Adherence to National Guidelines for the Diagnosis and Treatment of Malaria at the Kisii Teaching and Referral Hospital in Kenya

Bichanga K.P*, Karimi N.P, Guantai E.M

School of Pharmacy, University of Nairobi, P.O Box 19676-00202, Nairobi
Ministry of Health, P.O Box 30016-00100, Nairobi

**Corresponding Author: pbichanga@gmail.com*

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Abstract

Background: The Ministry of Health has developed specific national guidelines for diagnosis and treatment of malaria in Kenya. These guidelines assist health workers in making decisions on appropriate management of patients with malaria.

Objectives: The main objective of this study was to determine the proportion of patients with suspected malaria who were treated in accordance with the national guidelines.

Methodology: The study was a hospital-based cross-sectional study involving retrospective review of 430 patient files. Medical records of malaria patients were scrutinized to determine the proportion that was treated according to the guidelines. Data was collected using pre-tested data collection forms. The data was analyzed using descriptive and inferential statistics. The level of significance was set at 0.05.

Results: Majority of the patients [78.1% n=336] were aged <13 years. The mean age of the patients was 11.2 years [± SD 15.0 years]. The median age was 6 years with a range of 0.1 years to 84 years. Only 65% of the suspected cases were tested for malaria by either microscopy or Rapid Diagnostic Test (RDT). All the patients were expected to have been tested for malaria in accordance with the guidelines. Approximately 35% were not subjected to either confirmatory test. Of those tested, 78.4% tested positive and 25.5% tested negative for malaria with 95.8% of those who tested negative being issued antimalarials. Of the 208 patients who tested positive, 109 were classified as uncomplicated malaria but 99.1% of these patients received treatment for severe malaria. The most common co-morbidity in the patients treated for malaria was anaemia [29.9%] followed by gastroenteritis [9.9%]. Patients with co-morbidities were more likely to receive appropriate treatment [p=0.033] compared with those with none. The most commonly used combination of drugs was quinine and Artemether-Lumefantrine (AL) [44.7%] followed by artesunate and AL [43.3%]. The outcomes in these patients were discharge [95.6%], re-admission [2.6%], death [1.4%] and transfer [0.5%].

Conclusion: Malaria management was characterized by poor adherence to diagnosis and treatment guidelines. Antimalarial prescription in patients who test negative and those who are untested is still practiced in Kenya.

Keywords: *Clinical guidelines, ACTs, AL.*

Introduction

Clinical practice guidelines in healthcare are evidence-based recommendations, strategies or information that assists healthcare workers and patients in making decisions on appropriate healthcare for specific conditions. Reliable and trustworthy guidelines are based on a systematic review conducted by a panel of experts from different disciplines. These guidelines are a tool for making care more consistent and efficient and for closing the gap between what clinicians do and what scientific evidence supports. Adherence to clinical guidelines improves the quality of care received by the patients and thus improves patient outcomes. Malaria treatment guidelines have been developed at national and international levels. The first edition of malaria treatment guidelines by the World Health Organization (WHO) was published in 2006. The guidelines covered the diagnosis and treatment of uncomplicated and severe malaria caused by all types of malaria parasites. It also provided information on diagnosis and treatment of malaria in special groups (young children, pregnant women and patients with Human Immunodeficiency Virus (HIV), in travelers from non-endemic areas and in epidemics and emergency situations). These global guidelines are applicable widely, even in resource-limited settings. The WHO guidelines targeted policy makers at national levels and served as a framework for the development of national treatment protocols specific for different countries. These national guidelines are more detailed and tailored to the specific needs and conditions of each country. The National guidelines for the diagnosis, treatment and prevention of malaria in Kenya were first published by the Ministry of Health (MOH), Division of Malaria Control in 2006 and are updated periodically taking into consideration emergence of new evidence and continuous monitoring and evaluation. The most current guidelines were published in May 2014. These guidelines are aimed at improving malaria case management by all healthcare workers in Kenya and thus harmonizing efforts at reducing morbidity and mortality due to malaria.

