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ADHERENCE TO THE REVISED MALARIA TREATMENT GUIDELINE BY PRESCRIBERS IN HEALTH FACILITIES INTHE LA NKWANTANANG-MADINA MUNICIPALITY

BY

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DECLARATION

I, Dorothy Ansomaa Asiamah hereby declare that, with the exception of cited literature, this thesis is the result of my own original research undertaken under supervision and that it has not been presented elsewhere in part or whole.

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DEDICATION

Dedicated to God Almighty and my late parent.

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LIST OF ABBREVIATIONS

AA	Artesunate-Amodiaquine
ACT	Artemisinin-based combination therapy
AL	Artemether-Lumefantrine
ASMQ	Artesunate-mefloquine
ASSP	Artesunate Sulfadoxine-pyrimethamine
CHPS	Community-based Health and Planning Services
CHWs	Community Health Workers
DHAP	Dihydroartemisinin-Piperaquine
GDHS	Ghana Demographic and Health Survey
GHS	Ghana Health Services
GSS	Ghana Statistical Service
IMCI	Integrated Management of Childhood Integrated illness
IPTi	Intermittent Preventive Treatment in Infant
IPTp	Intermittent Preventive Treatment in Pregnancy
IRS	Indoor Residual Spraying
LLINs	Long Lasting Insecticide Treated Nets
malERA	Malaria Eradication Research Agenda

MICS	Multiple Indicator Cluster Survey
NMCP	National Malaria Control Programme
OPD	Outpatient Department
PLHIV	People living with HIV
RDT	Rapid Diagnostic Test
SMC	Seasonal Malaria Chemoprevention
SP	Sulfadoxine-pyrimethamine
SSA	Sub Saharan Africa
TTT	Test, Treat and Track
WHO	World Health Organisation

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ABSTRACT

Background

Although malaria is a preventable, it still remains a major public health problem worldwide, particularly in sub-Sahara Africa where it is associated with high morbidity and mortality especially in pregnant women and children under five. Due to resistance to monotherapy, in 2004 Ghana employed the Artemisinin-based Combination Therapy (ACT) as first line treatment policy which was also revised in 2014. The revised treatment guideline makes provision for surveillance which helps track management of malaria cases for early identification of potential emergence of drug resistance.

Despite Ghana's adoption of the malaria guideline and conducting series of training for health professionals including prescribers but, morbidity and mortality due to malaria still remains unacceptably high. The study sought to assess prescriber adherence to the revised malaria treatment guideline in health facilities in the La-Nkwantanang Madina Municipality.

Method

A cross sectional study was conducted in ten health facilities in the La-Nkwantanang Madina Municipality in Accra within the second quarter of 2017. Data collection methods employed included interviews and extraction of data from health facility records and interviewing prescribers. Data were edited, cleaned, coded in Microsoft excel and analyzed using the Stata version 15.

Simple descriptive statistics, frequencies, proportions and means of variables were computed. Bivariate analysis was done to show associations between selected independent variables and

outcome variable. Factors predictive of prescriber adherence to the guideline were determined by multivariate analysis at a 0.05 significance level and a 95% confidence interval.

Results

Four hundred and thirteen patient health records (413) from 10 health facilities with different level of care were used in the analysis. Of the 413 patient health records reviewed 87.7% (362/413) patients were tested for confirmation of malaria before treatment was given, whereas 12.3% (51/413) patient received presumptive treatment. Positive cases were 32.60% (118/362), however 56.42% (234/413) patients were prescribed ACT. For patients who received ACTs 48.50% had positive test results, 29.61% had negative test results and 21.79% were presumed cases. The proportion of patient health records in which prescribers adhered with guideline was 61.72% (255/413). However, overall prescriber adherence was poor 28.6%. Prescriber trained in case management (UOR = 6.01, 95% CI =4.16-12.6, p<0.001) history of fever, (AOR: 3.88 95% CI: 1.43 – 10.50, p<0.008), facility type, (AOR: 1.68, 95% CI: 0.20 – 4.26, p<0.008) and female prescribers (UOR = 5.87, 95% CI = 1.01, 34.02, p=0.048) had a positive influence on prescriber adherence.

Conclusions

Overall, prescriber adherence was poor (28.6%), however testing for malaria parasite was high (87.65%). Patients who tested negative were prescribed ACT coupled with presumptive treatment. There was poor documentation of patient assessment performed. Prescriber adherence was higher among female prescribers, patient without history of fever, facility type and those who have been trained on the malaria treatment guideline.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

1.1.1 Distribution

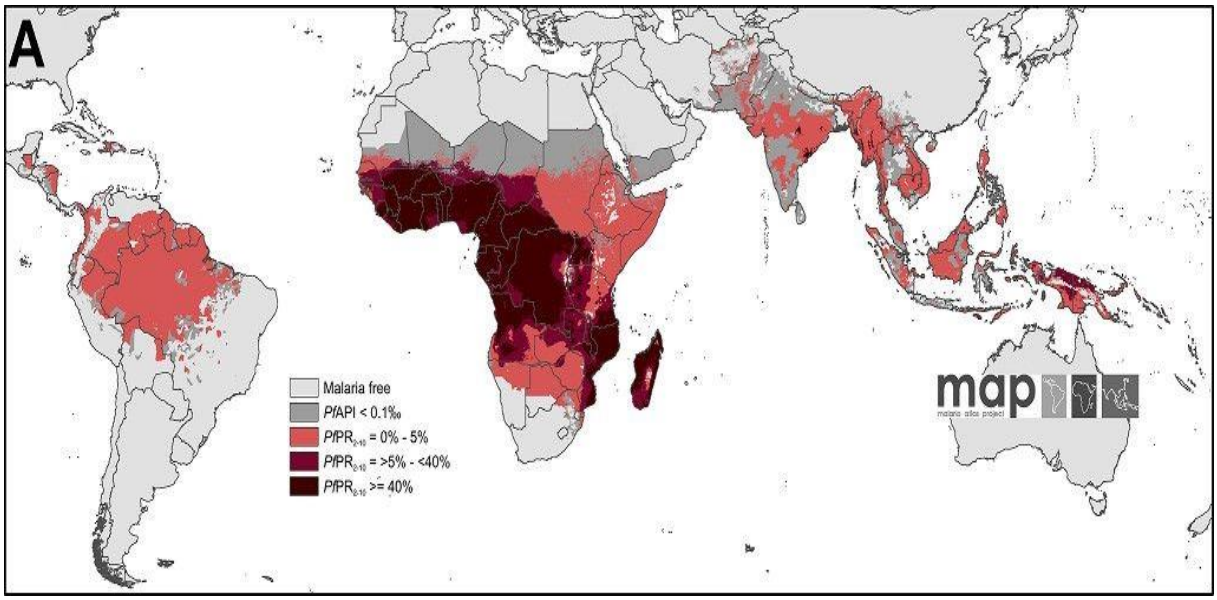
Malaria is an acute febrile disease caused by the Plasmodium species and transmitted by the female anopheles mosquito. It is a disease of public health concern because transmission transpires in 90 countries worldwide and is associated with high morbidity and mortality. Five main plasmodium species have been identified, namely Plasmodium malariae, P. ovale, P. knowlesi, P. falciparum and P. vivax. However, P. falciparum pose the greatest threat to man particularly in Sub Sahara Africa (SSA) (World Health Organization, 2015a).

Plasmodium malariae may occur in all areas of malaria transmission zone, yet its prevalence is generally low. P. falciparum is common in Africa, whilst P. vivax is endemic in South America. Both P. falciparum and P. vivax are prevalent in south-eastern Asia and the western Pacific region. P.ovale is widespread mainly in tropical Africa whereas P. knowlesi infection occurs only in certain forested areas of South-East Asia (Autino, Noris, Russo, & Castelli, 2012).

The World Health Organization reports of an estimated 212 million malaria cases in 2015. The highest number of cases were reported in the World Health Organisation (WHO) African Region (90%), followed by the South-East Asia Region (7%) and the Eastern Mediterranean Region accounting for the rest. Throughout the same period, an estimated 429, 000 malaria deaths occurred, of which 92%, 6% and 2% occurred in WHO African, South-East Asia, and Eastern Mediterranean Region respectively.

However, 70% of all global malaria death occurred in children less than five years. Below is a map showing malaria endemicity of the most prominent species of the malaria parasite in SSA, P. falciparum.

Figure 1.1 A map showing Plasmodium falciparum endemicity



(Peter W. Gething et al., 2011)

Although WHO declared in 2015 that nearly half of the world's population were at risk of malaria, some population groups are at a higher risk of contracting malaria, and developing severe disease, than others. They include children less than five (5) years, pregnant women and HIV/AIDS patients, as well as non-immune migrants and travelers. It has therefore, been recommended that these vulnerable population groups should be given special protective measures by their National Malaria Control Programmes (NMCP) (World Health Organisation, 2015b).

Ghana in 2006 had a proportion of 38.1% of all OPD cases being that of malaria. This reduced to 31.7% in 2008 but gradually increased to 43.7% in 2013.

There was a decline in cases to 30.9% in 2014 with the introduction of the test, treat and track (TTT) policy but has since then increased to 38.1% as at 2015. (National Malaria Control Programme, 2016).

Ghana's trends in OPD malaria cases ranges from 30% to 40% of all OPD cases over the years. In 2015, amongst the 38.1% malaria OPD cases found in Ghana, 31.2% were attributed to children under five years. 3.2% was also attributed to pregnant women with the rest (3.7%) were cases aged 5years and above who were not pregnant. There has been a continuous reduction in mortality caused by malaria from 3,461 in 2006 to 1,100 in 2015 (National Malaria Control Programme, 2016).

1.1.2 Transmission

Malaria transmission varies across and within countries over seasons and years. The intensity of transmission depends on the vector, parasite, human host and environment factors. Climatic conditions in tropical countries, such as temperature, rainfall patterns, and humidity increase survival of the vector anopheles, thereby increasing transmission. Other negligible modes of transmission are from mother to child and through blood transfusion.

1.1.3 Clinical presentation

Malaria has varied clinical manifestations that mimic other diseases; however, the most pronounced is fever. Others are headache, chills, weakness, vomiting, diarrhoea, abdominal and body pains. More severe manifestations include anaemia, cerebral malaria, and hypoglycaemia, respiratory distress in relation to metabolic acidosis, acute renal failure and acute pulmonary oedema. Disease progression and severity depends on the plasmodium species, the patient's age, genetic composition, general health, immunity and nutritional status as well as the effects

of any chemoprophylaxis or chemotherapy that is being used (World Health Organisation, 2015a).

1.1.4 Diagnosis

In malaria endemic places, malaria used to be diagnosed using clinical signs and symptoms. This amounted to high level of cases since most presumed cases were treated. However, in 2012 WHO recommended parasite-based diagnosis and management of malaria cases, which was adopted by most countries. There are modern methods of parasite identification however, the rapid diagnostic test and light microscopy are the methods recommended by WHO (World Health Organisation, 2015a).

Although microscopy is the gold standard, it is time consuming, expensive, cumbersome requiring a trained microscopist, microscope and an electric source. This makes its use in deprived areas very difficult. The malaria Rapid Diagnostic Test (RDT) is less time consuming, simple, accurate and cost effective. RDT testing can be performed anywhere with little training.

The RDT uses immunochromatography, detecting antigens; histidine-rich protein 2 (HRP2), parasite lactate dehydrogenase (pLDH), and aldolase produced by the parasites in blood. (Tangpukdee, Duangdee, Wilairatana, & Krudsood, 2009).

