COMPARATIVE STUDY TO ASSESS THE NEW MALARIA CHEMOTHERAPY POLICY AT TEMEKE DISTRICT HOSPITAL

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BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE UNIVERSITY OF DAR-ES-SALAAM

2002

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the University of Dar-es-Salaam a dissertation titled "COMPARATIVE STUDY TO ASSESS THE NEW MALARIA CHEMOTHERAPY POLICY AT TEMEKE MUNICIPAL HOSPITAL" in partial fulfilment of the requirements for the degree of Master of Public Health

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DECLARATION

I hereby solemnly declare that, this dissertation is my original work, and that it has never been submitted for a diploma or degree in any other university.

Candidate's signature: _____

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DEDICATION

This work is dedicated to my parents,

my beloved husband Said and

My loving children Ali and Fatuma.

ABSTRACT

A retrospective study on the management and outcome of malaria before and after introduction of a new National Guidelines for Malaria Diagnosis and Treatment was done at Temeke hospital, comparing the month of March 2001 and 2002 admissions.

In March 2001, there were 551(52.6%) records of malaria, while in March 2002; there were 619 (46.8%) records of hospitalised cases due to malaria. Blood smears done were 350 (56.5%) in March 2002 lower than March 2001, which were 333 (60.4%). Overall, in March 2001 about 367 (66.6%) out of 551 patients diagnosed to have malaria, were complicated or severe malaria, whereas in March 2002, severe or complicated malaria cases were 411(66.4%) out of 619 hospitalised cases due to malaria.

Patients hospitalized due to malaria received antimalarial drugs on the basis of blood slides (60.4%) and on clinical grounds alone (39.6%) in March 2001, while in March 2002, were 56.5% and 43.5%, respectively. Again 32 (9.6%) of 333 hospitalised malaria cases with Blood slide done received antimalarial drugs despite negative blood smears in March 2001 while in March 2002, 23 (6.6%) out of 350 hospitalised malaria patients, received antimalarial drugs despite negative blood smears

In March 2001, a total of 176(58.4) of the 301 hospitalised patients with blood smears positive were given quinine, and 71 (23.6%) were given CQ. While in March 2002 a total of 244 (74.6%) of the 327 hospitalised patients with blood smears positive were given quinine, and 28(8.6%) were given amodiaquine. This increase of Quinine was at the expense of lowering the rate of a first line drug (SP). Of the recorded cases due to malaria 472 (85.7%) were successfully managed (cured) and 26 (4.7%) patients died in March

2001.While in March 2002, 504 (81.4%) cases out of 619 hospitalised cases were successfully managed (cured) and 46 (7.4%) died. These differences were not significant.

It is concluded that although the new policy has been adapted there is no improvement in management of malaria patients and outcome. These results emphasize the need to improve diagnosis by ensuring laboratory services available every day around the clock and operation research is done on training of health workers on malaria management.

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ACRONYMS AND ABREVIATIONS

MOH	Ministry of Health
MMOH	Municipal medical office of Health
WHO	World Health Organization
IMCI	Integrated Management of Child Illness
NMCP	National Malaria Control Program
ITN'S	Insecticide Treated Nets
MPH	Master of Public Health
MNH	Muhimbili National Hospital
SP	Sulfadoxine /pyrimethamine
CQ	Chloroquine

1. CHAPTER ONE

1.1 INTRODUCTION

Malaria is a leading cause of morbidity and mortality in Tanzania, which accounts for 17% of all death nation-wide. Malaria is also a leading cause of inpatient admission for children (54.0%) and for adult (35.0%) of all admissions (Kitua *et. al.*, 1999) The cornerstone of malaria control in Tanzania is to ensure the early diagnosis, prompt management of cases, prevention of drug resistance, and reduction of morbidity and mortality, especially in children. Tanzania has been using chloroquine as the first line drug for treatment of malaria for over forty years. However, in the last two decades the malaria parasites have developed resistance to chloroquine by 52% (Kitua *et. al.*, 1999).