Malaria is among Africa's leading causes of mortality for children under the age of 5 years and it contributes to 10%

of the continent's overall disease burden[1]. It accounts for 40% of public health expenditure, 30-50% of in-patient admissions and up to 50% of out-patient visits in areas of high malaria transmission. Of all malaria deaths in the world today, 90% occur in Sub-Saharan Africa [1].

According to the Kenya Medical Research Institute (KEMRI), malaria is the leading cause of morbidity and mortality in Kenya. Out of a population of 34 million Kenyans, 25 million are at risk of malaria [2]. Malaria accounts for 30-50% of all outpatient attendance and 20% of all admissions to health facilities. It is estimated to cause 20% of all deaths in children under the age of five years (MOH 2006). The most vulnerable group to malaria infections are pregnant women and children under 5 years of age. An estimated 170 million working days are lost to the disease each year (MOH 2001).

This level of morbidity and mortality is high despite the fact that malaria is an easily preventable and treatable disease and that treatments are available. This burden impairs economic and social development at the individual, family, community and national levels. One of the reasons for the current state of affairs could be poor patient management from diagnosis to treatment and follow-up, arising from non-adherence to national treatment guidelines. The improper use of antimalarial medicines and the resultant development of resistance is another possible undesirable consequence of non-adherence to national treatment guidelines.

Healthcare workers' management of malaria cases may differ from national guidelines. Resistance to antimalarial medicines has been documented in all classes of antimalarials including artemisinin derivatives and this is a major threat to malaria control. The widespread and indiscriminate use of antimalarials leads to emergence of drug resistance. Resistance can be prevented, or its onset slowed considerably by ensuring very high cure rates through full adherence to the treatment guidelines.

The impact of clinical guidelines in practice is currently not optimal and there is much room for improvement. Studies have shown that patients with similar conditions are managed differently and given conflicting care depending on the practitioner. Healthcare workers manage cases of malaria differently from what is recommended in the national guidelines and this may contribute to the observed high morbidity and mortality.

Malaria continues to be one of the most severe public health problems worldwide despite global efforts to control it. Guideline adherent management is an important factor in preventing and treating malaria. Studies on the prevalence of guideline-adherent management of malaria patients in Kenya are lacking. This study addressed this gap as it sought to determine the prevalence of guideline-concordant management of malaria cases as well as to investigate the reasons for non-concordant management of these cases.

Practice patterns can be monitored to rank compliance with guidelines as an index of the quality of care offered to patients with suspected malaria. To achieve the long-term goal of malaria eradication, there is need to invest in the monitoring and use of evidence based guidelines. This study is useful for performance improvement purposes in terms of adherence to guidelines. The results may be useful in modifying and improving practices by healthcare workers in public health facilities in Kenya. The findings may help with developing strategies to improve adherence to malaria treatment guidelines and target the factors that impede malaria treatment guideline adherence. The study could also form a foundation for further studies which will assist in improving patient care. The recommendations will be forwarded to the division of malaria control as well as the hospital in which this study was carried out.

Materials and Methodology

Study design

The study design was a retrospective cross-sectional survey of patient files.

Study area

The study was carried out at the Kisii Teaching and Referral Hospital in Kenya. It serves as a referral facility for the Kisii county and the greater Gusii region, including nine neighboring sub-county hospitals. Kisii is a malaria endemic zone and transmission of malaria is intense throughout the year.

Study population

The study targeted patients treated for malaria between June 2014 to December 2014 at the Kisii Teaching and Referral Hospital. The management of these patients was reviewed to determine adherence to malaria treatment guidelines.

Inclusion criteria

Records of patients of all ages treated for malaria at the Kisii teaching and referral hospital between the months of June 2014 and December 2014. Because malaria in this region is endemic throughout the year, the study period is not expected to significantly affect the outcomes of interest.

Exclusion criteria

Records that were incomplete were excluded.

Sample Size Determination

The sample size was calculated using the Fischer's formula. The desired sample size was a minimum of 425 patients. This was sufficient to detect an incidence of 0.875 with a power of 80% and an alpha of 0.05. Due to unavailability of previous studies, the level of non-adherence was estimated to be 50%.

