Implementation of the Revised National Malaria Control Guidelines: Compliance and Challenges in Public Health Facilities in a Southern Nigerian State

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ABSTRACT

BACKGROUND: There has been a concerted effort to reduce malaria burden and bring malaria related mortality to zero. The objectives of this survey were to assess the level of adherence to the current revised malaria control guidelines in the public health facilities in Cross River State of Nigeria and to identify the challenges as well as suggest ways for improvement in treatment outcomes.

METHODS: This was a mixed observational and qualitative survey conducted in 32 public health facilities from 21st to 25th June 2022. Treatment records on malaria were assessed for adherence to the National guidelines. In-depth interviews were conducted with 36 key informants and 4 purposefully selected stakeholders to identify the successes and challenges. Quantitative data were summarized and presented in simple proportions and percentages while qualitative information was recorded, the transcripts thematically coded, analyzed and presented using NVivo 11 software.

RESULTS: The survey revealed that vector control program was poorly implemented across the state. For case management, presumptive treatment was frequently practiced especially at secondary health facilities for uncomplicated malaria. More than 60% of uncomplicated malaria were being treated with parenteral artemether instead of oral artemisinin combination therapy (ACTs) as recommended. Severe malaria were not treated with Intravenous (IV) Artesunate as first line drug in about 40% of the secondary health facilities. Key successes were noted in malaria management in pregnancy. Major challenges identified include: stock out of commodities, shortage of clinical man power, and low trust in parasitological diagnosis.

CONCLUSION: The survey showed that adherence to the key recommendations in various categories of malaria control among health care providers in the public health facilities was below expectation. Malaria preventive treatment in pregnancy with SP fared better perhaps because of its inclusion in ANC packages.

KEYWORDS: Adherence, uncomplicated malaria, severe malaria, rapid diagnostic test, microscopy

Introduction

Globally, 230 million cases of malaria resulting in 430 000 deaths were reported in 2020.[1] It is estimated that malaria burden may surge due to limited funds as more resources are now been channeled to the control of emerging infections such as COVID-19.[2] In 2019, an estimated 76% of Nigerians' population were at risk of malaria by living in high malaria transmission areas.[3] In one report in Nigeria, about 50% of out-patient consultations and about 40% of hospital medical admissions were related to malaria illness which was also considered to account for 30% of infant mortality and 10% of maternal mortality.[4] Nigeria accounts for 27% of malaria cases worldwide and the highest number of deaths (24%) due to malaria in 2019.[3]

Over the years, the Federal Government of Nigeria in collaboration with some health agencies such as WHO, World Bank, UNAIDS, UNESCO, US-PMI, as supporting partners, has put several interventions in place to control the menace of malaria in the country. In line with the third edition of the World Health Organization recommendation,[5] Nigeria has adopted the Test, Treat and Tract (3T) strategies with all suspected cases of malaria diagnosed using either Rapid Diagnostic Test or microscopy with confirmed cases treated promptly with effective Artemisinin combination therapy (ACT), and all cases tracked through surveillance system.[6] Adherence to recommended plan for case management of malaria is pivotal to the effort to eliminate malaria.[6,7] And to rapidly promote this, the Federal Government through the ministry of health with support from the implementing partners adopts evidence based guidelines for the control of malaria. The ultimate target to reduce malaria burden to pre- elimination levels and bring malaria related mortality to zero in the country. The findings

from the Therapeutic Efficacy Study (TES),[6] suggested that artemisinin combination drugs and their derivatives are highly patent in the treatment of malaria. The ministry of health also banned the use of inefficacious medicine such as Chloroquine and all oral artemisinin monotherapy for treatment of malaria.[6]

The revised guideline was published in March 2020 by the Federal Ministry of Health for health care facilities both private and public across Nigeria as an important step in standardizing diagnosis and treatment practices.[8,9] Health care providers in the country were advised to strictly comply with it, to harmonize malaria management practice within the country. However, no study has been conducted to evaluate the adherence of health care providers to these guidelines and to possibly examine the challenges that may constitute barriers to implementation of malaria control policies.