In cases were parasites are not in peripheral blood circulation to be detected by microscopy, RDTs are able to confirm the presence of the parasite by the presence of antigens released in the blood. However, persistency of these antigens occurs in the blood after treatment and parasites decline, a challenge leading to false positive result (Mouatcho & Goldring, 2013).

P. falciparum histidine-rich protein (Pfhrp), an antigen produced by P. falciparum is not available for detection by some RDTs that detects the Pfhrp antigen, thus leading to false

negative results which is of great concern with the Test Treat and Track (TTT) policy (Gamboa et al., 2010; Houzé, Hubert, Le Pessec, Le Bras, & Clain, 2011).

Other challenges in endemic countries include acceptability of test results by both patient and prescriber especially when signs and symptoms that mimic malaria are present. There is also the intermittent shortage of RDTs due to poor and inefficient planning and poor logistic management (Boadu et al., 2016).

1.1.5 Preventive measures

There are two main preventive measures in malaria control, which are vector control and chemoprevention. In controlling the mosquito vector, environmental modification is necessary to reduce multiplication and the rate of parasite transmission. Insecticides are also used in indoor residual spraying and are embedded in the Long-Lasting Insecticide-treated Nets (LLINs) as well. Moreover, larvicides are used in destruction of sources of mosquito larvae.

WHO recommends the used of long-lasting insecticide-treated nets (LLINs) and Indoor Residual Spraying (IRS) for protecting people at risk (The malERA Consultative Group on Vector Control, 2011).

In the Northern part of Ghana, vector control with other intervention reduced malaria prevalence from 44% in 2011 to 11.7% in 2014 in the Upper East region (MICS, 2011; GDHS, 2014). To increase usage of the LLINs, there is a need for an effective behavior change communication strategy. Currently some vectors are developing resistance to some of the insecticides use in vector control in some countries.

The other preventive intervention in most endemic countries includes the use of the monthly chemoprevention in pregnant women, the Intermittent Preventive Treatment (IPTp), which is

given after quickening until birth. In infants (IPTi) it is given during routine immunization schedules usually at 10 weeks, 14 weeks and about 9 months of age to infants at risk for malaria. In children 3-59 months, the Seasonal Malaria Chemoprevention (SMC) is given monthly during peak malaria seasons. Travelers from non-endemic areas are also given chemoprophylaxis for malaria prevention (World Health Organisation, 2015a).

1.1.6 Cases management

In addition to the preventive measures above, prompt and proper management of cases is key in malaria control. Effective and prompt case management is a challenge in some parts of Africa due to lack of access to health care. This leads to increase morbidity, mortality and increase transmission (World Health Organisation, 2015a).

In hard to reach areas where access to health care is difficult, the first resort of fever cases are traditional or spiritual healers who use concoctions or non-orthodox medicines. Some resort to self-management using left over medications that may be orthodox or not. Others resort to pharmacies or drug outlets where orthodox medicines are given.

The health seeking behavior depends on the socio culture and economic status of an individual or the caretaker in question. Most at times, these places of care treat individuals using signs and symptoms based on previous knowledge in treating malaria; however, some pharmacies may have RDTs to confirm the presence of malaria. Only if these remedies do not work do they visit a health facility or formal healthcare system, by which time the condition may be worse (Ladner, Davis, Audureau, & Saba, 2017; Littrell et al., 2011; Tynan et al., 2014).

To improve access in places where there is difficulty in accessing healthcare, WHO recommended the need for home management, where effective ACTs would be accessible.

This was aimed mainly at children under five and pregnant women. In home management, Community Health Workers (CHWs) who may be volunteers or non-health professionals are given basic skill in identification and treatment of malaria. They are also able to educate care givers on signs of malaria to prevent delay in treatment which may need referral (World Health Organization, 2005). In Ghana, some community health workers (CHW) have been trained in the use of RDTs to confirm malaria cases before treatment is given. Studies have shown reduced workload of health staff at the Health Facility level in communities were well-trained CHWs provide home management of malaria (Tiono et al., 2008). Others have shown prompt referral by caregiver to CHWs for prompt actions to be taken. This was due to caregivers' knowledge and acceptance of ACTs as against traditional treatment (Fatungase, Amoran, & Alausa, 2012).

Case management at the Health facility needs prompt diagnosis and treatment with effective antimalarial drugs since cases do not report early and may come in more severe forms.

Ghana subscribes to the TTT global initiative, which recommends that all suspected malaria cases, must first be confirmed using parasite-based diagnostic testing either by microscopy, the gold standard or rapid diagnostic test.

Positive confirmed cases are then classified as either severe or simple malaria depending on the signs and symptoms in addition to the test results. Recommended quality-assured antimalarial are then prescribed accordingly. However, negative results should be reassessed and other common causes of fever and treated appropriately. Cases, both positive and negative must be tracked through timely and correct reporting to direct policy and operational decision (World Health Organisation, 2015a). The introduction of malaria RDT in Ghana has improved testing rates from 39% in 2012 to 73.6% in 2015 (National Malaria Control Programme, 2016).

1.1.7 Adherence to treatment guideline

Guidelines are developed to ensure quality, uniformity and consistency of care for clients. To ensure adherence, stakeholders must be engaged in the process of developing guidelines. Adequate capacity building, appropriate infrastructure and equipment as well as continuous supplies of commodities are essential to enhance provided adherence.

WHO malaria treatment guideline provides evidence-based recommendations on identification of signs and symptoms, diagnosis, prevention and treatment of uncomplicated and severe malaria in all age groups and situations, including, young children, pregnant women, People Living with the Human Immunodeficiency Virus (PLHIV), travelers from non-malaria-endemic regions and in epidemics and complex emergency situations (World Health Organisation, 2015a).

The first edition of the malaria treatment guideline was published in 2006, when there was mass chloroquine resistance and artemisinin derivatives were producing results. However, to reduce progression of resistance to these new artemisinin derivatives, artemisinin combinations were introduced. Adherence was low due to the proliferation of monotherapies on the market and the high cost of the ACT.

The second edition of the malaria treatment guideline (2010), recommended the replacement of presumptive treatment with parasitological diagnosis whenever possible. This was to prevent overprescribing of ACTs most of which were subsidized and reduce resistance. Dihydroartemisinin piperaquine was added in this edition to make recommended ACTs for treatment of uncomplicated malaria five, artemether lumefantrine, artesunate amodiaquine, dihydroartemisinin piperaquine, artesunate mefloquine and artesunate Sulphadoxine Pyrimethamine (World Health Organization, 2010).

In addition to test and treat, tracking was added to the third edition since cases were not documented and reported. Prescribing any of these oral ACTs should be limited to parasitological diagnosis of malaria. Patients with negative results should be reassessed for other common causes of fever and treated appropriately. Only in places where test cannot be conducted can treatment commence on suspected malaria cases. In case of severe malaria, artemisinin or quinine injectable should commence followed by oral ACTs and quinine respectively (World Health Organization, 2015a). Adherence was expressed in WHO world report (2016) by indicators such as;

1. Percentage of patients with suspected malaria who received a parasitological test.
2. Percentage of patients with confirmed malaria who received first-line antimalarial treatment according to national policy.
3. Percentage of malaria cases receiving recommended first line ACT treatment according to national protocol.
4. Percentage of expected health facility reports received at the national level and percentage of malaria cases detected by surveillance systems. (World Health Organization, 2016)

1.1.8 Adapted malaria guideline for Ghana

In Ghana and other malaria endemic countries especially in sub-Saharan Africa, some of these recommendations have been adopted in various national guideline based on the country's needs. ACTs are still the drug of choice in the revised anti-malarial case management guideline published in Ghana in 2014 and in addition testing and surveillance. To achieve efficiency in malaria treatment and enhance the goals of case management, Ghana subscribed to the TTT (Test, Treat and Track) initiative.

It recommends that suspected malaria cases are tested and every positive tested case treated with recommended quality-assured ACT according to the malaria classification. However, both positive and negative tested cases must be tracked through timely and accurate reporting to guide policy and operational decisions. The TTT if strictly adhered to, will provide accurate reports of the malaria burden and greatly contribute to appropriately managing other causes of febrile illnesses. It will also reduce over consumption of ACTs, promotes rational use of antimalarial drugs, thereby reducing the occurrence of resistance (National Malaria Control Programme, 2014).

Ghana implemented the ACT policy in 2004, withArtesunate–Amodiaquine (AA) as the first-line drug. Two other alternatives, Artemether Lumefantrin (AL) and Dihyroartemisinin piperaquine (DHAP) were added to be used in cases where AA cannot be used. DHAP is contraindicated in pregnancy and those in their first trimester were given quinine. However, with severe malaria, quinine and ACT are used, proceeded with at least a 24hour course of quinine or an artemisinin injection respectively (National Malaria Control Programme, 2014).

1.1.9 Antimalarial resistance

Widespread antimalarial drug resistance has threatened malaria control efforts; however, compliance to treatment protocols will help reduce development of drug resistance. Resistance to previous antimalarial medications, some monotherapy, examples of which are chloroquine and Sulfadoxine-Pyrimethamine (SP) were due to their irrational use. This directed World Health Organization recommendation on the use of artemisinin-based combination therapy (ACT) which is highly effective to reduce resistance (World Health Organisation, 2015b).

In recent years, studies have confirmed parasite resistance to some ACTs in five countries; Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam. High

treatment failure rates with Artesunate-mefloquine (ASMQ) an ACT used in Cambodia and Thailand has led both countries to change their treatment policy to Dihydroartemisinin-piperaquine (DHAP) another ACT in 2010 and 2015, respectively (World Health Organisation, 2015b).

Stronger malaria surveillance systems are urgently needed to enable a timely and effective malaria response in endemic regions, to prevent outbreaks, resurgences and early detection of antimalarial drug resistance (World Health Organisation, 2015b).

1.2 Problem Statement

Ghana has high transmission of malaria especially during the rainy season. The predominant malaria parasite species prominent in Ghana and thus in the La Nkwantanang Madina Municipality is the Plasmodium falciparium (80-90%) with the others ranging within (10-20%) (National Malaria Control Programme, 2014).

In 2016, Ghana reported about 10.4 million Out Patient Department (OPD) malaria cases that was approximately 39% of OPD cases were seen, a 2.5% increment over 2015 (NMCP, 2016). There was an increase in the proportion of OPD malaria cases that were tested from 39% in 2012 to 73.6% in 2015. To ensure success of this policy, adherence to policy guideline by healthcare provider and patient adherence are essential. The National Malaria Control Program in Ghana adopted the TTT policy in 2014 and rolled out nationwide training on the revised antimalarial treatment guideline and the use of the malaria rapid diagnosis test (RDT) kit. There has also been continuous education of the patient through the OPDs and other media on prevention and confirming malaria before commencing treatment (NMCP, 2016).

Emphasis has been placed on intervention within the municipality coupled with environmental management, education and other preventive measures. Health professionals have been trained on malaria case management in accordance with the revised malaria guidelines Nevertheless, prescriber adherence is low and malaria precedes all OPD cases.

There is a problem of poor prescriber adherence to the revised malaria guideline, despite efforts in making commodities available, training health workers, and intensifying supervision, amongst others. Poor prescriber adherence to the revised antimalarial guideline reduces the quality of malaria care, increases transmission and progression in disease severity that will increase morbidity and mortality. Moreover, irrational used of antimalarials will give rise to drug resistance.

In the Nkwantanang Madina Municipality, there has been a reduction in malaria testing rate from 91% in 2014 to 80% in 2015 and an increase in presumptive treatment from 8,029 in 2013 to 14,944 in 2014 (District Health Information Management system, 2015).

