drugs per encounter

A total of 1.4% of the patients were not on pills, 2.9%of the patients were using one pill, 54.3% of the patients were using two different pills, 38.2% of the patients were using three different pills and 3.2% of the patients were using four different pills.

Table 2: Percentage number of drugs per encounter

Number Of Pills	Frequency (%)
0	1.4 (4)
1	2.9 (8)
2	54.3 (152)
3	38.2 (107)
4	3.2 (9)

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The percentage number of encounters with antibiotics

In combating other Comorbidities, the patient presented with malaria. Ciprofloxacin (22.5%), Amoxicillin (20.2%), IV Ceftriaxone (27.9%), Doxycycline (4.7%), and Metronidazole (7.0%). Iv Gentamycin (4.7%), Ampicillin (0.8%), and Amoxyl (12.4%)

Table 3: Percentage of encounters with antibiotics.

Antibiotic name	Frequency (%)
Ciprofloxacin	22.5 (63)
Amoxicilin	21.0 (59)
IV Cefriaxone	27.9 (78)
Doxycycline	4.7 (13)
Metronidazole	7.0 (19)
Gentamycin	4.0 (11)
Ampicilin	0.8 (2)
Total	100
Antibiotic use	46.1 (130)
No antibiotic use	53.9 (150)

The percentage of prescribed drugs with generic names

A total of 280 patients were involved in the study of which all 280 patients (100%) were treated with generically prescribed medications.

Table 4: Percentage of drugs with generic names

Prescription	Frequency (%)
GENERIC	100 (280)
Non Generic Prescription	0 (00)
Total	100

The percentage of encounters with injection.

A total of 280 patients were involved in the study of which 196 patients (70%) were treated without injections and 84 patients (30%) were treated without injections.

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Table 5: Percentage of encounters with injection.

Patient Details	Frequency (%)
Patients On Injections	30 (84)
Patients Not On Injections	70 (196)
Total	**100**

Level of adherence to new malaria treatment guidelines.

A total of 79.3% had uncomplicated malaria and 20.7% had complicated malaria, the percentage of patients with uncomplicated were treated with AL was 79.3%, percentage of patients with complicated treated with artesunate injection was 20.7%. All the 280 (100%) patients who had both uncomplicated and complicated received treatment.

DISCUSSION

Socio-demographic characteristics of the respondents

Malaria is one of the most severe public health problems worldwide. In this study, half of the patients (140) were females and the other half were males. The age groups of the patients were 1-5 years which was less than one-third, 6-8 years which was less than one-third,19-30 years which was a third, 31-45 years which was a few and 46 years and above years which was a few. It was revealed that age was significantly associated with malaria cases showing higher incidence in infants.

The average number of drugs per encounter (pill burden)

The average number of drugs per prescription, 2.0, at Kitagatta Hospital is not acceptable compared with the standard (1.6-1.8) derived as ideal. In a similar study performed in southwest Ethiopia at Jimma Hospital, the average number of drugs per encounter was 1.59, which was also in the acceptable range [18]. However, in a study on prescribing patterns in three hospitals in Southern Ethiopia, the average number of drugs per patient was 0.98 at Gondar Hospital, 1.8 at Bahirdar Hospital, and 2.2 at Debre Tabor Hospital [19]. A national baseline study on drug use indicators in Ethiopia in September 2002 also found the average number of drugs prescribed per encounter to be 1.9, which is similar to our finding of Desalegn [19]. In the study of drug use patterns in 12 developing countries, the average number of drugs per encounter was high in Nigeria (3.8) [20]. A high average number of drugs might be due to financial incentives to prescribers to prescribe more, lack of therapeutic training of prescribers, or shortage of therapeutically correct drugs. The incidence of ADRs due to polypharmacy is alarmingly high. The factors associated with ADRs are modifiable. Policies are needed to design and strengthen the prescription pattern.