Key recommendation in the revised 2020 malaria control guidelines include[5,6]:

(1) All suspected malaria cases should have a prompt parasitological confirmed tests using either microscopy or rapid diagnostic test (RDT).

(2) Artemisinin-based Combination Therapies (ACTs) are recommended treatments for uncomplicated malaria as first line drug. Artemisinin and its derivatives should not be used as monotherapy in the treatment of uncomplicated malaria.

(3) Severe malaria is a medical emergency, after rapid clinical assessment and confirmation of diagnosis where feasible, immediate treatment with parenteral medication should be commenced.

(4) Intravenous Artesunate is the first line treatment of choice for severe Plasmodium falciparum malaria. Parenteral Quinine or Artemether is an acceptable alternative only if artesunate is not available. Full oral treatment course of ACT should be administered once patient can take orally to achieve complete cure. Children weighing <20 kg should receive a higher dose of injectable Artesunate (3 mg/kg per dose) than larger children and adults (2.4 mg/kg per dose) to ensure equivalent exposure to the drug.

(5) Malaria microscopy is considered as the gold standard in malaria diagnosis, however, this is subject to skill and experience of the laboratory scientist/microbiologist.

For malaria in pregnancy, the current National Guidelines[6] recommends Sulfadoxine-Pyrimethamine (SP) for intermittent preventive treatment of malaria in pregnancy (IPTp) after the first trimester and it should be administered every month till childbirth. Delivery of IPTp through ante natal care (ANC) services is recommended. Pregnant women are also encouraged to sleep inside insecticide treated mosquito nets every night.[5,6] For malaria case management in pregnancy, ACT is recommended for treatment of uncomplicated malaria in all the trimesters.[6]

In the Cross River State of Nigeria, where the study was conducted, apart from the high burden of malaria, the state is also known for recurrent epidemics of neglected endemic diseases.[10] Annually, these diseases have been reported to claim tens or hundreds of lives in the state.[10] In 2022, several deaths were reported due to Cholera especially in the central and northern senatorial districts of the state due to lack of portable drinking water and poor sanitation.[11] Although there have been many intervention projects in the last 2 decades by various NGOs supported by United State Agency For International Development (USAID), sustainability of such projects is usually a major challenge due to inability of the state government to bear the financial burden.[12]

This study therefore, set out to assess the degree of compliance at the public health care facilities with regard to malaria diagnosis, treatment and prevention as well as data documentation and commodity management in line with the new National guidelines. It also focused on identifying key challenges that may have hindered the effective control of malaria encountered at the facility and community levels. The findings from this study would promote rational evidence based and sustainable decision making process as well as behavioral change toward elimination of Malaria.

Materials and methods

This study was a mixed qualitative and observational health facility (HF) based survey conducted in Cross River State of Nigeria. The State is located in tropical rainforest area of West Africa. It is a costal state near the Atlantic Ocean. It is an area of stable malaria transmission with a population of approximately 4 million people. Neglected tropical diseases are also endemic in the state.[11]

For administrative purpose, the state has 18 Local Governments areas and is divided into 3 senatorial districts. There are 17 secondary health facilities and numerous primary health facilities, all administered by the state government through the state ministry of health. The medical sector in the state is negatively affected by shortage of medical doctors and nurses-midwives. Many of the State PHCs are run by Community Health Officers (CHOs) or Community Health Extension Workers (CHEWs). Due to the peculiar nature of the state, there are various Non-Governmental Organizations (NGOs) working in partnership with the state and the government health agencies for the control of endemic diseases including malaria.