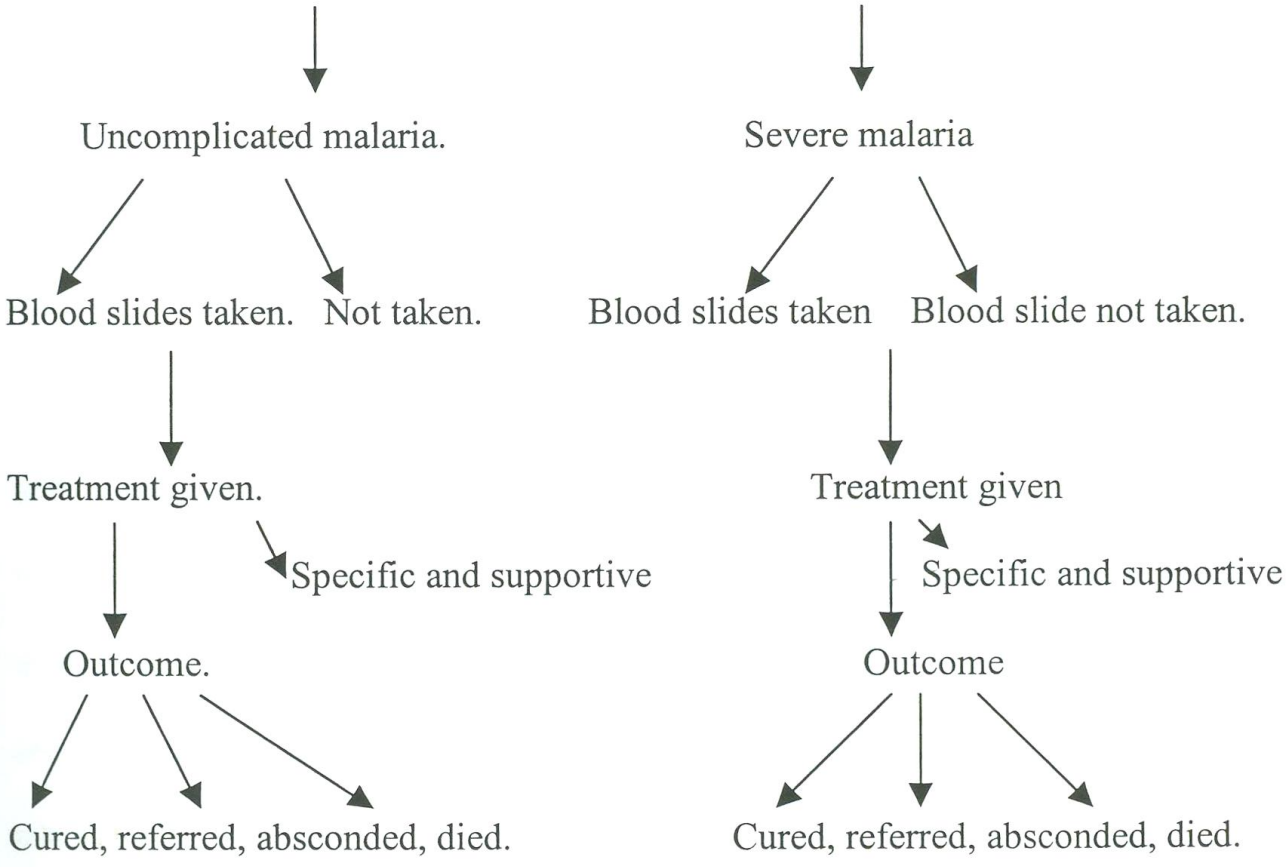
Management of malaria patients has a significant effect on the development of drug resistance. Among factors that contribute to the development of drug resistance are improper diagnosis, intentional under dosing and failure to comply with the full duration of treatment (Marero, 2000). An essential step in improving management and preventing rapid development of resistance require greater focus on proper diagnosis and treatment of malaria.

Therefore, in 2001 August, Tanzania introduced new National Guidelines for Malaria Diagnosis and Treatment, whereby sulfadoxine /pyrimethamine (SP) was adopted as the first line antimalarial drug. But this new first line drug might take a very short period before resistances evolve if the management of malaria is not well looked into.