Although there has been a slight reduction in positive cases from 27.5% in 2014 to 23.3% in 2015, a number of unknown parasite negative cases were prescribed antimalarial (District Health Information Management system, 2015).

Based on the policy objectives, it is necessary to determine prescriber adherence to the revised antimalarial guideline in the La Nkwantanang Madina Municipality. This study assessed prescriber adherence to the testing, treatment and tracking of uncomplicated malaria cases in the La Nkwantanang Madina Municipality and factors affecting prescriber adherence.

1.3 Conceptual Framework

Adherence to the malaria treatment guideline is depicted by the green shaded area in fig.1.1 below. A prescriber is said to adhere a negative malaria tested client is not prescribed any antimalarial or a positive malaria tested client is prescribed recommended oral antimalarials (ACTs).

Prescriber adherence to the revised malaria treatment guideline is influenced by several factors, examples of which are classified under healthcare system factors, prescriber and patient factors. These categories in the framework interact differently to impact prescriber adherence to the guideline.

Patient factors affect the way a prescriber performs consultation. The sex, age and principal diagnosis among others, would affect how patients are assessed, the type of diagnostic investigation a prescriber requests and the type of medications he or she would prescribe. These factors in a way may affect prescriber adherence to the protocol.

The health facility factors and systems affect prescriber adherence, especially where facilities do not have laid down systems and procedure for training. Another factor that can influence prescriber adherence is malaria commodity availability and its efficient management. Prescribers manage with what logistics they have available at their disposal and this tends to compromised on laid down guideline.

Prescriber age, cadre, working experience affects adherence to malaria case management. Other factors such as prescriber workload, among others also affects adherence as well.

All the factors at the three (3) levels interact with each other subsequently influence prescriber adherence to the revised malaria guideline.

A better understanding of how these factors interrelate would be useful in the development of appropriate policy interventions that will improve prescriber adherence to the revised malaria treatment guideline.

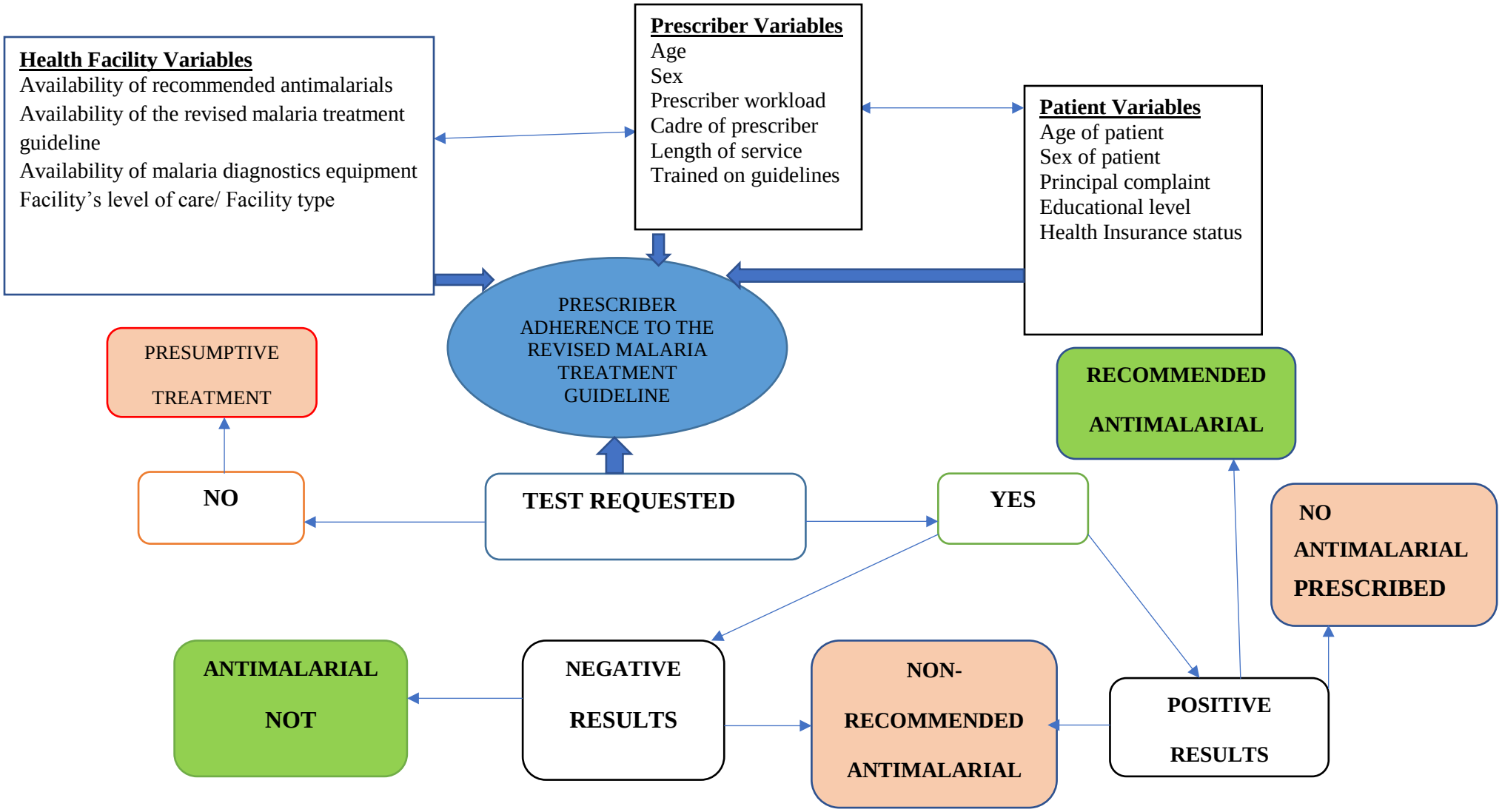


Figure 1.2: Conceptual framework of prescriber adherence to malaria treatment guideline.

1.4 Research questions

1. What are the malaria case management practices?
2. What proportion of patients are tested, treated and tracked in accordance to the revised malaria guideline by prescribers?
3. What factors affect prescriber adherence to the revised malaria guideline?

1.5 Objectives

1.5.1 General objective

To assess prescriber adherence to the testing, treatment and tracking of uncomplicated malaria cases in the La Nkwantanang Madina Municipality and factors affecting prescriber adherence.

1.5.2 Specific objectives

1. To assess prescribers' malaria case management practices.
2. To assess prescriber adherence to the revised malaria treatment guideline.
3. To determine the factors that affect prescriber adherence to the revised malaria treatment guideline.

1.6 Justification

In adherence to the TTT policy, this study would provide information on the true burden of malaria in the country and the emergence of resistance. Transition from control to pre-elimination phase requires slide positivity of 5%, which has not been attained in Ghana over years in the control phase. This policy will help identify the malaria phase in which the country is and strategies to implement towards malaria elimination.

In order to progress to the elimination phase as some countries have, and reduce drug resistance, there is the need to improve control measures and access to quality malaria care. To achieve this, adherence to the malaria protocols by health workers, patients and all actors involved in malaria control is crucial.

This study would provide information on prescriber's case management practices, and health facility, patient and prescribers factors that influence prescriber adherence to the revised malaria treatment policy. Furthermore, the research findings will inform La Nkwantanang Madina Municipal management team, the Greater Accra Regional Health Directorate and the National Malaria Control Programme (NMCP) on factors influencing poor adherence among prescribers and what new strategies to implement to aid compliance to the revised malaria treatment policy.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Malaria case management practices and adherence to malaria protocol have been massively researched into all over the world, mostly in Africa. This is because Africa contributes the highest percentage to malaria cases and most countries in Africa have weak health systems. Researchers look into the short falls in other to help modify strategies for better implementation of malaria policies.

2.2 Prescriber's case management practices and adherence to the malaria guideline

Currently World Health Organization and national protocols commend the 'test, treat and track' strategy for the management of uncomplicated malaria to decrease over prescription of artemisinin-based combination treatment (ACT) and reduce drug resistance. Although most countries have adopted this policy, different practices exist. Various studies conducted have reported gaps with malaria case management practices, which affects adherence to the guidelines.

An audit of patient's records on treatment of uncomplicated malaria in two public health facilities in Southeast Nigeria revealed the practice of presumptive treatment in 51% of sampled patient's records. Only 49% were tested for malaria and 58% of slide negative results were given antimalarial as well (Ezenduka, Okonta, & Esimone, 2014). Although, a greater percentage (93%) of patients received ACT, the rest received phased out antimalarial monotherapy.

Though compliance to the use of ACT as first line treatment for uncomplicated malaria was high, treatment practices were markedly characterized by limited use of laboratory diagnosis, depending mostly on presumptive treatment. The results were over-diagnosis and over-treatment that reduces the value of routine information on malaria. There was also the lack of routine data on malaria treatment (Ezenduka et al., 2014).

A study on children in six public hospitals in Uganda conducted by Sserwanga et al., (2015) also accessed adherence to the malaria guidelines by clinicians. Although testing (96.9%) and treatment were high, 39.6% of 30,210 children with negative test results were prescribed antimalarials most of whom had fever that could have been further investigated. Likewise, in Uganda, provider adherence to RDT testing was high but some negative malaria test results were prescribed antimalarials (Altaras et al., 2016).

Another study in Sudan among physicians treating children below five years of age also showed poor adherence to malaria management protocol. This was characterized with practices such as low testing rate, faulty prescription of anti-malarial to test-negative children and treatment (75%) with non-recommended anti-malarials (Bilal et al., 2015).

A study in twelve lower level health facilities on the quality of malaria case management in four districts in Zambia revealed practices like inconsistent use of confirmatory test for malaria, the use of unrecommended anti-malarials (e.g. sulphadoxine-pyrimethamine) and treatment negative malaria cases (Chanda-Kapata et al., 2014).

A national survey undertaken in public health facilities in Kenya revealed that malaria testing was generally low and the use of AL was high, moreover, anti-malarial (AL) treatments for test negative patients was widespread (Juma & Zurovac, 2011).

Studies above clearly showed non-adherence to the malaria treatment guidelines in various countries. The trends in non-adherence from the various studies varied, from high adherence to testing to presumptive treatment and treatment tested negative patient. Other studies above showed the use of unrecommended antimalarials as well as wrong dosing of ACTs (Bilal, 2015; Ezenduka, 2014). In general, the use of ACTs was optimal in these studies above but adherence to negative results was a challenge. Studies above show some level of adherence, but for best results, more effort should be made to improve adherence.

2.3 Prescriber attitude and knowledge on malaria case management guideline

Prescriber attitude and knowledge towards malaria case management needs to be probed into since these may also affect adherence to case management. For effectiveness of malaria programs, training of health workers is required to update their knowledge and standard operating procedures (SOPs), manuals and job aids should be provided. There should be reinforced with continuous refresher training and supportive supervision.

Early stakeholder engagement is necessary to help identify ways of training that would affect both behavior and case management. A qualitative study in Pakistan confirmed that the lack of knowledge on the case management protocol was one of the major factors contributing to irrational drug use in malaria in Pakistan aside unavailability of drugs and adherence of prescribers to standard treatment guidelines (Madeeha Malik, Azmi, Hassali, & Shafie, 2012).

Clinical decision is complex and can be influenced by beliefs, perceptions, peers and personal experiences that could undermine the impact of training and other support programmes. Distrust has been the regular reason given in non-adherence to test results and this was revealed in a study in Angola, where distrust for negative test results led to many incorrect malaria diagnoses and treatments (Rowe et al., 2009).