The data for this study were collected during a 5-day integrated monitoring and supportive supervision on malaria control carried out in 32 health care facilities across the 3 senatorial districts of State from 21st to 25th June, 2022. The State Malaria Elimination Program with technical support from the United State President Initiative on Malaria Control (US-PMI) embarked on the project. The general objective of the visit was to support facilities to enhance their full compliance with the

current protocol for malaria control. Major objectives were to assess malaria prevention, diagnosis and treatment protocols, to study data documentation and commodities management at the primary and secondary health facilities in the state and compared with the recommended guidelines. Another specific objective was to enumerate the challenges and to identify ways to strengthen the health sector in delivering malaria control interventions. All the 17 secondary health facilities (SHF) were selected while 15 primary health care facilities (PHC) were randomly selected across all the 3 senatorial districts of the state by lottery method (5 PHCs per senatorial district).

The activity started with 1-day planning meeting and thereafter the team was shared into 3, each made up of 4 persons (1 Case Management Officer, 1 Monitoring & Evaluation Officer, 1 Logistician, 1 Laboratory Scientist). A team worked in each senatorial district of the State. The field survey started from 21st June and ended on the 25th of June 2022.

On arrival at every LGA, an entry meeting was conducted with the LGA Director before moving to the facilities. At the facility level, another entry meeting was also held with the key personnel in charge before carrying out the task of data collection. The KoBo collect checklist was administered by thematic area and information obtained served to server online. In each facility, 5 cases of malaria managed in the preceding 3 months were selected systematically from the treatment register. At least one case of severe malaria and one for under 5 children were included in each facility. A total of 160 cases (5 cases per facility) were sampled. Uncomplicated malaria cases were 96, severe malaria-32 and 32 malaria illness in under 5 children. Their case notes were retrieved for in-depth study. The diagnosis, laboratory tests and treatment were noted and compared with the National guidelines. Malaria case management were rated as satisfactory when the diagnosis (signs and symptoms) was correct and a test done for confirmation and the recommended antimalarial for complicated or uncomplicated malaria or pre-referral treatment administered as well as the right route and doses. Otherwise it was adjudged unsatisfactory.

Antenatal records were also reviewed for malaria case management in pregnancy and Intermittent Preventive treatment. A total of 32 cases, one in each health facility were assessed for adherence to IPT protocols and another 32 for malaria case management in pregnancy. At the end of each facility visit, meeting was held with the Medical Superintendent/Administrator or Officer in-charge and key staff for in-depth discussion to debrief on the findings, identify challenges and suggest the necessary steps to take in correcting them.

Data Collection

A total of 14 experienced health personnel were engaged in the data collection. They were divided into 3 groups, 1 group per Senatorial district. Items on the "KoBo collect" software were used as check lists for the quantitative data collection. The items were specifically formatted in line with the contents of

the training manual on malaria control, fourth edition, developed by the Federal Ministry of Health for health care personnel in Nigeria. The items reflect the key summary in the revised guidelines on all aspect of malaria control. Each of the survey team members used a mobile phone installed with the "KoBo collect" APP to obtain the quantitative data. Members were assigned to different units in each health facility for data extraction based on individual experiences and area of specialization. Members were trained on this software before the commencement of the survey. The qualitative data were obtained sequentially after the observational survey in each facility before departure. For this section, participants were purposefully selected. A total of 36 key informants were interviewed. At least 1 per health facility, 2 members of state malaria elimination project and 2 community leaders. The leader of each team anchored the interview with the key informants while one of the team members did the recording. The interview guide and the Themes for this interview were developed by the research team during the review meeting. The participants were encouraged to freely express their thoughts and concerns relating to the issue. Information outside the themes were deductively coded as emerging issues.

Data Analysis

Quantitative data extracted from the "KoBo collect" on case management, IPT, logistics and vector control were summarized and presented in simple proportions and percentages in boxes and tables. The qualitative information obtained during the interview with the key informants was recorded digitally. The transcript was then subjected to content analysis, thematically coded, and presented using Nvivo 11 software. Key extracts were reported verbatim.

