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Barriers to Effective Management of Malaria in Children under Five Years in a Primary Care, Ghana

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Abstract

Background: Malaria is one of the leading causes of mortality among children below 5 years of age in Ghana. This study aimed to determine the barriers affecting the management of malaria in children under 5 years at the Manhyia hospital, Ghana.

Methods: This cross-sectional study was carried out at the Manhyia hospital, Kumasi. Questionnaires were administered to 131 health workers as well as 132 guardians of the children below 5 years affected with malaria to obtain data including socio-demographic characteristics of the children, guardians and health workers, the knowledge and practices towards good management of malaria and the challenges faced by guardians and health workers in malaria management.

Results: Majority of the infected children (38.6%) were between 1-6 months old. Route of drug administration ($p=0.018$) and those who were resistant to the action of the anti-malarial drugs ($p<0.001$) were significantly related to the outcome condition of the child after treatment. General body weakness (80.9%) was the common side effect of the anti-malaria drugs. There was no significant barrier affecting malaria management from the results of the guardians. However, affordability of the anti-malarial drug (24.2%) was a challenge to the parents/guardians.

Conclusion: Constant supply of quality but affordable drugs and adequate supervision working synergistically will ensure appropriate management of malaria in children and in turn improve the quality of healthcare.

Keywords: Malaria; Barriers; Drug; Anti-malaria; Management

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Introduction

According to the World Malaria Report 2015, there were 214 million cases of malaria globally in 2015 (uncertainty range 149–303 million) and 438 000 malaria deaths (range 236 000–635 000), representing a decrease in malaria cases and deaths of 37% and 60% respectively since the year 2000. The burden was heaviest in the WHO African Region, where an estimated 90% of all malaria cases resulted in deaths, and in children under 5 years, which accounted for more than two thirds of all deaths [1]. More than 300 million people in West Africa are at risk of malaria, with the greatest risk to children under the age of five and pregnant women [2]. In Ghana, malaria is estimated to cause 8% of all certified deaths and is ranked as the commonest cause of death in children below 5 years of age. Malaria continues to be the leading cause of out-patient department (OPD) attendance, admissions, and even death in Ghana in spite of the interventions being actively pursued to combat the disease [3]. We therefore hypothesize that, mortality and morbidity of malaria cases of children under 5 years are at their peak in the country due to some common barriers to the effective management of the disease either from health care providers or guardians of the affected children.

Little is known about the management of child malaria at home. Literature on malaria shows that most treatment for it takes place outside the formal health sector [4]. This is especially so for mild malaria, and in poor, low literacy populations with inadequate health services [5]. Major barriers to the prevention of this disease include lack of understanding of the cause and transmission of malaria, the belief that malaria cannot be prevented, and the use of ineffective preventive measures. Effective control and treatment of malaria presents enormous logistical challenges. The key to addressing the challenge and the limitations faced by health care providers will help in reducing the burden of malaria. The availability and affordability of

anti-malarial drugs contribute to effective management of malaria especially in low income countries [6]. Health care seeking behavior and socio-economic status, which determines access to health care services, are among the factors, which affect the utilization of health care services in developing countries around the world [7]. In addition, a study of the magnitude and nature of socioeconomic differences in the utilization of outpatient health care services showed that utilization among those who report an illness has a clear trend in favor of the wealthier [8]. Most of the studies reviewed about people's knowledge of malaria have indicated that some community members still have misconceptions about the causes of malaria. Also from literature, barriers to treatment of malaria include beliefs about the efficacy and use of conventional medicines, and beliefs about the role of traditional therapies [6].

Against this background this study in Ghana sought to determine the barriers to effective management of malaria in children under 5 years. The study also assessed the route of drug administration, drug resistance and common side effects of the anti-malarial drugs after treatment. The study recommends families to seek prompt and proper management of malaria for their children infected with malaria. Also, this study in Ghana provides the evidence and the basis for policy makers and government organizations to formulate and develop programs that will enhance proper management of malaria cases especially among children under 5 years, and by so doing reducing malaria mortality in the country.

Materials and Methods

Study site/Study design

This convenient cross-sectional study was conducted at Manhyia District Hospital, which is found within the Kumasi Metropolis opposite the Manhyia palace. Manhyia District Hospital was established as a clinic in 1966 and gained a health center status in 1977. In the early 2000,

District Hospital status was given to the health center by the Ghana health Service council. Currently, it serves as the District Hospital for Manhyia sub metro and provide services in the areas of General surgery, Outpatient department, In-patient, obstetrics and Gynecology, Laboratory services, Scan, Maternal health services, Oral health, Eye care, Ear, nose and throat services, Public health services, Youth/ adolescent friendly center. The major occupation of the people in the Manhyia district is trading with a few working as public servants

Study population and subject selection

Participants in the selected study site were randomly recruited for the study. The estimated sample size was 263, which included 131 health workers at the hospital and 132 guardians of the affected patients. Malaria management team and guardians for malaria patients more than 5 years old were excluded from the study. Permission was obtained from the individual members involved in the study and individuals not willing to participate in the study were excluded from the study.