Evidence proves that prescriber's capacity to confidently diagnose and treat non-malarial fevers may also influence their decision-making. Ten months after RDT introduction in a study rural district in mid-western Uganda revealed high provider adherence to RDT results, however some negative results were treated. The study described that this behavior was influenced by factors such as prescribers' clinical beliefs, knowledge, and patient's perception and demands (Altaras et al., 2016). A similar observation was made by Osterholt et al., (2006), that suggested that disease specific training on cases management was less effective on the quality of care for other disease with similar symptoms but an all-inclusive approach yielded better result.

To address behavioral change in prescribers, some studies confirmed that text messaging is an intervention that may improve adherence to the malaria guideline (Cundill et al., 2015; Zurovac et al., 2011). Mostly, clinicians do not request for testing when it is clinically appropriate, and when requested, test results are sometimes ignored (Whitty, Hopkins, Leslie, & Reyburn, 2008).

2.4 Factors that affect prescriber adherence to the revised malaria treatment guideline

To ensure adherence to the malaria treatment guideline, factors that affect adherence should be identified. Health system or facility factors, patient and prescriber factors are known to either have a positive or negative effect on adherence. Various study sought to assess factors that significantly affect adherence to the malaria treatment guideline and how these can help inform policy change.

2.4.1 Health system factors

A study carried out in Timor-Leste in 2012 observed some health facility factors that hampered the implementation of the new malaria protocol. These factors included inadequate introduction and training on the revised treatment protocol and the rapid diagnostic testing. In addition, were

the lack of supervision and non-availability of the new drug, ACT amongst others (Martins, Zwi, Hobday, Bonaparte, & Kelly, 2012).

Chanda-Kapata et al., (2014) demonstrated that malaria in-service trainings were not associated with better malaria case management practices. It was suggested that enhanced training rather improves quality of case management this was confirmed by Achonduh et al., (2014). In addition to training, a study in Kenya carried out by Zurovac et al., (2017) revealed that the continuous monitoring and supervisory visits improved commodity availability and adherence to case management protocols.

Another health system factor that reduces adherence to malaria management protocol in Sudan among physicians treating children below five years of age was the ambiguity of different guidelines (Bilal et al., 2015). Examples of such protocols were the malaria treatment guideline and the Integrated Management of Childhood Illness (IMCI) protocol which are contradictory. The IMCI protocol is based on presumptive treatment, while the malaria treatment guideline recommends testing before treatment commences (Bilal et al., 2015). Likewise, in Angola Rowe et al., (2009) also confirmed that policy ambiguity reduced adherence to the malaria treatment guideline.

Availability of a functional laboratory or malaria RDTs could affect effective implementation of treatment guideline. Bawate, Carter, Nsajju, & Bwayo, (2016) observed, in a study in Uganda that prescriber adherence was higher when the laboratory was functional, this was similar to findings in Malawi (Namuyinga et al., 2017). Contrary to this was a study in Nigeria that reported that RDT-supported malaria diagnosis rather led to the over prescription of ACTs and non-adherence, where both positive and negative cases were given ACTs (Uzochukwu et al., 2011).

Facilities with very large numbers of patient also affects adherence. The odds of testing among suspected malaria patients seen by health workers with caseloads < 25 patients/day were 18-fold greater than for those seen by workers with higher caseloads. (Rowe et al., 2009).

2.4.2 Prescriber's factors

A study in Nigeria Enugu State access prescriber factors that affected adherence to the malaria treatment guideline. It was observed that adherence was higher among young prescribers who had practiced for less than ten years (OR = 21.05), prescribers who saw less than 25 patients (OR = 7.271), prescribers who were mindful of National Treatment Guideline (OR =9.847), and prescribers who had been trained on the guidelines (OR =29.311) (Ogochukwu, 2010).

Also, a study in Uganda, confirmed that adherence is likely with lesser years of practice. It was found that prescribers who had been in practice for less than 6 years were about 3 times more likely to adhere to the policy than those who had been in practice for long (Ucakacon, Achan, Kutyabami, Odoi, & Kalyango, 2011).

Prescriber's cadre may also affect adherence, as a study conducted in Ghana revealed that compliance to the guidelines was significant in low cadre of health staff (Kwarteng et al., 2015). This was confirmed amongst nurses in a study in Uganda as lower grades had better compliance to the protocol (Bawate et al., 2016). In contrast Ucakacon et al., (2011) found out that doctors were 97.5 times more likely to conform to the policy when compared to nurses.

2.4.3 Patient factors

The strongest predictors of correct malaria treatment were patient-level symptoms. Some patient's factors affect adherence to the treatment guideline. The likelihood of a patient with fever or history of fever being treated is high presumptively.

A study in Uganda by Sserwanga et al., (2015) attested to the fact that the presence of fever in test negative patients compromises adherence to the malaria policy. In the study children with fever had 5.43 times the odds of being prescribed antimalarials as compared to those without fever when malaria test results are negative. However, in Steinhardt et al., (2014) patients who spontaneously complained of fever to the health worker were 72% more likely to be correctly treated for confirmed malaria ($p < 0.0001$).

Patient's age affect prescriber adherence. In Uganda, prescriptions for younger children were more likely to conform to antimalarial policy (Ucakacon et al., 2011), which was confirmed by Ghana when Kwarteng et al., (2015) where findings revealed that adherence is greater in children below 5 years of age.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Design

This is a cross sectional study that employed both descriptive statistics as well as inferential statistics. Data was generated through quantitative research methods for analysis.

3.2 Study Location

La Nkwantanang Madina Municipality, the study area is located in the Greater Accra Region of Ghana. It was carved from the Ga East District and is located in the North Eastern part of Greater Accra. It is bounded with Adenta to the east, Accra Metropolitan Area to the south, Ga East to the west and north by the Akwapim South District Assembly. It is one of the 16 districts, municipalities and metropolitans in the Greater Accra Region. Administratively, the municipality is divided into three (3) sub municipalities namely Madina, Danfa and Pantang (Ghana Statistical Service, 2014).

3.2.1 Demography

The municipality during the 2010 population and housing census had an estimated population of 111,926, with 48.5% males and 51.5% females. The annual growth rate is 4.2% with an average household size of 3.9. Women in the reproductive age and children under five years are 35,055 and 12,001 respectively. It covers a total land area of 70.887 km2 giving a population density of 1,579 persons per km2. The urban and peri-urban population constitutes 84% of the municipality's total population with 16% residing in the rural settlements (Ghana Statistical Service, 2014).

3.2.2 Environment

The Municipality falls within the trans-Saharan belt of the region with two major seasonal changes (i.e. Dry and Rainy seasons). The atmospheric condition across the municipality varies directly with the seasonal changes. Thus, the atmosphere is mostly hazy with dry air during the dry seasons and musky with humid air in rainy seasons providing conducive breeding grounds for the mosquito. Although, it has long duration of rainy season only few crops do well on its lands (Ghana Statistical Service, 2014).

3.2.3 Health Services

The municipality has twenty-five (25) health facilities but nineteen (19) are currently providing OPD malaria services and ten (10) submit malaria reports to the municipal health directorate. In addition, twenty (20) functional Community-based Health and Planning Services (CHPS) zones provide preventive services. Several pharmacies and licensed chemical sellers play vital roles in the health care delivery in the municipality. There are 2 maternity homes, 15 clinics, 5 hospitals, 2 polyclinics and 1 health centre. The Christian health association of Ghana (CHAG) hospital serves as the referral centre for all the other health facilities within the municipality. The two polyclinics are owned by the government, and one clinic owned by a non-governmental organization (NGO). A hospital, a clinic and the only health centre are QUASI facility. The rest are privately owned. Two Clinics were temporally closed and one Clinic was going through registration for accreditation.

3.3 Study Variables

The study variables were grouped into dependent and independent variables

3.3.1 Dependent variable

The main dependent variable is uncomplicated malaria cases managed in accordance with the revised malaria treatment guideline. This is a binary variable. A case is said to be managed according to the guidelines if,

1. A test is performed on suspected malaria case to confirm malaria.
2. Confirmed malaria positive cases are prescribed recommended oral antimalarials (ACTs).
3. Negative malaria test results are not prescribed any antimalarial.

Missing any of the steps above means that the case was not managed in accordance with the guideline.

With prescriber adherence, the average number of uncomplicated malaria cases managed according to the malaria treatment guideline by each prescriber was computed. Prescriber adherence was then pegged at 85% percent and above whilst below 85% is non-adherence.

3.3.2 Independent variable

The independent variables of interest are varied and include the following; health facility variables, patients and prescriber variables.

3.3.2.1 Health Facilities Variables

The study obtained information from the health facilities as follows;

Table 3.1: Health facility variables

Variable	Operational Definition	Scale of Measurement	Source of Data
Availability of antimalarial	Availability of recommended antimalarial for treatment of uncomplicated malaria at the facility	Binary (Yes, No)	Health facility checklist
Availability of malaria case management	Availability of revised guidelines for malaria treatment	Binary (Yes, No)	Health facility checklist
Availability of diagnostics equipment	Availability of any form of malaria diagnosis. RDT or microscopy for testing of suspected malaria at the facility	Binary (Yes, No)	Health facility checklist
Type of health facility	Facility's level of care	Nominal (hospital, polyclinics, clinics or health centre)	Health facility checklist

3.3.2.2 Prescriber Variables

The study obtained information from the prescriber as follows;

Table 3.2: Prescriber variables

Variable	Operational Definition	Scale of Measurement	Source of Data
Age	Age of respondent at last birthday	Continuous in years	Prescriber's questionnaire
Sex	Biological make-up	Nominal (Male, Female)	Prescriber's questionnaire
Length of service	How long health worker has been managing malaria.	Categorical (<5, 5-10,> 10years)	Prescriber's questionnaire
Cadre of prescriber	Professional background of prescriber	Nominal (Medical officer, physician assistant)	Prescriber's questionnaire
Training	Training on revised malaria guideline	Binary (Yes, No)	Prescriber's questionnaire
Prescriber's workload	The average number of patients a prescriber attends to a day	Categorical (<25patient, >25patient)	Prescriber's questionnaire

3.3.2.3 Patient Variables

The study obtained information from the patient as follows;

Table 3.3 Patient Variables

Variable	Operational Definition	Scale of Measurement	Source of Data
Age	Age, as indicated in patient health record on day of visit	Binary (<5years, ≥5years)	Patient's health record
Sex	Sex as indicated in patient health records	Nominal (Male, Female)	Patient's health record
Educational level	Level of education of patient	Categorical (primary, secondary, tertiary)	Patient's health record
Health insurance status	Possession of health insurance	Binary (Yes, No)	Patient's health record
Principal complaint	Main signs and symptoms of patient indicated in patient health records	Nominal (fever, pains vomiting, diarrhoea etc.)	Patient's health record
Occupation	Type of employment	Nominal (farmer, teacher etc.)	Patient's health record

3.4 Sampling

3.4.1 Study population

The study population included health facilities, sampled folders of suspected malaria cases seen within the second quarter of 2017 and prescribers who attended to cases from sampled patient's folders.

3.4.2 Sample size

The ten health facilities were selected from all the five sub-districts. Samples of four hundred and twenty-three (423) patient health records with suspected malaria were selected for inclusion in the study.

To determine the number of patient health records to select, the sample size formula for study of infinite population was used. The total sample size for patient health records was calculated as:

The minimum number (n) of records included was determined by:

$$n = \frac{z^2 p(1-p)}{e^2}$$

Where z value for 95% confidence interval = 1.96,

P = proportion of patients managed correctly for malaria in the municipality.

e = allowable error of 5%.