Results

Key findings from the observation data

A total of 32 health facilities (15 primary and 17 secondary) were surveyed. A total of 160 patients' records on malaria case management were analyzed. Also, 64 pregnant women records, 32 for IPTp and 32 for treatment of malaria in pregnancy were analyzed to assess for the level of adherence. Some gaps were identified in diagnosis, laboratory procedures, case management, vector control and data recording. In 60% of the facilities visited, the diagnosis of malaria was not classified as uncomplicated or severe. While the secondary health facilities frequently experienced stock out of antimalarial, 40% of the primary health facilities had expired commodities in stock. While mRDT was the main method of confirming diagnosis at the PHCs, secondary facilities tended to utilize microscopy as a standard for diagnosis of malaria. Most microscopy results for malaria were reported in pluses like $+$, $++$, and $+++$ instead of actual parasite count per micro litter (μ/L) as recommended.

On the logistic aspects of malaria control the following key findings were noted: Overall, good storage condition was seen

Table 1. Comparing case management and IPTp with the revised guidelines: Extract from case notes and ANC records.

TREATMENT PLAN	SATISFACTORY (%)	UNSATISFACTORY (%)
Uncomplicated malaria		
a) Primary HF (n = 45)	39 (86.7)	6 (13.3)
b) Secondary HF (n = 51)	29 (56.9)	22 (43.1)
Severe malaria		
a) Primary (n = 15)	7 (46.7)	8 (53.3)
b) Secondary (n = 17)	11 (64.7)	6 (35.3)
Treatment of under-5 children		
a) Primary (n = 15)	14 (93.3)	1 (6.7)
b) Secondary (n = 17)	15 (88.2)	2 (11.8)
IPTp		
a) PHC (n = 15)	12 (80)	3 (20)
b) Secondary (n = 17)	14 (82.4)	3 (17.6)

in 70% of the facilities visited. Two of the PHCs complained that rodents invaded the room where drugs were stored and this necessitated the storage of antimalarial medication outside the health facilities. In 2 PHCs, expired mRDT was still being used for testing. Standard operative procedures (SOP) on logistic and management were seen in 60% of the facilities. Proper documentation was observed in 12 (80%) of the primary health centers compared to 6 (29.4%) of the secondary facilities. In all the secondary health facilities, updated malaria chart was not displayed on the wall. In 20% of the secondary health facilities surveyed, it was found that laboratory records showed more malaria positive results that what was recorded in the out-patients registers. Data triangulation notebooks were not kept in all the secondary health facilities.

The key findings on malaria case management practices in comparison with the revised guidelines are summarized on Table 1 below.

Extracts from the In-depth discussion on the challenges by key informants

Vector control. Stock-Out of LLIN was a common finding: Almost all the key informants blamed poor vector control on non-availability of LLIN for free distribution especially to pregnant women and under 5 children. Lack of LLIN for free distribution was also mentioned as a reason for observed decrease in ANC attendance at PHCs. The high cost of this commodity coupled with high level of poverty was considered as a major challenge. In the words of the informants: *"We have not given Long Lasting Insecticidal nets (LLINs) to our pregnant women for some months now because of non-availability. The state*

ministry has not supplied us with insecticide treated nets for a long time. . . In fact in the whole of this community there are no mosquito nets even in private drug stores."* (Head of maternity unit of a general hospital) *"We do not have LLIN in our facility since the beginning of this year. The last time we gave out nets free was during an outreach program. "We have been applying for supply but we are told that there are no nets in our local government council to be given out free. . . Even when you tell them to purchase the nets in commercial outlets they would complain that they cannot afford it. . ."* (PHC in-charge). The issue of ignorance and misuse of LLIN was also echoed by a participant: *"The main challenge in this community is ignorance and poverty. . .some women would collect it and store it in their boxes instead of sleeping inside it. . . sleeping inside it would affect the quality of sleep. . . and pregnant women would not have money to buy it."* (Chief nursing officer [CNO]). It was also reported that some household members rather use LLIN for pest control to protect their crops the farm.