Sampling procedure

Patient files dated June 2014 to December 2014 were scrutinized to identify those containing malaria cases. A total of 1,392 files of the patients treated for malaria within the study period were identified for sampling. The sampling method was systematic random sampling. The sampling frame was created and the corresponding sampling interval, n, calculated by dividing the total number of files

(1,392) by the target sample size of 425. The files were then arranged in chronological order, and every 3rd (n=3) file was then selected for inclusion in the study population. If the selected 3rd file contained incomplete records, it was skipped and the immediate next file in the sequence was selected.

Data collection techniques

The data collection instrument was a pre- tested data collection form. Data was collected by the Principal Investigator between 8am and 5pm on Mondays, Tuesdays and Thursdays during the data collection period.

Data analysis

For the purpose of data analysis, the following definitions were applied. A diagnosis of malaria was considered only if malaria parasites were found in peripheral blood or the RDT was positive. The malaria diagnosis was further classified into uncomplicated malaria or severe malaria. The basis for the classification was the presence or absence of the documented features of severe malaria as defined by the WHO. Age classification was as follows; ages 0-5 years were classified as young children, ages 6-13 were classified as older children and all patients above the age of 13 were classified as adults.

A database of the collected data was created in Microsoft Excel 2010 spreadsheet and exported to SPSS version 22. Inferential and descriptive statistics were then calculated. The level of significance was set at 0.05. The data was summarized and presented in the form of tables, pie-charts and bar charts.

Ethical considerations

This study began after approval by the Kenyatta National Hospital and University of Nairobi Ethical and Research Committee (study reference number ***P715/12/2014)***. Permission was sought from the research committee of the Kisii Teaching and Referral Hospital before commencement of the study. Confidentiality of the participants was assured and maintained and no participant identifiers were recorded.

Results and discussion

The total number of patient files selected was 430. However, during data analysis, some data was lost causing the totals to be off by one or two digits. This was not thought to significantly affect the results.

Demographic characteristics of the Patients

The mean age of the patients was 11.2 years [± SD 15.0 years]. The median age was 6 years with a range of 0.1 years to 84 years. Majority of the patients [78.1%] were between the ages of 0 and 13 years with only 94 [21.9%] being older 13 years. Majority of the patients were male 243 [56.5%] while 187 [43.5%] were female. This is presented in Table 1.

Table 1. Demographic Characteristics of Patients

Characteristics	Frequency	Percentage
Age (years	**n**	**%**
0-5	212	49.3
6-13	124	28.8
> 13	94	21.9
Gender		
Male	243	56.5
Female	187	43.5

Co-morbidities in Patients Treated for Malaria

Of the study participants, 156 [36.3%] had no co-morbidities while 269 [63.7%] had either one co-morbidity or a combination of co-morbidities (Table 2). Anaemia was the most prevalent co-morbidity with 127 [29.5%] of the patients having the condition followed by gastroenteritis in 42 [9.8%] patients.

Table 2. Co-morbidities Associated With Malaria in the Kisii Teaching and Referral Hospital

Co-morbidity	n	%
Anaemia	127	29.5
Gastroenteritis	42	9.8
Gastroenteritis	22	5.1
Meningitis	22	5.1
Peptic Ulcer Disease	17	4.0
Malnutrition	10	2.3
Urinary Tract Infection	7	1.6
Anaemia + Gastroenteritis	Tra	Tra
Psychiatric	5	1.2
Epilepsy	5	1.2
Anaemia + Malnutrition	5	1.2
Anaemia + Pneumonia	4	0.2
Anaemia + peptic ulcer disease	1	0.9
None	156	36.3

Adherence to guidelines in the diagnosis of malaria

The number of patients who underwent a confirmatory laboratory test for malaria was 278 [65%] as presented in table 3 below. Most of the patients were diagnosed using microscopy [98.2%] with only 5 patients diagnosed using the RDT [1.8%]. The other 150 [35%] patients did not undergo any laboratory tests for diagnosis of malaria.