1.2 Conceptual framework

To limit spread of resistance proper diagnosis and treatment of malaria is of vital importance. With early diagnosis of malaria, it is possible to reduce frequency of severe illness and death (in the population). The introduction of the new guidelines is envisaged to lead into improvements in malaria case management and therefore treatment outcome. Malaria cases are hospitalized based on degree of severity or complications and drug resistant (see definition on page 52).

Diagramatically the management and outcome can be presented as follows:



1.3 Statement of the problem

Tanzania has been using chloroquine as the first line drug for treatment of malaria for over 40 years but the increase of resistance to 52% has compelled the Tanzanian Government to change malaria treatment policy (Kitua *et. al.*, 1999). The MOH introduced the new guidelines for diagnosis and treatment of malaria in August 2001. The determinants of parasite resistance to antimalarial drugs include poor management of patients in the health facilities, problems in the diagnosis and treatment of malaria, widespread and frequent use of drugs, under dosing or provision of incomplete courses of malaria drugs, polypharmacy and absence of clearly outlined or not followed standardized National management guidelines. Even where guidelines exist and the capacity for microscopy is there, some health facillities often do not base malarial treatment on blood slide examination results (Marero, 2000).

The mere introduction of new Guidelines may not necessarily solve the problem, unless there is strict adherence to it and if there is an improvement in management of malaria in hospitals. There are in the recent past, anecdotal reports in the media as well as in leadership platforms that the community and health care provider do not accept the new National Guidelines for Malaria Diagnosis and Treatment. It appears that the adverse effects of SP are causing these reservations in the community, hence giving suspicion whether there are effective changes in the management and outcome after introduction of new National guidelines for Malaria Diagnosis and Treatment. No study has been done yet to monitor management and outcome of patients after the introduction of new National Guidelines for Malaria Diagnosis and Treatment. This

study describes management and outcomes in malaria cases, among hospitalized patients, before and after introduction of new National Guidelines for Malaria Diagnosis and Treatment. The study focused on the management of uncomplicated as well as severe and complicated malaria cases among hospitalised patients, whether blood slides were taken or not to support the diagnosis, and the outcome of the admitted patients, whether they got cured, died or developed severe malaria or complicated malaria.

1.3.1 The research questions

i. What are the practices in case management of malaria in hospitalised patients before and after introduction of new Guidelines for Malaria Diagnosis and Treatment?

ii. Is there any improvement in the quality of malaria management after the introduction of new Guidelines for Malaria Diagnosis and Treatment?

1.4 Study hypothesis

With the introduction of the new National Guidelines for Malaria Diagnosis and Treatment, it is expected that malaria case management will improve leading to better outcome of malaria cases.

1.5 Rationale

Malaria is one of the most serious public health problems in Tanzania.Thus correct diagnosis and prompt treatment of malaria requires close monitoring. Although it is a short period since the introduction of the new Guidelines, there is a grave concern from the public regarding it is safety and effectiveness. Both the public and health authorities need reassurance of the effectiveness of the recommended drugs. Understanding of management process will be of great contribution to the provision of high quality care, and will help to identify problems as well as giving directions to improve and develop better malaria management protocols. The findings will form a preliminary data for the evaluation of the effectiveness of the new versus the previous National Guidelines for Malaria Diagnosis and Treatment. This will also contribute to the better implementation of the new policy by National Malaria Control Program (NMCP).

1.6 Research objective

1.6.1 Broad objective

To describe malaria management and outcomes in hospitalised patients before and after introduction of new National Guidelines for Malaria Diagnosis and Treatment at Temeke hospital.

1.6.2 Specific objectives

1. To determine the proportion of hospitalised patients diagnosed to have malaria by age and sex, before and after new National Guidelines for Malaria Diagnosis and Treatment.
2. To determine if microscopy was used to support diagnosis in hospitalised patients with malaria before and after new National Guidelines for Malaria Diagnosis and Treatment.
3. To determine malaria specific and supportive treatment given to hospitalised patients with malaria before and after introduction of new National Guidelines for Malaria Diagnosis and Treatment.
4. To determine the proportion of hospitalised patients with a diagnosis of complicated malaria before and after introduction of new National Guidelines for Malaria Diagnosis and Treatment.
5. To determine the malaria deaths by age, before and after introduction of new National Guidelines for Malaria Diagnosis and Treatment.