Other methods of vector control like outdoor residual insecticide spraying with insecticide was rarely carried out in some commodities. An informant expressed her thought: *"I am aware that outdoor residual insecticide spraying is one of the ways to eliminate mosquito parasite but since I was posted to this station it has not been carried out. The use of Indoor residual insecticides depends on the individual ability to purchase it. We have never given it free in our facility."* (CNO in-charge). Members of the community appreciated the burden of malaria but their effort was limited by lack of funds: *"We cannot embark on regular fumigation of the community due the lack of fund. . . During monthly sanitation exercise we mobilise various households to clear bushes and drainage channels around their houses to reduce mosquito count in the community. . . malaria disease kills. . . We would be happy to record zero mortality due to malaria in our homes."* (Community leader)

A state malaria control manager advocated for an integrated vector control approach and also expressed deep concern about an emerging issue related to vector linked resistance to LLIN. In his words: *"integrated method. . ..a rational process to utilized available resources optimally for vector control using various methods including chemical, biological and physical method for vector control is needed. . . With the genuine concern about emerging vector-linked resistance to LLIN, reported in Biase LGA and some communities in the state, there is need for holistic approach to vector elimination."* (a member of the State malaria elimination project).

Treatment of uncomplicated malaria. The survey found that some health care providers especially doctors in the secondary health facilities still administer ACT without laboratory confirmation of malaria in about 25% of the cases. The main reason for this practice was the low confidence on the accuracy of the diagnostic (mRDT) tests and non-availability of trained personnel on microscopy: *"Sometimes I don't trust the RDT result especially when the symptoms are so clearing. So I would go ahead and administer antimalarial even when the RDT is negative. To*

me microscopy is more reliable than RDT but in this hospital we have only one laboratory scientist who can perform malaria microscopy. So when he is not on duty we just prescribe artemether without test result." (Medical officer)

It was also observed that uncomplicated malaria were treated with injection artemether or quinine in 47% of the cases. Although the doctors were familiar with the guidelines on the choice of drugs, the main reason for this practice was to satisfy patients' desires and encourage patronage. In the words of a key informant: ". . . we consider patient's request while prescribing medication. Some patients would request for injection and if you do not give them they would not come back when they fall sick again. Most private patent medicine dealers and private medical practitioners would give the injection for uncomplicated malaria. So I usually give start dose of intramuscular artemether before completing the treatment with ACTs." (Medical superintendent). Another informant also supported the practice: ". . . to maintain patients 'confidence you make some adjustment provided it is not detrimental. . . There is a belief among community members that injectable drugs are more powerful (superior) to oral medication. It is not unrelated to ignorance. A stat dose of injectable brings much satisfaction to patients and they are willing to pay. . . It is more like placebo effect. There is need for enlightenment using appropriate mass media." (Medical officer).

Use of AL was not classified. Participants blamed this practices on shortage of man power, lack of time for documentation and classification. According to a facility head, "I am familiar with the protocols for treatment of uncomplicated malaria. But I think that the main challenges here is lack of personnel and . . . This affects proper recording of medication. . ." (Medical superintendent)

A state malaria project officer also expressed concern about an emerging issue related to substandard and low potent ACTs circulating in some communities. This may constitute a challenge in the malaria control program. In his words: "Another serious problem we may be confronted with is that of substandard drugs in circulation especially ACTs. . . a recent report from the institute of Tropical disease in the state suggests that ACTs distributed by PMI in the state are more potent than those purchased from commercial outlets. This should be suspected when you have persistent positive test after full course of treatment. . ." (State Malaria project officer).

Treatment of complicated or severe malaria. Although the guidelines give the treatment of choice for severe malaria as parenteral artesunate; this was not the case in 60% of secondary health facilities (SHF) where providers treated complicated malaria with IM Artemeter or IV Quinine. The respondents attributed the low usage of parenteral artesunate to shortage of qualified health care personnel, high cost and non-availability of artesunate injections and the low-income status of the communities as remarked by the Medical superintendent that "I have just been told now that IV Artesunate has been supplied to the facility free. The head of the pharmacy unit never informed me. . ., so we prescribed the cheaper injectable – E-mal. I would not like to

prescribe the drug I know that patients cannot afford. It costs about 10,000 naira to treat severe malaria with intravenous artesunate and many people in this village cannot afford that. Intramuscular Artemether and quinine are much cheaper, so we prescribe them." Follow-up treatment with ACT also not done according to National guidelines in 20% of SHF.