Among the patients who underwent a confirmatory test for malaria, 208 [74.8%] tested positive for malaria while 70 [25.5%] tested negative. Almost 96% of those who tested negative were still treated for malaria. Of the ones who tested positive 109 [25.3%] were classified as uncomplicated cases while 101 [23.5%] were classified as severe cases according to the WHO classification of malaria.

Table 3: *Proportion of Patients Tested for Malaria*

Variable		n	%	P value
Lab test done	Yes	278	65	<0.001
	No	150	35	

Type of test	Microscopy RDT	274 5	98.2 1.8	
Result of test	Positive Negative	208 70	74.8 25.2	
Type of malaria	Uncomplicated Severe	109 101	25.3 23.5	

These results reveal that there exists a significant deviation from the guidelines at the level of diagnosis [p <0.001]. A bivariate analysis found no association between testing and age or testing and gender. The p values were 0.455 and 0.207 showing no statistically significant probability of either variables affecting likelihood of testing of the patient.

Table 4. Association Between Age and Gender and Testing for Malaria

Lab test done						
Yes				**No**		
Variables		**n**	**%**	**n**	**%**	**P value**
Gender	Male Female	164 114	67.5 61.6	79 71	32.5 38.4	32.5
Age group	Children Adults	220 58	65.9 61.7	114 36	34.1 38.3	0.455

Guideline adherence in management of patients diagnosed with malaria

Treatment with antimalarials was given to 99% of the patients who tested positive, 95.8% of those who tested negative. Only one case of uncomplicated malaria was treated as such with the other 107 [99.1%] cases being managed with drugs for severe malaria which are parenteral artesunate or Quinine. Of the cases fitting the classification of severe malaria, 95 [95%] received guideline concordant management with parenteral artesunate or quinine followed by oral AL and 5 [5%] received non-concordant management by receiving drugs other than parenteral artesunate or quinine followed by oral AL.

Table 5. Treatment of Patients with Confirmed Malaria

Lab test done		
	Frequency	**Percentage**
Uncomplicated malaria	**n**	**%**
Yes **No**	1 107	0.9 99.1
Severe malaria		
Yes **No**	95 5	95 5

Drug combinations used to treat malaria

For the purposes of this discussion, the first drug refers to the initial drug given to the patient and the second drug refers to the follow-up drug given either after the first drug or in combination with the first drug.

The recommended treatment for uncomplicated malaria is artemether-lumefantrine (AL) co-formulated tablet. In the event of confirmed treatment failure, therapy with the second line ACT dihydroartemisinin-piperaquine (DP) is initiated. DP is also the recommended second line treatment for uncomplicated malaria in Kenya. Parenteral artesunate is the recommended first line treatment for severe malaria. Artemether or parenteral Quinine may be used in the absence of artesunate. As soon as the patient is able to tolerate oral medication, a complete course of AL is given. The most common combination of antimalarials used was Quinine and AL 190 [44.7%] followed by Artesunate and AL 184 [43.3%]. Five patients [1.2%] were treated with both quinine and artesunate. The remaining 15 [2.6%] were treated with DP as a second drug after quinine or artesunate (Table 6).

Table 6. Combinations of Antimalarial Drugs Used

First drug	**Second drug**	**Frequency**	**Percentage**
Quinine	AL	190	44.7
Artesunate	AL	184	43.3
AL	None	24	5.6
Quinine	D-P	13	3.1
Artesunate	Quinine	5	1.2
Quinine	Artesunate	3	0.7
Artesunate	Proguanil	3	0.7
Artesunate	D-P	2	0.5
Quinine	None	1	0.2

Outcomes of the patients treated for malaria

The four main outcomes were: discharge, death, re-admission and transfer. The patients who were treated and discharged were 410 [95.6%] of the cohort. Those re-admitted were 11 [2.6%], those who died were 6 [1.4%] while those who were transferred were 2 [0.5%] (Table 7).