Assuming 50% of malaria cases are appropriately managed, now;

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05 \times 0.05} = 384.16$$

Allowing for loss of information in 10% of the records

$$n = (384 \times 0.1) + 384 = 422.58 \text{ approximately } 423.00$$

Table 3.4: Number of patients' records reviewed by health facility, La Nkwantanang Madina Municipality.

Facility	Malaria case load C	Calculated sample size (c/T) x n	Allocated sample size (F)
Danfa health centre	1603	33.52	34
Passion clinic	350	7.32	7
Sanford world clinic	789	16.50	17
Bennett memorial clinic	241	5.04	5
Esidem hospital	299	6.25	6
Greater grace hospital	378	7.91	8
Swan clinic	229	4.79	5
Madina polyclinic- Rawlings circle	4425	92.54	93
Madina polyclinic- kekele	3220	67.34	67
Pentecost hospital	8692	181.78	181
Total	T = 20,226	n = 423	423

From four hundred and twenty-three (423) patient health records that were reviewed, forty-two (42) prescribers were identified as having managed such cases. These identified prescribers were subsequently interviewed.

From the total number of forty-two prescriber, six were from the Health Center, seven from the clinics, fifteen prescribers from the hospitals and fourteen from polyclinics.

3.5 Sample and Sampling Technique

In selecting the study site and sample for the study, both purposive sampling method and matching selection criteria were used, despite the disadvantages of purposive sampling methods in a quantitative study. This was applied in selecting the study site and study population due the limited number of attendance and prescribers in some facilities during the time of the study. Practically, purposive sampling was used in selecting ten health facility and the forty- two prescribers in La Nkwantanang-Madina Municipality. From four hundred and twenty-three (423) patient health records that were reviewed, forty-two (42) prescribers were identified as having managed such cases. These prescribers were identified from folders and interviewed.

Out of a total number of forty-two prescriber (Medical doctor and Physician assistant) from the reviewed patient health, six were from the Health Center, seven from the clinics, fifteen prescribers from the hospitals and fourteen from polyclinics.

3.6 Data Collection

Bryman and Bell (2007), note that the techniques and instruments for collecting data play significant roles in answering research questions and objectives effectively. In this study, both secondary and primary source of data collection procedure was employed.

3.6.1 Source of Data

The study used both the primary and secondary source of data collection. Primary data was obtained from prescribers who managed suspected malaria cases within the second quarter of 2017. Secondary data was obtained from patient health records from ten selected health facilities.

3.6.1.1 Secondary Source of Data Collection

The secondary source of data collection involves extracting data from an administrative source. This study extracted data records of patients from the ten health facilities by requesting for the patient folders at the out-patient department. The study extracted data on patient who reported to the health facility within the study population with diagnosis of malaria symptoms.

3.6.1.2 Primary source of Data Collection

The primary data consisted of quantitative and qualitative data collected through semi-structured questionnaires and interviews. The questionnaires included; a facility audit checklist and questionnaires for prescribers.

The questionnaires were administered by the principal investigator and two other trained research assistants using interviewer-administered strategy and each lasted between ten (10) and fifteen (15) minutes (see appendix for the questionnaire).

3.6.2 Sampling Procedure

The survey team including the Principal Investigator (PI) visited selected facilities, sought permission and introduced the team members to the heads of the facility. The objective and the various tools that would be used were introduced and the team requested a day to commence survey. On agreeing on a date, other heads of departments were introduced and permission was sought.

3.6.3 Health Facility

A total of ten health facilities were selected from all the sub municipals. These facilities performed malaria outpatient consultations within the second quarter of 2017 and reported to the health directorate, La Nkwantanang-Madina Municipality.

They were three hospitals that included the referral facility, the two polyclinics, five clinics and the only health centre. These were purposively selected due to the limited number of attendance and prescribers in the other facilities during the time of the study.

3.6.4 Patients health records

On the agreed day, verbal consent was sought from heads of departments this health facility involved in the study. The numbers of patients' health records calculated for each facility were selected from the consulting room registers using patient's names age and date of consultation. This helped the team extract patient's identification numbers from the OPD register. These identification numbers were then used to trace and retrieve patients' health records from the records department. In the case of the computerized system (electronic folder), the team was helped by a staff from the records or Health information unit. The 423 patient health records were proportionally distributed among the ten facilities according to their outpatient malaria caseload within the second quarter of 2017. Base on the sample size of each facility shown in Table 3.4. In each facility, selection of patient records was done by systematic random sampling. The sampling interval of forty-eight "48" was calculated by dividing the total uncomplicated malaria suspected cases for the second quarter of 2017(20,226) by the sample size (423). Starting from the number ten (10) of suspected malaria cases, each forty eighth (48th) record were noted and picked from the record archives as part of the sample. If selected patient health record does not have enough data, then the immediate next record was picked. This continued until the total numbers of patient records required for each facility in Table 3.4 were selected. Only uncomplicated cases were included.

3.6.5 Prescribers

From four hundred and twenty-three (423) patient health records that were reviewed, forty-two (42) prescribers were identified as having managed such cases. These prescribers were purposively identified and interviewed.

Out of a total number of forty-two prescriber (Medical doctor and Physician assistant) from the reviewed patient health, six were from the Health Center, seven from the clinics, fifteen prescribers from the hospitals and fourteen from polyclinics.

3.6.6 Inclusion Criteria

- The sample included folders of suspected malaria cases seen within the second quarter of 2017 and corresponding prescribers who treated such cases.
- The health facility must be functional within the second quarter of 2017 and should report in DHIMS.

3.6.7 Exclusion Criteria

- All severe malaria cases, malaria in pregnancy and maternity homes were excluded
- Patient health records with other diagnosis suspected apart from malaria.

3.7 Data collection technique and tools

3.7.1 Structure interview questionnaire for prescribers

This was used in interviewing prescribers who performed malaria outpatient consultations on selected patient health records. Their consents were sought after which their knowledge on malaria management was assessed. Enquiry on malaria case management training, supervision and work experience among others were made.

Prescribers whose consultations were selected were identified either by names or by their signature on an electronic folder or patient's folder. These prescribers were then interviewed using the structured interview questionnaire for prescribers after their consents were sought. The survey team recorded the cadre of prescriber, working experience in years, demography, and workload among others.

3.7.2 Facility Audit Questionnaire

Assessment of the health facility was done with the Facility Audit Questionnaire after permission was sought from respondents. Respondents included heads of the various facilities, administrators and other members of staff who could adequately provide information on key aspects of the facility and services provided.

The administrator or head of facility was interviewed on some relevant general issues regarding malaria case management such as availability of the malaria treatment guidelines, availability of recommended antimalarials, stocks management, laboratory and other logistics equipment. Stock cards of these commodities were also observed.

3.7.3 Patients health records extraction tool

This tool was used in extracting available information from patient health records. On the agreed day, verbal consent was sought from heads of departments this health facility involved in the study.

Documented assessment task, diagnoses, medications and their dosages were extracted from the selected records. Only patients' health records with uncomplicated malaria were included but pregnant women and severe malaria cases were excluded.

3.8 Quality control

Trained field workers with practical knowledge in the health sector were included in the data collection team to ensure quality data collection. During data collection, the principal investigator supervised the field workers. Data collected were randomly selected, crosschecked with participants, and health records for accuracy.

Two independent data entry clerks entered the data into Excel 2016 version. Discrepancies were resolved by referring to the original data collection tools. Data validation was ensured during the data entry process by using checks whilst creating the data entry template.

3.8.1 Recruitment and training of field workers

Field workers were recruited and trained prior to data collection. They were oriented to understand the objectives, data collection tools and interpretation of the tools. Simulation exercises were done in order to avoid or minimize error.

3.8.2 Pre-Test

Before collection of data, the tools were pre-tested to ensure they reflected the local conditions, and to determine the clarity, strengths and weakness of these tools on the field. The tools were pre-tested in Abokobi Health Centre in the Ga East District that has similar characteristic as facilities in the La Nkwantanang Madina Municipality. Data collection tools were then reviewed where necessary to improve the quality of data tools.

3.9 Ethical Issues

The protocol of this research was reviewed and approved by the Ethical Review Committee of the Ghana Health Service with reference number GHS-ERC062/02/18. Permission was sought from the La Nkwantanang-Madina Municipal Health Directorate referenced

LNMMHD/TU/RCH and dated 14/03/18. Permission was also sought from heads of the various health facilities selected to participate in the study. Consents were obtained from the prescribers who were assured of confidentiality.

The participants were completely informed about the purpose, procedures, risks and benefits of participating in the study. Participants who decided to be part of the study were required to sign a consent form as an indication of their willingness to participate. Questions asked by participants were clarified to their satisfaction. Participants were made to understand that they had the right to withdraw from the study without attracting any penalty, decide not to answer certain questions that may cause possible minor discomfort and refuse to participate, since participation was voluntary.

They were informed of the fact that there was no risk involved in participating in the study, neither was there any compensation, therefore participants were not coerced to take part in the study. Participants were assured that all information obtained from this study would be kept confidential and used purposely for the study. In addition, information would be securely stored without the names of the participants, in a secured file, which would be only accessible to the research team.

3.10 Data Analysis

The returned questionnaires were cleaned and edited to ensure completeness and accuracy before they were coded in Microsoft excel, and entered and analyzed using STATA version 15. Chi square test of significance and logistic regression models were used to analyze the data so as to establish relevant as well as the strength of the associations between the dependent and independent variables.

The level of significance was accepted at $p<0.05$ with a 95% confidence interval. Quantitative data was presented in the form of frequency tables. The analysis of data therefore, looks at set objectives, implementation structures, and consensus.

CHAPTER FOUR

4.0 RESULTS

4.1 Distribution of Health facility used in the study

Study was conducted in ten selected health facilities across the La Nkwantanang-Madina municipality. Majority (60%, n=6) of selected health facilities were situated at Madina. Most (40%, n=4) of the health facilities were clinics, followed by hospitals (30% n=3), Polyclinics (20%, n=2) and a Health Centre (Table 4.1).

Table 4.1: Facility selected by sub municipality and level of care

	Sub municipality			
Facility's level of care	**Madina**	**Pantang**	**Danfa**	**Total**
	n	**n**	**n**	**n**
Hospitals	2	1	0	3
Polyclinic	2	0	0	2
Clinic	2	2	0	4
Health Centre	0	0	1	1
Total	**6**	**3**	**1**	**10**

4.2. Demographic Characteristics of Prescribers

This study recruited 42 prescribers whose consultations were selected in the study. Majority of them were Physician Assistants (PA). The Prescribers were aged 27 to 59 years with an average age of 38.7 (±7.8) year and males (59.52%) were the dominating sex. More than two-thirds of

the prescribers had been formally training (78.57%) on malaria case management. Most (57.14%) prescribers had less than 5 year working experience with most (66.7%) of them attending to more than 25 patients a day. Detail characteristics of prescribers interviewed are shown in Table 4.2.

Table 4.2: Demographic Characteristics of Prescribers

Prescribers	Frequency(n)	Percent (%)
Sex		
Male	25	59.52
Female	17	40.48
Cadre		
Physician Assistant (PA)	29	69.05
Medical Doctor (Doc)	13	30.95
Received Training in Malaria Case Management		
Yes	33	78.57
No	9	21.43
Prescriber's workload		
≤ 25	14	33.33
>25	28	66.67
Facility's level of care		
Health Centre	6	14.29
Clinic	7	16.67
Polyclinic	14	33.33
Hospital	15	35.71
Length of practice		
<5years	24	57.14
5-10years	15	35.71
>10years	3	7.14
Facility ownership		
Government	14	33.33
Quasi Government	6	14.29
NGO	2	4.76
Mission	12	28.57
Private for Profit	8	19.05
Age (Mean ± SD) *	38.72 ± 7.75	

*Only 29 Prescribers provided their age, SD: Standard deviation

4.2.1 Characteristics of patient

A total of four hundred and twenty-three (423) patients record were reviewed for this study however the records of ten patients were dropped from the analysis due to poor data records. Most (81.1%) of the patients were aged 5 years and above with females (62.5%) being the most represented sex.