Ethical consideration

Ethical clearance for the study was obtained from the Committee on Human Research, Publication and Ethics (CHRPE) at the KNUST School of Medical Sciences/ Komfo Anokye Teaching Hospital in Kumasi-Ghana (Reference Number: CHRPE/AP/078/17). An approved research information leaflet form was provided to each prospective participant who volunteered to be part of the study. An introductory letter obtained from the Faculty of Health Sciences, Department of Nursing of Garden City University College was presented to the medical district director of health services at Manhyia District Hospital to notify them about the research and its purpose. The health care providers and guardians were assured of confidentiality and anonymity.

Data and sample collection

For the health workers in the hospital, a questionnaire was used to obtain information on socio-demographic characteristics (age, sex, and marital status) and educational background, and also assess them on their knowledge in relation to malaria prevention and case management, and the barriers (costs and source of money for the treatment) encountered in the optimum management of malaria cases among children under five years. There was a survey on the diagnostic tool for malaria cases and the availability of facilities and treatment drugs in the hospital.

For the guardians of the malaria patients under 5 years, there was a questionnaire-based interview to obtain their socio-demographic characteristics, educational background. There was also an assessment on knowledge, challenges of guardians in relation to malaria prevention and adopted interventions. Information on the barriers (transportation to hospital, lack of early treatment, self-medication, costs and source of money for the treatment) encountered in the optimum management of malaria cases among their children were assessed.

Data analysis

Data entry and analysis were done using Microsoft Excel 2013 and SPSS version 23.0 respectively. Chi-square test was used to find the association between the health workers and guardian's knowledge on malaria management and the effectiveness of malaria treatment. A statistical relationship between the availability, administration and side effects of the treatment drugs with the effective management of malaria cases was established by the use of Chi-square. A statistical distribution frequency was used to assess the modal barriers in proper management of malaria for children under 5 years.

Results

This study constituted a total of 131 health care providers (HCP) of which 52(39.7%) were males and 79(60.3%) females. The age range of the participants was 23 to 52 years with mean age of 30.62 years. Moreover, higher proportions of the health care workers were within the age range 21-30 years (64.9%). About half of the participants were Enrolled Nurses (48.1%) and 67.9% have worked for about 1-5 years. Regarding educational level, about half of the participants (46%) are diploma holders in general nursing (Table 1). This study also assessed 132 guardians of affected children who have been to the hospital for malaria treatment of which 63(47.7%) were males and 69(52.3%) females. Majority of infected children (38.6%) were 1-6 months old. About 79.5% of the study participants were married and 71.2% were Christians. Moreover, higher proportions (57.6%) of the participants were employed and regarding educational level, 38(28.8%) were tertiary graduates. The results are clearly illustrated in Table 1 below.

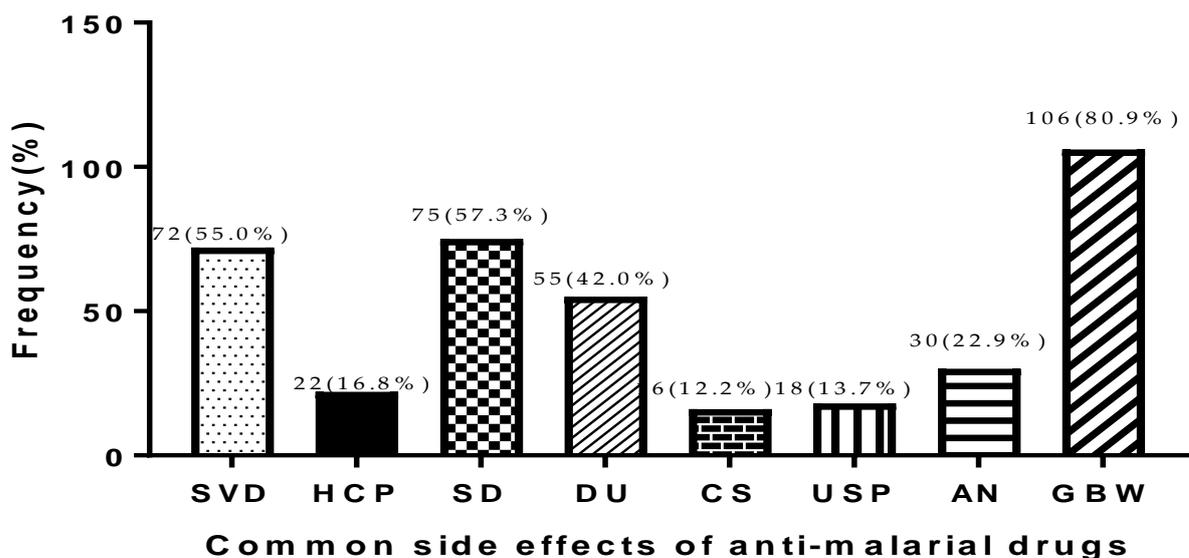
Health care providers in the hospital were asked to answer questionnaires on some predisposing factors affecting the management of malaria.