Low resource allocation to public health sector and lack of political will by the regional and national government are major hindrances. Poor drug supply and distribution chain due to inadequate transport facility, bad roads and unethical practices were also implicated. Medical practitioners have to simply make do with what is available and affordable. Even where the drug was supplied free there was report of hoarding and diversion making it not available for the clinicians to administer to patients. The following quote relates to these challenges, "We depend on supply of parenteral Artesunate from the state drug store. If it is not available, we go for cheaper drug. Most pharmaceutical outlets in the community do not stock parenteral artesunate. Quinine is readily available, and it is highly effective and very cheap. But the problem is with the adverse effect of quinine so I switch to oral ACT when the patient can tolerate oral meals." (Medical superintendent)

Adherence to the laboratory results was low with only 40% withholding treatment in the light of a negative result while 20% commenced treatment commenced without laboratory result (RDT or Microscopy). Malaria microscopy was reported in pluses instead of actual parasite count. The attitude of health workers is suggestive reason for poor adherence to guidelines as stated by a medical officer that "Sometime I don't wait for lab result because of delay in initiating treatment. When symptoms suggest severe malaria I commence treatment immediately. I also routinely add antibiotics for typhoid fever when treating for severe malaria and this gives good outcome."

Laboratory confirmation before treatment. Apart from low trust on RDT among practitioners especially at secondary hospital, the delay in getting the result from the lab (microscopy) was another reason for commencing treatment without parasitological test in severe cases when there was high level of suspicion for malaria in patients with severe symptoms. Apart from the lack of trust in the accuracy of RDT results, there is lack of trust in the personnel performing the test as another reason some doctors engaged in treatment without confirmation. In many secondary facilities, the lab results did not state the actual parasite count. The reason as already highlighted is multifactorial ranging from inadequate man power to poor funding of the government health sector. The following quotes support this findings:

"It takes more than one hour to get microscopy result in our centre depending on who is doing the test. So to be on the safe side I give the first dose of parenteral antimalarial to enhance parasite clearance in children with severe malaria before microscopy result is retrieved." (Medical officer)

"Posting of staff is done at the state ministry of health. . . Some newly deployed laboratory staff do not have adequate experience in

malaria microscopy. That could be the reason for improper reporting of parasite count. . . We intend to send some of our laboratory personnel for training on the new method of parasite count" (Hospital administrator)

Intermittent preventive treatment of malaria and case management in pregnancy. The survey found excellent compliance to implementation of IPT through antenatal setting. The health worker also adjusted the timing and interval of administering SP as recommended. The few drawbacks were related to stock-out of SP or patient's unpreparedness to take SP by DOT during ANC. Use of ACTs for case treatment of malaria in pregnancy was also done according the new guidelines (using ACT in the first trimester instead of quinine). The following quotes support these findings: *"We have been giving SP through directly observed therapy except when it is not available. We rarely have stock out. We withhold the drug if there is concern about adverse drug reaction." (CHEW in charge). "We tell women to come with sachet water to swallow the drugs on their schedule ANC visit because we do not have a good source of drinking water in our facility since the bore hole got bad. We have the drugs and we dispense them free. But some women do not complete the doses because they default. . .and deliver their babies at home" (CHO in charge)*

Discussion

This was a mixed observational and qualitative study. Mixed studies are important in public health research such as malaria control because the qualitative component reveals deeper understandings of the causative factors which are often less studied.[13] The major thematic concepts for this survey included vector control, case management, malaria in pregnancy, laboratory analysis, and logistics. The highest rate of adherence (90%) to the recommended guidelines was noted on the control of malaria in pregnancy (case treatment in pregnancy and administration of IPTp).