The percentage of encounters with antibiotics

On the basis of the finding of this study, the prescribing practices for antibiotics and injection show deviation from the standard recommended by WHO as the percentage exposure to antibiotics was higher than the recommended value of 2. Ciprofloxacin 22.5% and IV ceftriaxone 29.7% are the two commonly overused and costly forms of drug therapy that need to be regulated closely. Drug use evaluation should be done for some of the antibiotics to check whether they were appropriately prescribed or not. Overprescribing of antibiotics has led to resistant bacteria (bacteria that are harder to treat). Some germs that were once very responsive to antibiotics have become more and more resistant.

The percentage of drugs prescribed with a generic name

The percentage of drugs prescribed by generic name at Kitagatta Hospital is almost similar to the standard derived to serve as ideal (100%). In a similar study carried out at Jimma Hospital, southwest Ethiopia, the percentage of drugs prescribed by generic name was 75.2% [19], which is low compared to the standard and to our findings. In the study of 12 developing countries, the percentage of generic drugs prescribed was low in Nigeria, Tanzania, and Zambia [20-22]. Prescribing using generic names allows for any suitable chemical substitute of the drug, rather than a particular brand of drug to be dispensed. Hence, a wider range of alternative preparations can be used rather than being limited to one which may not be stocked. Brand-name drugs have to go through expensive animal and clinical studies to prove their safety and efficacy.

The percentage of encounters with Injection

One-third of the patients were exposed to injection, which is higher than the standard injection (13.4%-24.1%) recommended by WHO as ideal derived to serve as ideal. Possible reasons for the high use of injections could be **(i)** beliefs and attitudes of patients and health professionals about the efficacy of injection versus oral medication or **(ii)** our study setting is a referral hospital where patients with serious conditions are treated, and injectable forms produce faster onset of action. Unsafe injection practices (including reusing injection equipment) increase the risk of

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PRINT ISSN: 2992-6122

transmission of infectious diseases, such as hemorrhagic fevers, hepatitis (B and C), and HIV, as well as skin abscesses, nerve damage, and paralysis of the area around the injection site [23, 24, 25, 26, 27, 28, 29]. In a prescription pattern study in 12 developing countries, the percentage of encounters in which an injection was prescribed was high in Uganda (48%) [23, 24, 25, 26, 27, 28, 29]. Injections are very expensive compared to other dosage forms and require trained personnel for administration. Moreover, unhygienic use of injections can increase the risk of transmission of potentially serious pathogens, such as hepatitis, HIV/AIDS, and blood-borne diseases [23, 24].

The level of adherence to new malaria treatment guidelines

Prescribers strictly adhered to the use of artemether-lumefantrine (79.3%) and artesunate injection (20.7%) for the treatment of uncomplicated and complicated malaria as recommended by the guideline. All the 280 (100%) patients who had both uncomplicated and complicated received treatment.

CONCLUSION

A total of 38.2% of the patients were on three different pills with an average number of drugs per prescription of 2.0 (optimal value=1.6-1.8) which indicates over-prescription. The percentage of encounters with antibiotics is 46.8% which indicates irrational antibiotic use. The percentage of drugs prescribed by generic name is 100% (Optimal value= 100) which is ideal. The percentage of encounters with injection was 30.7% (optimal value=13.4%-24.1%) which is above the range. The percentage of patients with uncomplicated treated with AL was 79.3%, percentage of patients with complicated treated with artesunate injection was 20.7%. Prescribers strictly adhered to the use of artemether-lumefantrine and artesunate injection for the treatment of uncomplicated and complicated malaria as recommended by the guideline at Kitagata Hospital.

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Kasozi Rodgers (2023). Antimalarial Drug Utilization and Adherence to Treatment Guideline in a Secondary Hospital in Sheema District Western Uganda. NEWPORT INTERNATIONAL JOURNAL OF BIOLOGICAL AND APPLIED SCIENCES (NIJBAS). 3(2):100-106.