Table 7. Outcomes of Patients Treated for Malaria at the Kisii Teaching and Referral Hospital

Outcome	**Frequency**	**Percentage**
Discharge	410	95.6
Death	6	1.4
Re-admission	11	2.6
Transfer	2	0.5

A comparison of the outcomes of the patients treated in accordance with the guidelines with those treated contrary to the guidelines is summarized in table 8 below. Of the patients who were diagnosed as per the guidelines, 96.4% were discharged, 1.1% died, 2.2% were re-admitted and 0.4% were transferred. The patients not diagnosed as per the guideline had the following outcomes: discharge [94%], death [2%], re-admission [3.4%] and transfer [0.7%]. There was no statistically significant association between testing for malaria and patient outcomes [p= 0.705]. The outcomes of the patients treated as per the guideline had the outcomes of discharge [95.8%], death [2.1%], re-admission [1%] and transfer [1%]. The patients not treated as per the guideline had the following outcomes: discharge [95.5%], death [1.2%], re-admission [3%] and transfer [0.3%]. There was no statistically significant association between testing for malaria and patient outcomes [p= 0.491].

Table 8. Association Between Adherent Management and Patient Outcomes

Outcome										
		Dis-charge		Death		Re-ad-mission		Trans-fer		P value
	Adher-ence	n	%	n	%	n	%	n	%	
Testing	Yes	140	94.0	3	2	5	3.4	1	0.7	
	No	268	96.4	3	1.1	6	2.2	1	0.4	0.705
Treatment	Yes	318	95.5	4	1.2	10	3.0	1	0.3	
	No	92	95.8	2	2.1	1	1.0	1	1.0	0.491

Outcomes of patients with co-morbidities

Patients treated for malaria who had no co-morbidities were 151 [35.5%] while those with co-morbidities were 259 [60.9%]. Of these patients, 151 were discharged, one died, two were re-admitted within 14 days of discharge and one was transferred to another facility. Analysis of the data found no statistically significant associations between the co-morbidities and the patient outcomes (Table 9).

Table 9. Association between co-morbidities and outcomes

Outcome		Co-morbidity present		Co-morbidity absent		
		n	%	n	%	P value
Discharge	Yes	15	5.5	5	3.2	
	No	259	94.5	151	96.8	0.283
Death	Yes	269	98.2	155	99.4	
	No	5	1.8	1	0.6	0.314
Re-eluation	Yes	265	96.7	154	98.7	
	No	9	3.3	2	1.3	0.206
Transfer	Yes	273	99.6	155	99.4	
	No	1	0.4	1	0.6	0.686

The most prevalent co-morbidity was anaemia which occurred in 29.9% of the study population. Although analysis revealed no statistically significant association between co-morbidities and outcomes [p=0.428], it is worth noting that anaemia accounted for 5 out the total 6 deaths [83.3%] and almost half of all re-admissions [46.2].

There was a statistically significant association between the presence of a co-morbidity and appropriate or inappropriate patient management. Patients with co-morbidities were more likely to receive appropriate management [p=0.003] as presented in table 10 below.

Table 10. Association between presence of co-morbidities and adherent management

Patient management					
	Adherence		Non-adherence		
	n	%	n	%	P value
Co-morbidity Present	70	25.5	204	74.5	
Co-morbidity Absent	26	16.7	130	83.3	0.033

Discussion

Almost half of the patients treated for malaria at the facility were aged 0-5 years [49.3%]. A total of 336 of the surveyed patients [78.1%] were children between the ages of 0-13 years. This is consistent with evidence that shows that in Kenya as in the rest of Sub-Saharan Africa, children under the age of 5 years are the most vulnerable group to malaria infection [2]. Of those who died, 66.7% were children under the age of 13 years. This shows the severity and high mortality due to malaria in children and suggests the possibility that adults in these endemic areas have developed some degree of natural immunity towards the disease. Development of acquired immunity to malaria occurs in childhood and thus the disease is severe and has rapid progression in children who have not yet developed this immunity.

For this study, adherence was measured in terms of parasitological diagnosis of malaria and treatment with the correct drug. Non-adherent treatment was defined in terms of inconsistency in confirmatory diagnosis of malaria, prescribing of antimalarials which are not recommended and prescribing antimalarials to cases testing negative. Malaria case management was characterized by sub-optimal adherence to the treatment guidelines.