Route of drug administration ($p=0.018$) and children who were resistant to the anti-malarial drugs provided ($p<0.001$) were significantly associated with mediate condition of the child after assessing malaria treatment in the hospital. Most of the nurses (67.9%) administered the anti-malarial drugs to the patients orally. Results are presented in Tabel 2.

Information on some common side effects of anti-malarial drugs observed after treatment was obtained from the health workers at the hospital. General body weakness (80.9%) and clay-colored stool (12.2%) recorded the highest and lowest frequencies respectively. The results are shown in figure 1.

Figure 1: Common side effects of anti-malarial drugs after treatment.

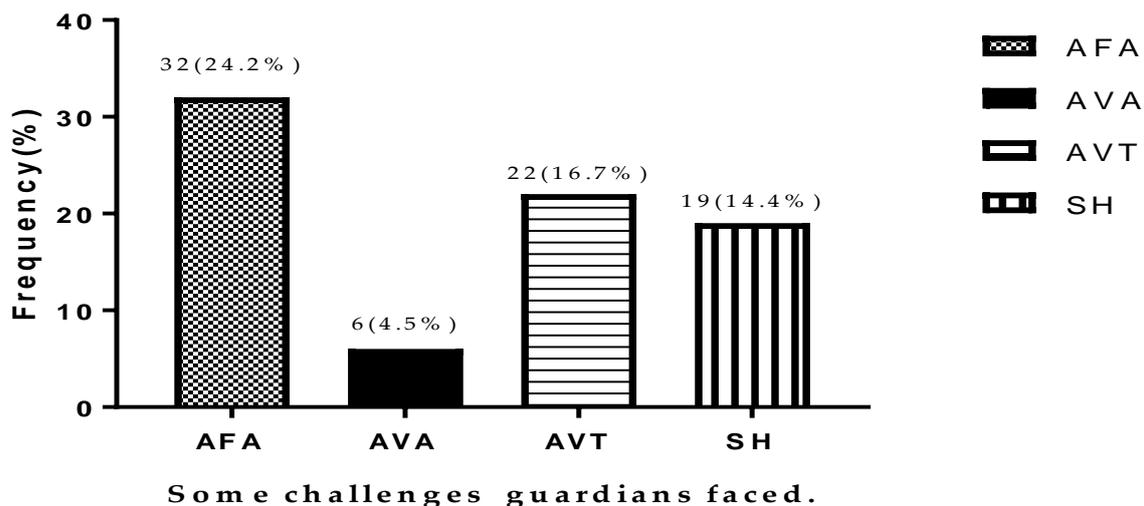
- *SVD=Severe vomiting or diarrhea
- *CS=Clay-colored stool
- *HCP=Headache with chest pain
- *USP=Upper stomach pain
- *SD=Severe dizziness *AN=Anemia
- *DU=Dark urine *GBW=General body weakness



Guardians who were with their wards at the hospital for malaria treatment liberated certain barriers that affects the malaria management. None of these barriers showed significant association with the condition of the child after treatment. Majority of the guardians (88.6%) responded that they were with their children and are sited at mosquito-prone area. Most guardians (59.8%) had no knowledge on malaria management and 74.2% of the study participants were not using mosquito-treated nets or insecticides at their homes. Results are presented in [table 3](#).

Figure 2 shows some challenges the guardians faced while assessing malaria treatment for their child. Affordability of the anti-malarial drugs (74.2%) recorded the highest frequency for this study followed by the availability and cost of transportation to the hospital (16.7%). Availability of the anti-malarial drugs (4.5%) was the least modal challenge the guardians faced in assessing malaria treatment for their children.

Figure 2: Challenges faced when accessing malaria treatment.