The study reveals that vector control protocol was rarely implemented in the state. There was a consistent report of non-utilization of LLIN even among vulnerable groups such as pregnant women and under-5 children. The main reason this poor vector control was blamed on scarcity and ignorance. This is in keeping with a report from a qualitative study in Uganda.[14] Vector elimination has been one of the major interventions to curtail the menace of malaria in poor communities.[8] In fact the surge in cases of malaria in some remote communities especially during rainy season has been attributed to low coverage of LLIN.[8] Inadequate supply of commodities has also been identified in a study in Malawi as a major structural challenge to malaria control.[15] Integrated vector control measures (IVM) approach was suggested by a key informant. The WHO in 2004 adopted IVM, similar to the methods used for agricultural pest control, for malaria program.[16] This largely involved the use of insecticide treated nets and indoor and outdoor control. This approach also encourages community participation and behavioral change that would promote elimination of

malaria. In a recent pilot study in Kenya, community health workers were trained on the use of mobile phones installed with Zzapp malaria software to track mosquito larva breeding sites as part of IVM program.[17] This is highly recommended in Nigerian communities.

The survey also revealed lack of adherence to the National guidelines in the case management of uncomplicated malaria in many ways. Parenteral drugs especially intramuscular artemether were often administered to patients instead of oral ACT. This findings is similar to that reported in another qualitative study in Ethiopia.[18] In the Ethiopian study 80% of the health care workers studied claimed adherent to the national guidelines but in-depth analysis revealed that only 40% of them practiced malaria care according to the recommendations. Presumptive treatment for uncomplicated malaria was also reported to be widely practiced among private health care providers in another survey.[19] Furthermore, another recent study in Eastern Uganda reveals that only about 50% of health care workers carry out case management of malaria in line with the WHO recommendations.[20] Unnecessary use of injectable drugs may amount to over treatment and is a form of drug abuse. Health care practitioners in both public and private sectors should be motivated to adopt the recommended protocols to ensure uniformity of care toward malaria eradication in African continent. Regular trainings and facility-based workshops on malaria control may yield positive result. Appropriate counseling should be offered to patients who request for injectable in place of oral medications. Artemether-Lumefantrine (AL) is the recommended first line medication for treatment of uncomplicated malaria.[6,7]

The latest WHO and the National guidelines recommend a universal "test and treat" strategy for case management of malaria.[21,22] Microscopy or RDT should be done to confirm the diagnosis before treatment.[5,8] However, findings from this study suggest that this recommendation was seldom implemented especially at the secondary level of health care delivery. Presumptive treatment for uncomplicated malaria was a common practice among physicians. This finding is in consonance with other report.[18-20] The key informants consistently attributed this practice to shortage of clinical and laboratory personnel as well as inadequate testing materials in their health facilities. Shortage of man power and poor funding have been identified as major factors that hinder malaria policy implementation.[23] Presumptive case management of malaria should be discouraged because it is considered inaccurate and may contribute to poor management of febrile illness as well as increase risk for drug resistance.[24] Although, evidence from a study in high transmission area suggest that the "test and treat" method may not be cost effective,[25] there is need for increase allocation of resources to health system.

Furthermore, the treatment practices for severe malaria were also not consistent with the key recommendations in the revised guidelines in some setting. The problems noted

included delay in initiating treatment and use of inappropriate drugs as first line treatment. The interviewees identified non availability of skilled personnel and high cost as well as limited supply of parenteral artesunate as major limitations. Similar findings of (60.6%) adherence rate was reported among public health care workers in a Western Nigeria study.[7] A study on treatment of severe malaria in children in Uganda showed that adherence to the WHO recommended protocols was very low, 3%, among health care providers.[26] Complicated malaria carries risk of mortality and severe morbidity.[3-5] Mortality from severe malaria is most likely to occur in the first 24 hours of presentation.[4] Prompt treatment with appropriate drugs is life-saving. In the revised guidelines, the recommended first line drug is intravenous artesunate.[5] Intravenous artesunate is associated with fewer side effects compared to quinine and has better parasite clearance than Intramuscular (IM) artemether.[5,27] Establishing IV access requires some skills and is often the duty of a doctor at the secondary level of care. Where there are shortages of physicians, other cadre of health care workers should be trained and encouraged to administer IV drugs otherwise prompt referral of the patients should be considered after giving intramuscular pre-referral dose as recommended.