Of the 425 patients surveyed, 65% underwent a confirmatory test for malaria (microscopy or RDT) while 35% were diagnosed clinically. Parasitological confirmation is essential as the result informs the clinician's decision on whether or not to prescribe an antimalarial. As in other studies conducted in Africa, co-morbidities were present in 36% of the patients. This is comparable to a study conducted in Gabon in which 22% of the study population had co-morbidities [3]. In children, it is essential to differentiate malaria from Upper Respiratory Tract Infection and Gastroenteritis. In this study 6.7% of the patients had an Upper Respiratory Tract Infection as a co-morbidity and 9.8% had Gastroenteritis. The inability to correctly diagnose and treat non-malarial fevers contributes to the decision to treat all or most fevers as malaria. Studies have indicated that the concordance rate between "presumptive" and "actual" parasitological malaria ranges between 10% and 60% [4]. This shows that presumptive treatment for malaria leads to many other febrile illnesses being treated as malaria and this endangers the patient's life and contributes to waste of resources. The 34.6% diagnosed clinically and treated for malaria should therefore be considered to have been inappropriately managed as only parasitologically confirmed cases should be prescribed antimalarials. Presumptive treatment of malaria was recommended by WHO for a long time. This method is however no longer recommended as it has very poor specificity. One study in Malawi showed that algorithms for malaria that are based solely on clinical symptoms do not perform well as they are non-specific and overlap with other potential causes of fever [5]. The symptoms of malaria have a significant overlap with conditions like pneumonia [5] which was present in 5.1% of the patients in this study. Clinical diagnosis of malaria without attendant parasitological confirmation makes it impossible to correctly estimate the disease burden in the region. This in turn limits efficient planning and

implementation of strategies to control and manage the disease. Laboratory confirmation of malaria would lead to a significant decrease wasteful use of antimalarials. Introduction of RDTs in public health facilities in Malawi resulted in a decrease in consumption of ACTs [5]. In a study evaluating the effect of increased use of RDTs on management of patients with malaria in Tanzania, it was established that correct treatment of malaria was significantly higher in the post-RDT implementation areas [85.9%] compared to the pre-RDT recommendation areas [58.3%]. Overtreatment was lower in the post-RDT [20.9%] areas compared to the pre-RDT areas [45.8%] [6]. Implementation of confirmatory diagnostic procedures has thus been proven to improve management of patients with suspected malaria.

Of the 278 patients who were tested, 74.8% had a positive result while 25.2% tested negative. Almost all who tested negative were still treated with antimalarials [95.8%], contrary to the guidelines which prescribe that patients with negative parasitological results are not prescribed antimalarials. These patients are therefore classified as receiving inappropriate treatment. This number is far higher than that in other studies across Africa that found that approximately 30% [7] and 33% [5] of patients who tested negative at the participating facilities were still treated with antimalarials. The large proportion may be due to the fact that the patients in this study were all in-patients and many had attendant co-morbidities which may influence overtreatment. In a study conducted in Tanzania, Ghana and Zambia, 50% of negative results were treated with an antimalarial [4]. This number is still unacceptably high and interventions are necessary to bring it down. In another study conducted in Tanzania, of the 168 patients presenting for treatment at the public health facility, only 63% were tested for malaria. Of those tested, 30% were positive and 70% were negative. Antimalarials were then issued to all the positive results, 14% of the negative results and 28% of those not tested [8]. The prevalence of positive results was higher in this study compared to that in Tanzania [8]. However, overtreatment was more prevalent in this study as 95.8% of negative results and 100% of untested patients received the antimalarials.