Discussion

The purpose of this study was to determine some barriers hindering the effective management of malaria in children under 5 years in Manhyia Hospital. In Ghana, malaria is estimated to cause 8% of all certified deaths and ranks as the commonest cause of death in children under 5 years of age [3]. In our study, most (38.6%) of the infected children sent to the hospital were within 1-6 months old ([Table 1](#)). This was similar to the results reported in a study conducted by Roberts and Matthews (2016) in Uganda. From their work, more than half of the participants (children) infected with

malaria were within 1-6 months old [9]. From the current study, there was no significant association between the type of diagnostic tool used in diagnosing malaria parasite in the blood and the condition of the patient after treatment ($p=0.681$). Most of the responses from the health workers indicated that majority of the malaria cases in the hospital are diagnosed with the Rapid Diagnostic Test (RDT). RDTs are easy to use, give fast results and are affordable. As RDTs become more widely available, confirmation of malaria prior to treatment will become a simple standard procedure [10].

Table 1: Socio-demographic characteristics of the health workers and guardians.

Socio-demographic characteristics	Frequency, N (%)
Health Workers	N=131
Age (years) (mean±SD)	30.62±5.68
Age group (years)	
21-30	85 (64.9)
31-40	40 (30.5)
41≤	6 (4.6)
Gender	
Male	52 (39.7)
Female	79 (60.3)
Religion	
Christianity	94 (71.8)
Islam	33 (25.2)
Traditional	4 (3.1)
Category of staff	
Community Health Nurse	33 (25.2)
Enrolled Nurse	63 (48.1)
Midwife	35 (26.7)
Level of Education	
Certificate	39 (29.8)
Diploma	61 (46.6)
Bachelor in Science	31 (23.7)
Years of service	
1-5	89 (67.9)
6-10	30 (22.9)
≥11	12 (9.2)
Guardians	N=132
Age group of the ward	
1-6 months	51 (38.6)
7-12 months	30 (22.7)
1-3 years	31 (23.5)
4-5 years	20 (15.2)
Gender	
Male	63 (47.7)
Female	69 (52.3)
Marital status	
Married	105 (79.5)
Single	22 (16.7)
Widowed	4 (3.0)
Co-habitation	1 (0.8)
Religion	
Christianity	94 (71.2)
Islam	36 (27.3)
Traditional	2 (1.5)

Educational level	
Primary	30 (22.7)
J.H.S	35 (26.5)
S.H.S	29 (22.0)
Tertiary	38 (28.8)
Occupational status	
Employed	76 (57.6)
Unemployed	30 (22.7)
Housewife/Self employed	26 (19.7)
SD=Standard Deviation.	

There was nearly a significant relationship between the anti-malarial drug used and the condition of the patient after been treated ($p=0.059$). Moreover, Artemeter plus lumefantrine recorded the highest percentage (55.7%) as the anti-malarial drug being used in the hospital, and this is not in accordance with the results reported in a review on malaria control by Mendis *et al.* (2009) on anti-malarial drug [11]. Their findings indicated that the effective drug for eliminating malaria parasite is the Artemisinin combination therapy (ACT) [11]. The disparity could be attributed to the combination of several works used in their review as compared to our study. The use of the Artemeter plus lumefantrine could be attributed to the occurrence of about 88.5% of the patients not being resistant to the malaria drugs and thus had positive effects on their treatment ($p<0.001$) (Table 2). This finding is consistent with several studies which have indicated that Artemeter lumefantrine is very effective even for multidrug-resistant *Plasmodium falciparum* malaria [12-15]. Artemisinin derivatives are the only class of anti-malarial agents to which *P. falciparum* resistance has not been reported in Africa [16]. From literature, Artemisinin drugs work efficiently when administered to the patient intravenously [17]. In this study there was a significant association between route of drug administration and the outcome of malaria treatment ($p=0.018$). This finding agrees with a study by Achan *et al.* (2011) which reported that most anti-malarial drugs made of quinone are usually taken into the body orally especially