2. CHAPTER TWO

2.1 REVIEW OF LITERATURE

2.1.1 Magnitude of malaria

Malaria remains a major public health problem causing disease and death in most of the developing world. Malaria is an infectious disease caused by a protozoan parasite of the species *Plasmodium falciparum* (Manson-Bahr and Bell, 1987). There are an estimated 300-500 million cases of malaria in a year (WHO, 2000). The majority of these occur in Africa, where the vast majority of the estimated one million annual deaths from the *Plasmodium falciparum* malaria occur among children mainly in sub Saharan Africa (WHO, 2000).

In Africa south of Sahara, about 10% of hospital admissions and 20-30% of outpatient consultations are caused by malaria (WHO, 2000). In developing World, over one million of deaths due to malaria, affected mainly are children below five years of age; equally at risk are women in their first or second pregnancy. Others at risk are non-immune persons having previous exposure like refugees (WHO, 2000).

In Tanzania, malaria remains the leading cause of mortality and morbidity. It accounts for approximately 17% of death National wide (Kitua *et. al.*, 1999). In terms of morbidity, malaria is the leading cause of outpatient's attendances in all regions ranging from 24% to 42% and makes 31.4% of all outpatient diagnosis (MOH, 2000). Malaria is also a leading cause of child 54.0% and adult 35.0% inpatients admission (Kitua *et. al.*, 1999)

2.1.2 Clinical case management of malaria

Most of the Government dispensaries and rural health centres lack basic diagnostic facilities and microscopic detection of malaria parasitaemia; therefore most of population living in rural areas lack proper management of malaria. In this situation treatment of majority of malaria cases is based on clinical symptoms and signs. In areas where laboratory procedures for diagnosis of malaria is not performed, febrile syndromes unaccompanied by specific symptoms and signs of definitive disease are usually considered to be an attack of malaria (Marero, 2000). The danger here is, many malaria cases are likely to be missed and other infectious diseases might be misdiagnosed as malaria.

As a solution to this, algorithms based on symptoms and signs for the areas with absence of microscopy have been developed. However, the marked overlap in the clinical features of malaria and those of several other infections is still present (Greenwood, 1999). The integrated management of childhood illness (IMCI, 1998) was developed, which covers the management of Malaria, Helminths, ARI, Malnutrition and anaemia. The IMCI (1998) recommended that, in malaria endemic areas, all children presenting with fever, who are febrile and no other obvious cause for their illness should be treated with antimalarial drugs. This is a safe approach, which ensure that all children who have malaria are treated effectively (Greenwood, 1999). This approach is most useful in the health centres where microscopy is not available, but the difficult with this approach is that, they incorporate as few symptoms and signs as possible so as to avoid the inclusion of signs that are important parts of algorithms for another disease. For example, a child with fever and difficult breathing may be treated as a case of pneumonia as well as malaria, so this

patient may have received two treatments even if he had only one of them. This approach may be useful also for screening patients in order to reduce the number of patients requiring microscopy examination.

Although accurate diagnosis of malaria is essential to ensure that individuals who suffer from malaria receive appropriate treatment, malaria is so common that any patient who has been in malarial area in previous two months (usual incubation period, two weeks) might be considered to have malaria until it has been proved otherwise by microscopy (White, 1996).

A study done by Armstrong *et. al.* (1994), noted that a direct measure of malaria illness based on signs and symptoms of disease, provides a good starting point, although fever alone is too non-specific. Combining fever with other factors may lower the false positive rate. For example, a case control study of febrile children presenting to a dispensary in the republic of Niger found that in the absence of likely non-malarial causes, high fevers (more or equal to 39 ^{0}C) of short duration less than three days in the rainy season were almost always associated with parasitemia (Armstrong *et. al.*, 1994).