About four of every ten selected patients, had secondary education as their highest level of education. More than half of the participants resided within the La-Nkwantanang Madina municipality. The median weight of patients from selected health records was 56kg (interquartile range; 23-72 kg).

4.3 Case management practices and prescriber adherence

Table 4.3 Socio- demographic characteristic of selected patients' health records.

	Frequency(n)	Percentage (%)
Patient age		
<5years	78	18.89
≥5years	335	81.11
Patient sex		
Male	155	37.53
Female	258	62.47
Patient NHIS status		
Yes	149	36.08
No	264	63.92
Patients educational level		
Primary	108	26.15
Secondary/JSS	171	41.4
Tertiary	47	11.38
Missing	87	21.07
Residence		
Within the district	219	53.03
Outside the district	194	46.97
Weight Median (LQ, UQ)	56(23,72)	

LQ: Lower quartile, UQ: Upper quartile

4.3.1 Availability of services and logistic for malaria management

The health facility checklist indicates that all ten health facilities provided diagnostic services. Both microscopy and RDT were rendered in 90% (n=9) of facilities. Bennett Memorial clinic perform only RDT diagnosis and send out specimen for microscopy and other diagnostics when necessary.

All facilities had ACTs mainly Artemether lumefantrine. In addition, 60% (n=6) of selected facilities had stocks of Artesunate Amodiaquine during that period. These facilities were Danfa health centre, the two polyclinics, Bennett memorial, Swan and Sanford world clinic.

Other logistics in malaria case management that were looked out for were BP apparatus, weighing scale, thermometer, malaria case management training manual, standard treatment guidelines and malaria treatment chart. All facilities had these; however, reference manuals were either shelved or available in few consulting rooms, especially with facilities with more than one consulting room. Facilities had all received supervisory visit within the first half of the year 2017.

4.3.2 Malaria case management practices.

From the reviewed data, malaria test was conducted for 87.7% (362/413) of the patients. Of the 362 patients who were sent for testing, about one-third (32.6%, n=118) of them were confirmed of having malaria (test positive). Among all the 413 patients, oral ACTs was prescribed for 56.4% (234/413) of them, antimalarial injection was also prescribed for 15% (65) of patient. About 93.0% (385/413) of patients were given more than 2 medications. Details of Malaria case management practices are shown in Table 4.4

Table 4.4: Malaria case management practices within the second quarter of 2017.

	Frequency(n)	Percentage (%)
Malaria test conducted		
Yes	362	87.65
No	51	12.35
Malaria test results(n=362) *		
Negative	244	67.40
Positive	118	32.60
Oral ACT prescribed		
No	179	43.34
Yes	234	56.42
Prescribed antimalarial injection		
Yes	65	15.74
No	348	84.26
Number of drugs prescribed		
One	29	7.02
Two	99	23.97
Three	104	25.18
Four	102	24.7
Above four	79	19.13
Patient review date recorded in records		
Yes	64	15.5
No	349	84.5

*Applicable to only those who were tested for malaria

4.3.3 Adherence to malaria management

Of all the 413 suspected malaria patients whose folders were reviewed, the proportion of them who receive adhered malaria treatment was 61.7% (95% CI: 56.9 – 66.3%). Thus, in 61.7% of the times the prescribers adhered to the malaria case treatment guidelines. However, the proportion of Prescribers adherence to treatment guideline (in at least 85% of the cases they attended to) was 28.6% (95% CI: 16.6 – 44.6%). Table 4.5 gives details of adherence to malaria management.

Table 4.5 Adherence to malaria management

	Frequency	Percentage
Reviewed Patient health records that were managed according to malaria treatment guideline (n=413)		
No	158	38.26
Yes	255	61.74
Prescriber adhered to guideline (n=42)		
No	30	71.43
Yes	12	28.57

4.4 Factors associated with Prescriber Adherence

4.4.1 Association between Demographic characteristics of Prescribers, Health facility factors and Prescribers' adherence

In assessing the association between prescriber factors and prescriber adherence, the chi-square and Fishers exact test showed significant association between prescribers' sex and the type of facility ($p<0.05$). The proportion of female prescribers who adhered to the treatment was relatively higher than that of the male prescribers (female - 47.1%, male -16.0%, $p=0.029$). Prescribers from the Health Centre had higher proportion of adherence compared to those from the other levels of care. Details of the test of association are shown in Table 4.6

Table 4.6: Association between Demographic characteristics of Prescribers, Health facility factors and Prescribers' adherence

Prescriber's variable	Prescriber adherence to treatment guideline		chi-square	p-value
	No	Yes		
Sex			4.78	0.029*
Male	21(84)	4(16)		
Female	9(52.94)	8(47.06)		
Received Training in Malaria Case Management				0.247¥
No	8(88.89)	1(11.11)		
Yes	22(66.67)	11(33.33)		
Workload			0.53	0.469
≤ 25	9(64.29)	5(35.71)		
>25	21(75.00)	7(25.00)		
Cadre			1.6	0.205
Physician Assistant (PA)	19(65.52)	10(34.48)		
Medical Doctor (Doc)	11(84.62)	2(15.38)		
Facility type				0.001**¥
Health Centre	2(33.33)	4(66.67)		
Clinic	6(85.71)	1(14.29)		
Polyclinic	7(50)	7(50)		
Hospital	15(100)	0(0)		
Length of practice				0.872¥
<5years	18(75)	6(25)		
5-10years	10(66.67)	5(33.33)		
>10years	2(66.67)	1(33.33)		
Age (Mean ± SD)	38.05 ± 7.28	40.00 ± 8.84	-0.6	0.558§

*p<0.05, **p<0.01, ***p<0.001 ¥: p-value estimated from Fishers' exact test, §: p-value estimated from welch t-test

4.4.2 Effects of Demographic characteristics of Prescribers, Health facility factors on Prescribers' adherence

In assessing the effect of prescribers' characteristics on their adherence to the malaria treatment guideline, the mixed effect logistic regression model was employed.

The residual intraclass correlation was 68.5% indicating that prescriber within facilities had homogeneous characteristics compared to prescribers across different facilities and hence facility was controlled for.

The model showed that prescriber's sex status and their training status on malaria management were significantly related to adherence to the malaria treatment guideline in the simple logistic regression model ($p<0.05$). However, no factor in the multiple logistic regression models was significantly related to adherence to malaria treatment guideline ($p>0.05$)

From the simple regression model, respondents who had received training on malaria management had 6 times odds of adhering to malaria treatment guide lines compared to those who have received no training (UOR: 6.01, 95% CI: 4.16-12.6, $p <0.001$). The multiple regression model showed that respondents who have received training on malaria management had 6.6 times the odds of adhering to malaria treatment guide lines compared to those who have received no training (AOR: 6.59, 95% CI: 0.75-17.91, $p =0.089$).

Also, the simple logistic regression model indicated that female providers had 5.9 times the odds of adhering to malaria treatment guidelines compared to males (UOR: 5.87, 95% CI: 1.01-34.02, $p = 0.048$). Whereas the multiple logistic regression model indicated that females had 16.4 times the odds of adhering to malaria treatment guidelines compared to males (AOR: 16.39, 95% CI: 0.75-36.32, $p = 0.075$) Table 4.7).

Table 4.7 Effects of Demographic characteristics of Prescribers, health facility factors on Prescribers' adherence

	Unadjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Received Training in Malaria Case Management			<0.001***			0.089
No	1.00			1.00		
Yes	6.01	4.16 - 12.6		6.59	0.75 - 17.91	
Prescriber's workload			0.380			0.246
≤ 25	1.00			1.00		
>25	0.55	0.15 - 2.07		0.12	0 - 4.33	
Length of practice			0.761		-	0.576
<5years	1.00			1.00		
5-10years	1.48	0.47 - 4.7		2.40	0.27 - 12.23	
>10years	1.94	0.09 - 12.5		3.43	0.06 - 18.98	
Prescriber's sex			0.048*		-	0.075
Male	1.00			1.00		
Female	5.87	1.01 - 34.02		16.39	0.75 - 36.32	

*p-value < 0.05, **p-value<0.01, ***p-value<0.001

4.4.3 Association between Demographic characteristics of Patients and Prescribers' adherence

The Pearson's chi-square test of association shows that, with the exceptions of the client's educational status and history of fever that showed significant association with prescriber's adherence to malaria treatment guidelines ($p<0.05$), no other clients related characteristics was significantly associated with prescriber's adherence to malaria treatment guidelines ($p >0.05$). The proportion of respondents who had a history of fever and were managed according to the malaria treatment guideline was significantly lower than that of those who were not having any symptom of fever (56.2%, 75.3%, $p<0.001$).

For patients with primary education, the prescribers followed the malaria treatment guideline for half of them (50%, n=54) and for those patients with secondary level of educations, the malaria treatment guideline were adhered for 67.3% (n=115) of them by the prescribers.

Also 66% (n=31) and 63.2% (n=55) of those clients with Tertiary level of education and no-formal education or children respectively received malaria treatment through malaria treatment guideline, Table 4.8.

Table 4.8: Association between patients' characteristics and prescribers' adherence to malaria treatment guidelines.

	According			
	No N=158(%)	**Yes N= 255(%)**	**chi-square**	**p-value**
Patient age				
<5years	30(38.46)	48(61.54)	0	0.967
≥5years	128(38.21)	207(61.79)		
Patient sex				
Male	64(41.29)	91(58.71)	0.97	0.326
Female	94(36.43)	164(63.57)		
Patient NHIS status				
Yes	56(37.58)	93(62.42)	0.04	0.833
No	102(38.64)	162(61.36)		
Patients educational level			8.94	0.030*
Primary	54(50)	54(50)		
Secondary/JSS	56(32.75)	115(67.25)		
Tertiary	16(34.04)	31(65.96)		
None/child	32(36.78)	55(63.22)		
Fever symptoms				<0.001
Yes	131(43.81)	168(56.19)	14.16	
No	27(23.68)	87(76.32)		
Residence				
Within the district	81(36.99)	138(63.01)	0.32	0.572
Outside the district	77(39.69)	117(60.31)		
Weight: Median(LQ,UQ)	53.8(25,72)	57.5(22,70)	0.72	0.472

4.4.4 Effects of client's characteristics on Prescribers' adherence

The simple and multiple logistic regression model was used to assess patients' related characteristics that influence prescribers' adherence to malaria treatment guidelines.

From the models, patients' level of educations was the only patient related characteristics that showed significant influence on prescribers adhering to malaria treatment guidelines both in the simple and multiple logistic regression model (p-value<0.05).

From the multiple logistic regression model, the odds of a prescriber adhering to the malaria treatment guidelines for patients with secondary level of education was 5.4 times the odds of them adhering to malaria treatment guidelines for patients with primary level of education (AOR: 5.35, 95% CI: 2.01-14.24). The odds of prescribers adhering to malaria treatment guidelines for patients with tertiary level of education was 1.9 times that of those with primary level of education (AOR: 1.85, 95% CI: 0.47-7.33).