Low confidence on the diagnostic accuracy of mRDT was a major concern among physician in malaria case management and a reason for presumptive treatment of malaria. This was in contrast with a previous report in Northern Nigerian study[28] which revealed adherence to mRDT was achieved in 80.5% of the health workers sampled. Majority of the participants in that study (72.5%) were working at PHCs. Our findings also suggest that lower carder of health workers serving at PHCs, where microscopy was not available, showed better adherence rate compared to physicians in the general hospitals. Malaria Rapid Diagnostic Test (mRDT) is a device which detect specific antigen (proteins) produced by malaria parasite. In a field study in Myanmar, the SD-05fk60 malaria RDT preformed consistently with microscopy.[29] It sensitivity increased with increased parasitemia level. When parallel testing with malaria microscopy and RDT was conducted, it was recommended that RDT use is adequate in setting where high quality microscopy is not available.[30] Another study in children showed comparable sensitivity in parasite detection although the correlation between the 2 methods of diagnosis was better with high parasite density.[31]

Furthermore, the "plus system" of parasitology report is an old method, which is simple but has less accuracy for establishing parasite density in the blood film.[30,32] It is therefore recommended that the actual parasite count per microliter (μ/L) be reported.[32] The parasite density provides information on the severity of the infection and the response to treatment.[30]

In this study, malaria case management in pregnancy using ACT in all the trimesters of pregnancy and IPTp administration were rated satisfactory in about 90% of the public health facilities. This is in contrast to a report of 22% adherence rate from a study in Somalia.[33] In that study, only about 33% of the

health care workers (respondents) were trained on the new revised guidelines while 59.3% knew about the existence of a new protocol.

A major social factor identified in this survey which post a serious threat to malaria control is the low resource setting in the State. This was evidenced either in the reported "stock-out" of commodities or patients' inability to pay for treatment out of pocket due to shortage of fund. Malaria has been described as both a cause and a consequent of poverty.[34] Apart from the risk of mortality, severe malaria may lead to loss of man-hour resulting in low productivity which may affect the overall GDP in the State. The United Nations therefore considered malaria as extremely serious human rights issue as some of the goals of sustainable development plan cannot be achieved without tackling malaria.[35,36] Inadequate manpower and administrative flaws were also found as limitations in the implementation of malaria policies. Similarly, previous studies had identified shortage of skilled health attendants and the fragility of health system as hindrances to malaria control.[37-39]

Emerging issues of great concern are the findings of vector-linked LLIN resistance in setting of multi-species of female Anopheles mosquito and the wide circulation of less potent and adulterated ACTs especially in commercial outlets. These challenges need urgent attention in tackling the menace of malaria and moving toward elimination of the disease.

Limitation

The study did not examine the potential influences of the socio-demographic factors such as age, educational status and duration of service of the participants on malaria control. Also, this study was conducted among health care workers in government health facilities. The findings may differ from what are obtainable in private practice.

Conclusion

The survey reveals low level of compliance with the recommended protocols in almost all the categories of malaria control strategies. The problems are multifactorial ranging from poor funding of health sector, individual practitioners' attitude, shortage of skilled care givers and patients/community perceptions.

Acknowledgements

Author Contributions

AU was involved in development of the theme, research play, coordination of data collection and analysis. ME was involved in the design of training manual and planning of survey. SE was involved in the final editing.

Declarations

The author declares that this is an original research work that is not currently being considered for submission by any other Journals.

Ethical Approval

No formal ethical approval was required for this survey. However, all the Health facilities selected for the survey were required to give consent/permission before the survey was carried out in each facility. All the key informants also gave informed consent.

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