In contrast, in Tanzania it was shown that over 60% of all presumptive diagnosis in older infants were wrong as fever alone has a very low specificity (Marero, 2000). The malaria diagnostic accuracy of Tanzanian clinicians was noted to be low during the era of chloroquine; particularly for the children under-five (Font *et. al.*, 2001), this greatly affects quality of antimalarial drug prescriptions. The quality of malaria diagnosis was noted to be weak, because of poor exploration, non-observance of

treatment guidelines and reliance on basic signs and symptoms for the diagnosis (Font *et. al.*, 2001).

Investigations conducted in tropical Africa showed that of the patients treated as malaria cases only about 46% of patients so diagnosed were actually suffering from the disease, and 54% of these cases were wrongly treated with antimalarial (Marero, 2000). Symptoms and signs of uncomplicated malaria overlap with several other febrile illnesses, even experienced physicians may have difficulties in diagnosing malaria. Therefore this shows that presumptive diagnosis of malaria is therefore, a very imprecise means of diagnosis. The diagnosis of malaria is both clinical and parasitological.

2.1.3 Laboratory diagnosis of malaria

Laboratory diagnosis can increase specificity and consequently reduce over treatment. Parasitological diagnosis is done by examining thick blood film stained with Field or Giemsa stains. However, other authors suggest, negative blood slides do not necessarily rule out presence or absence of malaria (Manson and Bell, 1987). Paediatricians in Gambia and Tanzania, diagnosed malaria in children by using their clinical skills had specificity of 86% and 99% respectively, and sensitivity of only 13%(Greenwood *et. al.*, 2002).

2.1.4 Complication of malaria

The clinical complications of malaria occur more often in the vulnerable groups, pregnant mothers and under-fives children in malaria endemic areas. Malaria has ability to inflict severe anaemia in pregnant mothers and children due to compliment mediated haemolysis and bone marrow depression (Brewster *et. al.*, 1993).

Severe malarial anaemia in African children is variously defined but the simplest is the presence of haemoglobin (Hb) concentration of less than 5g/dl in the presence of a blood slide positive for falciparum malaria (Mike, 2000). The incidence of severe malaria anemia appears to have increased with the spread of CQ resistant *Plasmodium falciparum* parasites in Africa.

The frequency and severity of malaria are greater in pregnant women than in the same women before pregnancy and in their non-pregnant counterparts (Menendez, 1995). Treatment of malaria in pregnancy should follow the same guidelines as for other patients but SP is not recommended during the last months of pregnancy, so oral quinine should be the treatment of choice from the 36th week up to delivery. Amodiaquine may be used in those facilities where quinine tablets are not available (MOH, 2000).

An annual increase in severe anemia of 27% in Gambia hospital was attributed to CQ resistance (Brewster *et. al.*, 1993). Similarly in Zaire, recent CQ treatment was associated with anaemia in hospitalised children (Hedberg *et. al.*, 1993) and the number of blood transfusions required to treat severe paediatric anaemia increased to 25% over one year which corresponded temporally to the rapid development of CQ resistance.

Anaemia is a major cause of the high morbidity and mortality associated with malaria. Anaemia in the African child is sometimes also associated with high parasitemia (Louise *et al.*, 1994), however among children who had severe anaemia (haemoglobin less than 5g/dl) in western Kenya, half had parasitemia of less than 10,000 per microliter and parasitemia did not predict the risk of death in the severely anaemic children (Louise *et al.*, 1994).

Acute attacks of malaria especially in pregnant mothers and children may result in renal or heart failure and consequently death. Other complications of malaria are pulmonary oedema, liver failure, disseminated intravascular coagulopathy and derangements of body fluids balances. Most under-fives who have malaria, present at health facilities with fever and respiratory tract infections, anaemia and some are found to be in need of blood transfusion. Apart from aggravating the physiological anaemia in pregnancy, malaria also can be complicated by hyperpyrexia, abortions, low birth weights and intrauterine foetal death (Sabatinelli, 1995; Najera *et. al.*, 1993).