Compared to those with primary level of educations, prescribers had 2.2 odds of adhering to malaria treatment guidelines for patients with no formal education (AOR: 2.21, 95% CI: 0.47-10.32), Table 4.9.

Table 4.9: Patients related characteristics that influence prescribers' adherence to malaria treatment guidelines.

Patient variable	Unadjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Weight	1.00	0.99 - 1.00	0.405	0.98	0.96 - 1	0.12
Residence		-			-	
Within the district	1.00	-		1.00	-	
Outside the district	0.89	0.6 - 1.33	0.573	1.66	0.78 - 3.51	0.187
Age		-			-	
<5years	1.00	-		1.00	-	
≥5years	1.01	0.61 - 1.68	0.967	1.62	0.29 - 9.2	0.587
NHIS status		-			-	
Yes	1.00	-		1.00	-	
No	0.96	0.63 - 1.45	0.833	1.66	0.71 - 3.86	0.239
History of fever						
Yes	1.00					
No	4.49	1.76- 11.41	0.002**	3.88	1.43 - 10.5	0.008**
Type of facility					-	
Health centre	1.00			1.00		
Clinic	0.11	0.02 - 0.67		0.30	0.03 - 2.93	
Polyclinic	0.42	0.07 - 2.56		1.68	0.2 - 14	
Hospital	0.05	0.01 - 0.27	<0.001***	0.15	0.03 - 0.9	0.011*
Patients educational level		-	0.032*		-	0.008**
Primary	1.00	-		1.00	-	
Secondary/JSS	2.05	1.25 - 3.37		5.35	2.01 - 14.24	
Tertiary	1.94	0.95 - 3.95		1.85	0.47 - 7.33	
None/child	1.72	0.97 - 3.06		2.21	0.47 - 10.32	

*p-value < 0.05, **p-value<0.01, ***p-value<0.001

CHAPTER FIVE

5.0 DISCUSSION

Prescribers' adherence to the guideline is important for the fruitful implementation of the revised malaria treatment guideline, but prescriber adherence was poor in this study. This study revealed that less than 85% of cases managed by a prescriber conformed to the national malaria treatment guideline. Thus only 28.57% (12/42) of prescribers correctly managed 85% and above of suspected malaria patients they took care of. Among the 413 health records reviewed, 61.74% (n=255) were managed according to the malaria treatment guideline.

From observations in patient's health records, patient's assessment was either not done or not documented. This may have had a toll on clinical judgment and treatment outcome leading to wrong or missed diagnosis of possibly serious ailments.

It was evident that all facilities had basic logistics for malaria management. In instances where there were no microscopist, staff had been trained on the use of the RDTs. Non-adherence could not be attributed to non-availability of logistic since there were no shortages of RDTs, ACTs and other logistics during the period of review in any of the facilities.

Although a greater proportion of prescribers had been formally trained on the revised malaria treatment guideline, prescriber adherence was poor. A study by Mbacham et al., (2014) showed a better compliance with training, but Chandler et al., (2008) observed that peer influence affected adherence to knowledge gained. Although most prescribers had been trained, peer influence may have affected their adherence in this study.

Findings from this study revealed a high testing for malaria parasite 87 % (362/413) which cuts across all patient age groupings. This may be due to the availability of malaria diagnostic

services or laboratories in the various facilities. In contrast, other studies observed low malaria testing rate with patients under 5years due to disparity with different guidelines. This disparity could increase presumptive treatment in children under 5years, as IMCI accepts treatment with ACT when fever was present (without other cause of fever) contrary to the revised treatment guideline (Bilal et al., 2015). However, this was not the case in this study as testing was high across all the age groups.

Although testing rate was high, it did not positively affect prescriber adherence as prescribers still prescribed ACTs to 28.69% (70/244) of negative cases. A study in Zambia on community health workers on the contrary revealed 99.4% -100% adherence to negative test results (Chanda, Hamainza, Moonga, Chalwe, & Pagnoni, 2011). This practice may be attributed to prescribers' distrust in the RDT or microscopist as shown in a study by Rowe et al., (2009). Some prescribers believe that plasmodium parasites may be sequestered in the liver, thereby producing negative results. However, studies have proven that RDTs are able to detect malaria parasite antigens in such cases (Mouatcho & Goldring, 2013). Prescribers may need some of these facts during training sections to increase adherence to negative test results by looking out for other causes of fever.

In addition, to treatment of parasite negative cases with ACTs, presumptive treatment played a role in non-adherence. All 51(12.3%) non-tested suspected malaria cases were given ACTs. A study in Angola made mentioned of distrust in the laboratory services and high caseload as being the cause of overprescribing of antimalarials (Rowe et al., 2009).These may have contributed to low adherence in this study since most (66.7%) of the prescribers attended to more than 25 patients a day.

It was also observed from the results that all (100%) oral antimalarial prescribed were ACTs, which implies that ACTs are highly acceptable, especially the Artemether Lumefantrine. Contrary to other studies, the monotherapy, SP, artesunate among others were still prescribed (Wasunna, Zurovac, Goodman, & Snow, 2008). However, there was misuse of antimalarial injections, as 15.7% (65/413) of patient health records in this study were prescribed single doses of artemisinin injection before the start of oral ACTs which is not indicated in uncomplicated malaria treatment. This practice is believed to clear lots of the parasite before oral ACTs are administered. Injectables are only used in complicated malaria per the malaria treatment guideline. At least three doses of antimalarial injection must be given before oral ACTs are administered in complicated malaria. Non-adherence may be attributed to the fact that these prescribers do not trust only oral ACTs to effectively clear all malaria parasites. This could lead to the ineffectiveness of these injectables in treatment of complicated malaria cases and possible emergence of resistance.

Patients review is important in malaria management but in this study, only 15.5% (64/349) of patient's health records were reviewed by prescribers. It helps track patient adherence and effectiveness of patient's assessment as against medications prescribed. Also reports from reviews may help identify emergence of resistant to drug therapies. This led to the recommendation of tracking which was a form of surveillance in the revised malaria guideline (World Health Organisation, 2015a).

From the results, test of association of prescriber adherence against the various independent factors, it was realized that, the sex of prescriber, facility type and history of fever were significantly associated with prescriber adherence. However, these factors and others that were found in literature to be significant were put in the mixed effect logistic regression model.

Results showed prescriber training status on malaria management, patient's history of fever, facility type and sex of the prescriber, were significantly related to prescriber adherence to the malaria treatment guideline.

Prescribers who have been trained in the revised guideline have 6.01 the odds of adhering than those that have not been trained (UOR = 6.01, 95% CI =4.16-12.6, p<0.001). The knowledge acquire may have influence their beliefs and decision taken during consultations. Findings were similar with that of Ogochukwu, (2010) in Nigeria as those trained had a greater odd of adhering to malaria protocol.

Female prescribers (UOR = 5.87, 95% CI = 1.01, 34.02, p<0.048) in this study adhered better as compared to their male counterparts. Contrary to a study in Pakistan where prescriber's sex hardly affected adherence (Malik, Shafie, & Hussain, 2014).

Patients tested without fever or a history of one had about 4 times the odds of receiving an adhered treatment compared to those who had fever (AOR: 3.88 95% CI: 1.43 – 10.50, p<0.008). Fever is the chief complaint in suspecting malaria. Therefore, in the absence of fever and a negative malaria test results, a prescriber is likely to adhere to the guideline. Sserwanga et al., (2015), observed that adherence was poor in patient with a history of fever who were negative to malaria test.

Regarding health facility levels, patients who received care at the clinics in La Nkwantanang Madina, had 70% lesser odds and hospitals had 85% lesser odds of receiving complied malaria treatment as compared to the health centre. However, when adjusted for other factors, patients from the polyclinics had 1.68 times the odds of receiving complied treatment compared to those who went to the health centre (AOR: 1.68, 95% CI: 0.20 – 4.26), p<0.008. Contrary to this was

a study by Bawate et al., (2016) in Uganda, where lower facilities are more likely to adhere to malaria treatment protocol as compared to high level facilities. This may be due to the fact that the polyclinics had better systems and quality control checks with sufficient logistic resources and supervision.

Limitation

- The sentinel site (Danfa health centre) has an ongoing project addressing malaria management which might affect the outcome.
- Not all facilities in the municipality were included and this could affect the number of prescribers.
- All trained prescribers were treated on the same level, although the quality of the training given to prescribers on the revised malaria treatment guideline was difficult to ascertain.
- The study was purely non-interventional; therefore, neither verification of patient's diagnosis nor assessment of prescription appropriate for age and weight could be determined.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Overall, prescriber adherence was poor (28.6%), however the proportion of reviewed patient's health records managed according with the revised malaria guideline was optimal (61.72%). Testing rate was high (87.65%) and 51patients were given presumptive treatment. The use of ACTs was high but was coupled with the use of antimalarial injections. There was poor documentation of patient's assessment performed. Prescribers trained in cases management, patient's history of fever, facility type, and the sex of the prescribers (female) were factors that affected prescriber adherence.

6.2 Recommendations

Municipal health management team

- The management team must organize refresher training on malaria case management and the use of RDTs with emphasize on the TTT policy to address case management practices.
- The team must frequently provide supportive supervision to health facilities as there is a need to constantly improve knowledge and reinforce skills taught to sustain improved adherence to guidelines.

Heath facility management

- The management must ensure that logistics and strategies are put in place to ensure sound implementation of the policy.

- Management should encourage health staffs to document all assessments performed for to ease reporting and tracking of cases.

NHIA

- The NHIA should provide a policy document that would be a disincentive for facilities that over prescribe ACT and do not adhere to the revised malaria treatment guidelines.

Researchers

- Regular follow up studies are recommended, adding on more facilities and if possible other districts.

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APPENDICES

APPENDIX 1: CONSENT FOR PARTICIPANTS

Prescriber Adherence to the Revised Malaria Treatment Guideline in facilities in the La Nkwantanang- Madina Municipality in the Greater Accra Region.

Dorothy Ansomaa Asiamah the Principal Investigator is a Graduate student at the Department of Epidemiology and Disease Control, School of Public Health, University of Ghana, Legon

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Background

The purpose of this study is to assess prescriber adherence to the testing, treatment and tracking of uncomplicated malaria cases in the La Nkwantanang Madina Municipality and what factors affecting prescriber adherence.

The study will involve prescribers, patient health records for the selected three months in selected health facilities in the Municipality. It is expected that the results will be used in planning Malaria Activities in the Municipality. As part of this study, you have been selected to help in obtaining information for this study. If you agree to be part of this research, it will involve either one or both of the following:

- Answering some questions that will be posed to you by a member of the research team.
- Responding to some questions on a questionnaire which will take 30minutes.

Possible Risks and Discomforts

The research will not pose any risks or cost to you. You may however experience some minor discomfort in answering certain questions. You may refuse to be observed or refuse to answer any question if you feel uncomfortable about it.

Possible Benefits

You may not benefit directly from this study but the findings would benefit the District Health Management Team and the Ghana Health Service in planning health delivery services. Your participation may therefore be helping in improving malaria case management in the district.

Confidentiality

Information obtained from you will be confidential and used for the purpose designated only for the study. The information will be securely kept without your name, in a file which will be only be available to the research team. A number connected to a specific name or facility name will be kept confidential. The results of this study will be disseminated in such a way that no information will be linked to your identity.

Compensation

Participation in this study is purely voluntary. There is no monetary compensation available to you for accepting to be part of this study.

Choice of Participation

Participation in this study is voluntary and you can choose not to partake. You are at liberty to withdraw from the study at any time. However, I will encourage your full participation since your participation is important.