The patients surveyed were treated as cases of uncomplicated malaria or severe malaria. Almost all patients with symptoms of uncomplicated malaria received treatment for severe malaria [99%]. Of the patients with symptoms of severe malaria, 95% received guideline-adherent management while only 5% received treatment that was contrary to the guidelines. Overtreatment of confirmed and unconfirmed cases of malaria was rampant. This may be due to perceived severity of the illness in the presence of co-morbidities. Anaemia was the most prevalent co-morbidity followed by gastroenteritis, pneumonia, meningitis, PUD, malnutrition, UTI, epilepsy and psychiatric illness. This is consistent with other studies that showed that patients who were considered "more ill", e.g. those with higher fevers were treated more aggressively with more potent antimalarials [9]. We found no significant association between age of the patient and guideline adherent treatment. This is unlike a study in Uganda which revealed that children <6 months were less likely to be prescribed an antimalarial after a negative test result compared to children >6 months of age [10].

Patient co-morbidities influenced correct management. Patients who had attendant co-morbidities were more likely to receive appropriate treatment compared to those who had no co-morbidities. A possible explanation for this would be that patient-level symptoms influenced testing and treatment. Patients perceived to be more ill are more likely to be tested more thoroughly and treated more aggressively than less ill patients. This is consistent with another study that showed that children who tested negative for malaria but had symptoms suggestive of severe malaria were more likely to receive proper treatment as well as overtreatment [10]

Though we did not find statistically significant associations between adherent treatment and patient outcomes, this does not infer that adherence had no influence on outcomes. In comparison of outcomes of patients, 66.7% of deaths occurred in patients who received inappropriate management. Of the 11 readmissions, 90.1% occurred in patients managed contrary to the guidelines. This is consistent with other studies that have shown associations between non-adherent treatment and poor patient outcomes [11] [12]. Studies have shown higher mortality in children treated for malaria without confirmatory diagnosis compared to those who had a positive blood smear [13].

The most common combination of antimalarials used was Quinine and AL 190 [44.7%] followed by Artesunate and AL 184 [43.3%].This was perhaps due to the greater availability of quinine compared to artesunate at the facility. The choice of drug is usually determined by availability and licensing. In general, artesunate is preferred to quinine as research has shown that it decreases mortality in both adults and children with severe malaria compared to quinine [14]. Artesunate is also easier and safer to administer compared to quinine which has a narrow therapeutic index and requires cautious administration with glycaemic state and cardiac rhythm monitoring. This finding is consistent with a study in Uganda which revealed that IV Quinine was prescribed more frequently than IV artesunate to in-patient children being managed for malaria [10].

Study Limitations

This study was conducted at only one public health facility in Kenya. The reason for selection of only one facility was limitation of resources, specifically time and money. The results obtained may therefore not be generalisable to all other public health facilities in Kenya or to private health facilities in Kenya. However, majority of patients seek treatment at public health facilities. The study site serves as a primary care facility as well as a referral facility and thus serves as an adequate catchment area for a generalisable survey.

The retrospective nature of data collection from patient

records suffered challenges arising from incomplete records or poorly documented records. This was minimized by excluding all incomplete records from the study.

The method of diagnosis of the co-morbidities cannot be verified due to the retrospective nature of the study. The presence and nature of the co-morbidities is thus of limited reliability.

Conclusion and recommendation

Malaria management was characterized by poor adherence to diagnosis and treatment guidelines. This is despite widespread belief that adherence to the guidelines leads to improved patient outcomes and deters emergence of resistance to antimalarials.

Antimalarial prescription in patients who test negative and those who are untested is still practiced in Kenya as in other countries. Strategies need to be put in place to curb this culture of overtreatment. There is need for better management of febrile illnesses especially in children to avoid the high mortality in this population due to misdiagnosis or treatment of unconfirmed malaria cases. Healthcare workers should be reminded about the potential for co-morbidities in patients presenting with symptoms of malaria. They should also be encouraged to perform confirmatory diagnostic tests on all febrile patients. An emphasis should be made on the recommendation of not treating patients who test negative for malaria with antimalarials but instead investigating for other causes of the symptoms.

Wider dissemination of the guidelines and extensive training of healthcare workers on the same is recommended. Continuous medical education on the guidelines should be done to augment the trainings and update healthcare workers on any changes in the recommendations. Other recommended interventions that would likely improve guideline adherence are; enhanced supportive supervision, job aids, internal and external audits and feedback sessions. Further exploration of the factors related to non-adherence and development of strategies to address the same is also recommended.

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