The clinical pattern of severe malaria and the age distribution vary with intensity of transmission. In areas of high and stable transmission, severe malaria is confined mainly to the first two years of life and presents predominantly as severe anaemia. With lower and more seasonal pattern of transmission, the age distribution shifts upward and cerebral malaria becomes the main clinical manifestation (Greenwood *et. al.*, 1987). At even lower level of transmission, severe disease may occur at all ages. Consistent with this observation is the marked reduction in malaria transmission that

has occurred during the past 40 years in the Gambia and has resulted in a shift in disease pattern from severe anemia in youngest children to cerebral malaria occurring in all age groups (Waller *et. al.*, 1995).

The case fatality rate of cerebral malaria is higher than that of severe malaria anemia, however in high transmission areas severe anemia is more common cause of death due to its higher incidence (Menendez, 1995).

The global strategy for malaria control emphasizes prompt and effective treatment as essential tool for reducing morbidity and mortality due to malaria through provision of drugs capable of reducing or eliminating parasites (Bloland, 1999).

2.1.5 Treatment of malaria

The treatment of malaria depends on the severity of the infection, the patient's age, the degree of background immunity (if any) and the likely pattern of drug susceptibility (White, 1996).

Early diagnosis and prompt treatment is key to prevent severe and fatal malaria. The possibility for early recognition of severe malaria is limited by several factors Children often die at home; either after a brief illness or after prolonged illness without medical contact. The severity of disease may not have been recognized in health facility and traditional treatment may have been sought (Mabeza *et. al.*, 1995). There is some evidence that mothers of children with severe disease are less likely to take their children to hospital than those with mild disease (Koram *et. al.*, 1995).

Proper treatment should be based on established criteria and proper adherence to the treatment regime. Unfortunately, in developing countries there are many individual and structural barriers to effective and timely treatment. Antimalarial treatment reduces the chances of dying from *falciparum* malaria up to 50 fold (White, 1999). If no antimalarial treatment is given, most authorities consider severe malaria as a usually fatal condition, thus in the context of severe malaria, mortality is reduced up to five fold by effective antimalarial treatment (White, 1999).

The likelihood of progressing from uncomplicated to severe malaria and ultimately fatal infection depends on the intervention with antimalarial treatment. Even if effective parenteral treatment for severe malaria is available at health centres and hospital, there will still be an increase in the number of patients who present with severe malaria if ineffective first line oral treatments are used (White, 1999). Thus morbidity and mortality rise, not because of ineffective treatment of severe malaria, but because of ineffective first line oral treatment, which causes an increasing proportion of patients to develop severe disease (White, 1999).

2.1.6 Malaria mortality

Effective antimalaria treatment is key to prevent mortality. The mortality of untreated *Falciparum* malaria in non-immune individual is not known, but may be in the range of 5-20% according to available data (Trape, 1997). In contrast, the mortality of treated symptomatic drug sensitive infection is approximately 0.1-1% (Greenwood *et. al.*, 1991). In severe malaria, the treated mortality increases to 15-20% where as the untreated severe case is usually fatal (White *et. al.*, 1999).

A study done by Wilson (1936) in Tanga, which prospectively followed a cohort of children over several years, during early 1930s, found the mortality rate to be 15.4% among children in one village. During the early 1990s (Salum, 1994) repeated prospective mortality surveillance in the same region and described a malaria mortality rate similar to that defined by Wilson (1936) 60 years earlier. Furthermore, at Bagamoyo, a prospectively recorded malaria specific mortality in underfives between 1982 and 1984 was found to be 15.4 deaths per 1000 per annum (Cited from Snow *et. al.*, 2001).

Comparison of the four studies, two done in the same region and two from different region, suggest similar risks of malaria specific mortality despite being separated by 60 years.

2.1.7 Chloroquine resistance

In the early 1950s chloroquine was efficacious at a dose of 2.5mg/kg. In the mid 1970s due to slow increase in chloroquine resistance, the therapeutic dose was gradually increased to the maximum safe level of 25mg/kg (Kitua *et. al.*, 1999). The resistance status of parasites therefore has a fundamental role in the effectiveness of treatment. The precise reasons why *P .falciparum* strains developed resistance to CQ are not known. It is generally agreed that the wide spread use of chloroquine both for prophylaxis and treatment, incomplete, irregular, inadequate doses, under or over prescription may have encouraged parasite resistance to develop (Marero, 2000).