for patients presenting uncomplicated malaria, nevertheless intravenous administration of Artemisinin Combination Therapy (ACT) is more efficient for severe malaria [18]. The widespread distribution and utilization of insecticide treated nets (ITNs) has proven to be a very successful contribution to malaria control policy. In Rwanda, Ethiopia, and Zanzibar, the mass distribution of insecticide-treated bed nets and nationwide adoption of ACT resulted in substantial declines in malaria-related deaths [19] even though the use of ITNs and insecticide spray by the guardians at their homes was not significantly associated with the final condition of their child after treatment ($p=0.074$) in the current study. There was no significant association between location i.e if the guardians are situated in mosquito-prone areas with their wards, and the outcome of assessing treatment for their child ($p=0.414$) in this study. Findings from a work done in South Sudan by Snow *et al.* (2005) disagrees with the observations in our study. They emphasized in their work that it is really difficult to efficiently manage malaria cases from patients who are located in mosquito-prone areas such as the slums [20] as compared to ours where location had no significant effect on malaria treatment. Having knowledge on a disease helps in preventing oneself from it [21]. Majority of the guardians first rushed to the hospital (67.4%) to assess malaria treatment followed by those who went straight to the pharmacy shop (31.8%) to get anti-malarial drugs (Table 3). About 59.8% of the guardians recruited for this study did not have any knowledge on the management of

malaria even though it was not significantly associated with the afterward condition of their child ($p=0.064$). To most guardians or parents, the challenge was the inability to afford anti-malarial drugs even when they were available in the pharmacy shops (24.2%). With the existence of expensive health services, the costs associated with preventive and curative

treatment of malaria might deter or prevent the poorer from seeking healthcare, thus a barrier to proper malaria management [22]. There is therefore the need for a barrier-free and affordable effective malaria treatment for all children ≤ 5 years.

Table 2: Factors affecting malaria management (health care providers).

Predisposing factors	Mediate condition after treatment			P-value
	Total	Poor	Better	
Type of diagnostic tool used				0.681
Rapid diagnostic tool	110(84.0%)	14(87.5%)	96(83.5%)	
Microscopic diagnostic tool	21(16.0%)	2(12.5)	19(16.5%)	
Use of MTN at the ward				0.531
Yes	75(57.3%)	8(50.0%)	67(58.3%)	
No	56(42.7%)	8(50.0%)	48(41.7%)	
Anti-malarial drug for treatment				0.059
Artesunate plus Amodiaquine	56(42.7%)	7(43.8%)	49(42.6%)	
Arthemeter plus lumefantrine	73(55.7%)	8(50.0%)	65(56.5%)	
Artemisinin plus piperazine	1(0.8%)	1(6.2%)	0(0.0%)	
ACT	1(0.8%)	0(0%)	1(0.9%)	
Route of drug administration				0.018
Oral	89(67.9%)	6(37.6%)	83(72.2%)	
Intravenous	36(27.5%)	9(56.2%)	27(23.5%)	
Intramuscular	6(4.6%)	1(6.2%)	5(4.3%)	
Drug resistance				<0.001
Yes	15(11.5%)	12(75.0%)	3(2.3%)	
No	116(88.5%)	4(25.0%)	112(87.7%)	

P-value<0.05 =statistically significant. MTN= mosquito treated nets, ACT=Artemisinin combination therapy

Table 3: Barriers affecting malaria management (guardians).

Barriers	Condition of the child after treatment			p-value
	Total	Poor	Better	
Mosquito-prone area				0.414
Yes	117(88.6%)	5(100.0%)	112(88.2%)	
No	15(11.4%)	0(0%)	15(11.8%)	
KN on malaria management				0.064
Yes	53(40.2%)	4(80%)	49(38.6%)	
No	79(59.8%)	1(20%)	78(61.4%)	
Use MTN or Insecticides				0.074
Yes	34(25.9%)	3(60.0%)	31(24.4%)	
No	98(74.2%)	2(40.0%)	96(74.6%)	
First malaria treatment				0.062
Herbal medicine	1(0.8%)	0(0%)	1(0.8%)	
Drug from Pharmacy	42(31.8%)	4(80.0%)	38(29.9%)	
Hospital	89(67.4%)	1(20.0%)	58(69.3%)	

P-value<0.05 =statistically significant, MTN= Mosquito-treated nets, KN=Knowledge.
 *AFA=Affordability of anti-malarial drugs *AVA=Availability of the anti-malarial drugs
 *AVT=Availability and cost of transportation to the hospital
 *SH=Service delivery at the hospital

Conclusion

The adverse side effects of anti-malaria drugs is a major challenge to the health care providers. For guardians, it can be concluded that most of them do not have enough funds to afford anti-malarial drugs as well as have access to effective healthcare for their sick children. The need for health education on malaria should not be over emphasized among the Ghanaian population and Africa as a whole.

Author Contributions

Conceptualization, S.N; methodology, S.N.; validation, R.O.B.; formal analysis, B.O.A.;

investigation, R.O.B.; resources, S.D.;data curation, R.O.B.; writing-original draft preparation, B.O.A.; writing-review and editing, B.O.A.; visualization, S.D.; supervision, C.S.W.; project administration, C.S.W.

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