If you have questions or challenges, please contact;

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VOLUNTEER AGREEMENT FORM

The nature, purpose as well as the potential risks and benefits of the research on "Prescriber Adherence to the Revised Malaria Treatment Guideline in the La Nkwantanang Madina Municipality in the Greater Accra Region" have been thoroughly explained to me. I have been given ample opportunity to ask questions, which were answered to my satisfaction. I understand potential risks and benefits associated with participating in this study and I also know I have the right to withdraw from the research at any point in time I so desire. I therefore agree to participate in the research.

Signature of participant……. Date……. /……../……

In case of further information or enquiry about the research, the principal and co researchers as well as Administrator of the ethics committee of Ghana Health Service can be contacted on the following numbers. Dorothy A. Asiamah: 0244988173, Dr. Anthony Danso-Appiah: 0269083789 and Hannah Frimpong (GHS-ERC Administrator): 0507041223.

APPENDIX 2: PRESCRIBER QUESTIONNAIRE

La Nkwantang Madina Municipality

Date: ..... /...../.....

FACILITY CODE: .....**PRESCRIBER'S CODE**: .....

No.	Coded Questions	Entry code
Q1	Health Facility Type? Health Centre.....1 Clinic.....2 Polyclinic.....3 Hospital.....4 Others (specify).....88	
Q2	Operating Authority? Government .....1 Quasi Government .....2 NGO…….....3 CHAG…….....4 Private…… .....5 Others(specify)…….....88	

Q3	Prescriber Type Medical Doctor .....1 Physician Assistance.....2 Nurse Prescriber .....3 Others (Specify) …….....88	
Q4	Age (At Last Birthday) ……	
Q5	Sex Male .....1 Female 2	
Q6	Religion Christian.....1 Moslem.....2 Traditionist.....3 Others (specify).....88	
Q7	Years of Practices ……	
Q8	Have You Been Trained on the New Guideline for malaria case management? Yes .....1 No.....2	
Q9	Do you have access to the malaria guidelines when you want to refer or use it? Yes .....1 No.....2	
Q10	If yes (Q9) then how often do you refer or use it?	

	Always.....1 Sometimes.....2 Rarely.....3 Never.....4 Not applicable.....99	
Q11	If YES (Q11) how many years now? ……..... Not applicable.....99	
Q12	Who will you send for laboratory malaria testing? Patient with Severe disease.....1 Patient with Fever ……...…….2 Age of patient……..….3 Patient with NHIS card .....4 Patient's place of residence .....5 Patient's occupational status .....6 Patient educational status .....7 Others specify…….....88	
Q13	What type of malaria test is preferred? Microscopy .....1 Malaria RDT 2	
Q14	Why?	
Q15	What do you use in treating simple malaria in non-pregnant individuals? ACT……1	

	Artesunate injection + ACT……2 Artemether injection + ACT……3 Quinine injection + ACT……4 Sulphadoxine pyrimethamine…….....5 Quinine injection + quinine……6 Artesunate only……7 Amodiaquine only……8 Quinine only……9 None of the above……...10 Others, Specify ……88	
Q16	What factors do you consider before prescribing antimalarial? Severity of disease .....1 Patient place of residence.....2 Age of patient .....3 Patient occupational status .....4 Possession of NHIS card.....5 Patient educational status.....6 Presence of fever .....7 Patients contra indications.....8 Patients preference .....9 Positive malaria test.....10 Others (specify)…….....88	

Q17	Do you prescribe start doses of injectable for patients with simple malaria? Yes .....1 No.....2	
Q18	If YES (Q17), how often? Always .....1 Sometimes .....2 Rarely .....3 Never.....4 Not applicable.....99	
Q19	Factors that influence the dose of drug prescribe? Age of patient .....1 Weight of patient.....2 Cost of Drug.....3 Side effect of treatment .....4 NHIS .....5 Standard treatment guidelines.....6 Others(specify)…….....88	
Q20	Do you routinely counsel patient on medication? Yes .....1 No.....2	
Q21	Do you routinely counsel patient on malaria and some preventive methods? Yes always.....1	

	No.....2	
Q22	Do you routinely review your patients? Yes .....1 No.....2	
Q23	If NO (Q22)why? ..... Not applicable.....99	
Q24	How many patients on an average do you take care on a shift? Less than 25……...1 25 and more…….....2	
Q25	Which of these malaria references do you refer to? One or more…… Standard Treatment Guideline 2010…….……1 National Malaria Treatment Policy……2 IMCI Chart Booklet……3 Malaria Counseling Chart……...4 Malaria Case Management Manual……5 Malaria Treatment Chart……6 Others (Specify)……88	
Q26	Is there a need for additional training or refresher training in malaria case management? Yes…….……1 No……2	

Thank you

APPENDIX 3: PATIENT'S RECORD EXTRACTION TOOL

LA NKWANTANANG MADINA MUNICIPALITY

Date: ……/…… /……

Facility code: Prescriber code

Folder number/codedID:

A. Date of Consultation…….

B. Patients place of residence 1 = within La Nkwantanang 2 = outside La Nkwantanang

C. Patient weight (Kg) ……

E. Patient age 1 = under 5years 2 = 5years and above

F. Patient sex 1 = male 2 = female

G. Patient's temperature (^{o}C) 1 = below 37.5 2 = 37.5 and above

H. Does the patient an active NHIS card 1= Yes 2= No

I. Patient occupation 1=Farmer 2=Trader 3=Businessman/woman

4=Health worker 5=Teacher 6= Student/Pupil 99=Missing

Other, Specify..……....

J. What is the educational level of the patient?

1=Primary 2= Secondary/JSS 3=Tertiary

4=None 99=Missing

K. Does the record note the following symptoms?

1. Fever 2. Chills

3. Headache 4. General malaise/ Body pains

5. Vomiting/Abdominal pain/Diarrhoea 6. Startling attacks

7. Anorexia/Poor feeding 99. Others, Specify……

L. Is the duration of fever symptoms recorded? 1= Yes 2= No

M. What is the duration of fever? ……..

N. Does the record note the following signs? 1. Warm to touch/Febrile 2. Pallor

3. Hydration 4. Jaundice 5. Chest Findings

6. Ear Examination Findings 7. Throat Examination Findings

99. Other, Specify……

O. Laboratory investigations?	Yes	No	Results
A. Blood film (mps)	1	2	
B. Haemoglobin (Hb)	1	2	
C. RDT	1	2	
D. Full Blood Count (FBC)	1	2	
E. Others, Specify…….	1	2	

P. Drug prescribed	Yes	No	Prescription
A. Artesunate + Amodiaquine Antimalarial	1	2	
B. Artemether + Lumefantrine antimalarial	1	2	
C. Dihydroartemisinin piperaquine antimalarial	1	2	
D. Antimalarial Injection. Specify…….	1	2	
E. Other antimalarial? Specify …….	1	2	
F. Other injections Specify ……	1	2	

G. Antibiotics. Specify …….	1	2	
H. Analgesics Specify …….	1	2	
I. Multivitamin Specify …….	1	2	
J. Haematinics Specify…….	1	2	
K. Others Specify …….	1	2	

Q. Total Number of drugs prescribed. 1 = One 2 =Two

3 = Three 4 = Four 5 =More than Four

R. What was the diagnosis? 1 = Malaria 2 = Uncomplicated/Simple malaria

3 = Severe malaria 4 = Typhoid fever 5 = Malaria + Other,

Specify……..……. 9 = Missing

S. Was a date set for review? 1 = Yes 2 = No

T. Was malaria part of the former diagnosis? 1 = Yes 2 = No

If yes, what was the Consultation date: …….

APPENDIX 4: FACILITY AUDIT CHECKLIST

LA NKWANTANANG MADINA MUNICIPALITY.

Facility code: | | **Date: ……/…… /……**

Q1. Health Facility Type

1. Health Centre 2. Clinic 3. Polyclinic 4. Hospital

Q2. Operating Authority

1. Government 2. Quasi Government 3. NGO 4. CHAG 5. Private

88. Others, state……

INTERVIEWER CODE…….

Q3. Category and number of staffs who attend to malaria cases and have been trained on malaria case management.

Qualification	Total number	Total number trained in malaria cases management
Medical doctors		
Physician Assistants		
Nurse		
Midwife		
Registered Staff Nurse		
Others, specify…….		

Q4. Are there formal meetings to review management/administrative issues?

1 = Yes 2 = No 77 = Don't know

Q5. If Yes how often 1 = weekly 2 = Bi-monthly 3 = Monthly

4 = Quarterly 5 = Bi- annually 6 = Annually Others,

Specify……

Q6. Is an official record on meetings maintained?

1 = Yes 2 = No 77= Don't Know

Q7. Are there minutes from the most recent meetings?

1 = Document seen 2 = Document not seen 3 = No documentation maintained

Q8. Has facility conducted a client satisfaction survey?

1 = Yes 2 = No 77= Don't Know

Q9. IF YES, circle all that apply

1 = Suggestion box 2 = Client Survey Form 3 = Client Interview 4 = Community

Durbar 5 = Public Forum 88 = Other,

Specify……..……

Q10.Does facility have Quality Assurance Team?

1 = Yes 2 = No 77= Don't Know

Q11. Is there a Quality Assurance Action Plan?

1 = Yes 2 = No 77= Don't Know

Q12.If yes, evidence of recent activity available.

1 = Yes, Plan seen 2 = Yes, No plan seen

Q13.When was the facility last supervisor from an outside supervisory team?

1 = last week 2 = last month 3 = last Quarter 4 = last six months

5= Never 88 = Others, Specify……

Q14	What antimalarial are stocked and has there been stock out within the last three months?	Available (1)	Out of stock (0)	Never been stocked(99)
A	Artesunate Amodiaquine powder			
B	Artemether Lumefantrine powder			
C	Dihydroartemisinin Piperaquine tablets(p-alaxin)			
D	Artemether Lumefantrine tablet			
E	Quinine tablets			
F	Syr Quinine			
G	Quinine Injection			
H	Artesunate Amodiaquine + SP			
I	Artesunate only			
J	Amodiaquine only			
K	Sulphadoxine pyrimethamine			
L	Artesunate + Amodiaquine tablets			
M	Rectal Artesunate			
N	Artesunate injection			

O	Artemether injection			
L	Artesunate + Amodiaquine tablets			
M	Rectal Artesunate			
N	Artesunate injection			
O	Artemether injection			
P	None of the above			

Others,

Specify……..

Q15. Which ACT (artemisinin combination therapy) is mostly used? ……

Q16.What type of malaria test is/are available? 1. Microscopy 2. RDT 3. Both

Q17. Which one is mostly used? 1. Microscopy 2. RDT

Why? …….

	Question	Yes	No	Don't know
Q18	Has there been stock out of RDT within the last three months?	1	2	77
Q20	Has there been stock out of slides and reagent for malaria microscopy within the last three months?	1	2	77

Q21.	Are records kept for all malaria patients?	1	2	77
Q22	Are the following equipment available in the OPD?			
Q23.	Weighing Scale	1	2	77
Q24.	Examination Light Source/ Torchlight	1	2	77
Q25.	Patella Hammer	1	2	77
Q26.	BP apparatus			

Q27.Do you have any of the reference books available? Please tick

1. Standard Treatment Guidelines
2. Other visual aids for teaching caretaker
3. National Malaria Treatment Policy
4. Malaria treatment chart
5. IMCI Chart Booklet
6. Malaria Case management Training manual
7. Malaria Counseling Chart
8. Malaria in pregnancy Training manual

88. Others specify…….