Hospital data indicated that build up of chloroquine resistance was associated with increased admissions rates for malaria (Marero, 2000). The most important determinants of increased drug resistance appear to be due to increased drug pressure

(Bloland *et al.,* 1998). Increased drug pressure can occur in response to a high incidence of malaria infection and treatment or management practices such as reliance on a clinical rather than a definitive diagnosis of malaria. Prescribing practice can also have a significant effect on the development of resistance.

The emergence and spread of *Plasmodium falciparum* resistance to antimalarial drugs has several deleterious consequences. From the point of view of patients, ineffective treatment leads to increased morbidity and mortality (Greenwood *et al.*, 1987). Drug resistance in high endemic areas is especially apparent in small children, and the response to antimalaria treatment improves with age (Tanner *et. al.*, 1998).

The impact of drug resistance on public health can be illustrated by examining its effect on malaria incidence and species composition, increased case fatality rates and the risk of malaria low birth weight.

Recent studies in Tanzania indicate that the combined treatment failure rate to CQ is now 52% (range 28%-72%) (MOH, 2000), in addition, data collected in three districts (Hai, Morogoro, Dar-es-salaam) showed that of the patients dying of suspected malaria, 56%-80% had attended formal health services during their final illness. Assuming the previous guidelines were followed, most would have received chloroquine and yet they died (Kitua *et al.*, 1999), indicating that CQ was possibly not effective.

There is evidence indicating the favorable impact of using more effective antimalarial in response to growing drug resistance. In western Kenya, in 1991 a follow up study of children treated for malaria showed a two third reduction in case fatality rates among children receiving alternative and effective treatment such as SP,

Co-trimoxazole or quinine compared to those receiving chloroquine that was ineffective (Zucker *et. al.*, 1996). Data from the same hospital confirmed this as during a period of transition from nearly exclusive use of chloroquine for inpatient in 1991 to nearly exclusive use of alternative treatments in 1994, case fatality rate decreased from about 10% to less than 3% (Zucker *et. al*, 1996).

Hence the greatest benefit of effective antimalaria drugs is probably to prevent the progression from uncomplicated to a severe infection.

In a study done in Malawi by Takechi *et. al.,* (2001) showed chloroquine failure to be 57.8%, where SP treatment was efficacious. Malawi changed its policy for treatment of uncomplicated malaria from chloroquine to SP in 1993. Analysis of data from national information system of Malawi collected between 1991 and 1995 showed that where as admission for uncomplicated malaria increased after the policy change, admission and deaths from cerebral malaria and anaemia decreased (Bloland *et al.*, 1998).

A study done by Premji *et. al.*, (1995). on chloroquine treatment for uncomplicated childhood malaria with drug resistance done in Fukayosi village in Tanzania showed that 20% early treatment failure rate to chloroquine aggravates anemia, in contrast to SP which when administered to treatment failures improved the haemoglobin level significantly. Therefore it is expected that with the introduction of new antimalaria therapy we expect decrease number of patients with anemia and decrease in mortality.

2.1.8 Introduction of new National Guidelines for Malaria Diagnosis and Treatment

Tanzania, having experienced a similar trend of increase in morbidity and mortality due to Chloroquine resistance, changed its policy for treatment of uncomplicated malaria in August 2001. Till now no study has been done to show the trend of admissions for uncomplicated and complicated cases and death due to malaria complication. Therefore there was a need to evaluate malaria case management before and after introduction of new Malaria Guidelines for Diagnosis and Treatment. The guiding principle of a new National Guidelines for Malaria Diagnosis and Treatment is to provide safe, effective, good quality and affordable antimalarial drugs to those that need them, yet at the same time promote rational drug use which will minimize the development of antimalarial drug resistance (MOH, 2000). The main purpose of antimalarial policy were (MOH 2000):

- To provide rapid and long lasting clinical cure.
- To reduce morbidity including malaria treated anaemia.
- To halt the progression of simple disease into severely and potentially fatal disease.
- To reduce the impact of placental malaria infection and maternal malaria associated anaemia through chemoprophylaxis or intermittent therapy.

Therefore the guiding principle of antimalarial drug policy is to promote safe effective, good quality, and affordable malaria treatment. At the same time it should encourage rational drug use in order to minimize the development of resistance to drug. The new policy will be supported by a strategy promoting better public

awareness of appropriate use of antimalarials. This is necessary to minimize abuse and misuse of the drug, which is one of the main causes for emergence of drug resistance.

After introduction of new antimalarial chemotherapy, the first line drug of choice for treatment of uncomplicated malaria is sulfadoxine/pyrimethamine (SP), it is also used as intermittent presumptive treatment of pregnancy (MOH, 2000). There is no pharmacological or clinical evidence of any benefit from the administration of a second dose after one or two weeks (MOH, 2000). SP is effective in clearing parasitemia but has little antipyretic action so it produces a less dramatic clinical cure than that which was used to be associated with chloroquine. Patients with fever should be given an antipyretic drug like paracetamol or aspirin every 4 to 6 hours until symptoms resolve, usually after three days (MOH, 2000).

When a patient returns within 4 to 14 day after treatment with SP, complaining of continued symptoms of malaria, on response should be considered that has developed resistance to SP and the following recommendation followed after a full history and examination; Where laboratory facilities are not available and malaria is still suspected treatment with amodiaquine should be started immediately with strict follow up. Amodiaquine is the indication for second line treatment of uncomplicated malaria, and it is also treatment of uncomplicated malaria where SP is contraindicated, Amodiaquine can be used in pregnancy and lactation, as at present there is no evidence for contraindication in this situation (MOH, 2000).

Non-response to amodiaquine treatment should be managed with the third line drug, which is quinine. It is also the drug of choice for treatment of severe *P.falciparum* malaria, and treatment of multi drug resistance (MOH, 2000). The risk of quinine induced hypoglycaemia is however greater in pregnant women than in non-pregnant women. Non-response to quinine therapy persistence of malaria symptoms and failure to clear parasites after 3 days of treatment should be regarded as non-response to quinine. In such a situation the artemisinin derivatives should be given along with quinine.

Thus so far, there are no data on the management and outcome of malaria after the introduction of new National Guidelines for Malaria Diagnosis and Treatment. Therefore this study compares the management and outcome of hospitalized patients in Temeke Municipal hospital. The findings shall provide a preliminary data for the evaluation of malaria case management before and after the new Guidelines for Malaria Diagnosis and Treatments.

3. CHAPTER THREE

3.1 METHODOLOGY

3.1.1 The design of the study

A descriptive retrospective study was undertaken to describe the management and outcome of malaria in hospitalised patients at Temeke hospital, during two periods: 1st to 31st March 2001 and 1st to 31st March 2002. Only one month data before and after the new Guidelines for Malaria Diagnosis and Treatment were included due to time constraint. In March 2001 the New Tanzania National Guidelines for Malaria Diagnosis and Treatment of the Ministry of Health (MOH) had not yet been introduced, while in March 2002 the New Tanzania National Guidelines for Malaria Diagnosis and Treatment of the Ministry of Health (MOH) had been introduced.

3.1.2 Description of the study area

Dar-es-salaam is the largest city and commercial capital of Tanzania. The city is divided into three municipalities (also referred to as districts), each with a municipality (district) hospital. Temeke Hospital belongs to Temeke Municipality (District). The Temeke District's main tribes are Wazaramo, Wandengereko and Wamatumbi. But being an urban area and part of the capital of Tanzania, there are people from all over Tanzania.

The hospital provides services to about 1.2 million, mostly residents of Temeke, Mtoni, Tandika, Vituka, Mbagala, Kurasini and Kiwalani wards of the district. It also extends its service to other nearby areas of the districts of Ilala and Mkuranga.

Mkuranga had until recently no district hospital of its own. Temeke district is mostly populated by residents of low and middle income. An average of 800 to 1000 patients per day attend at the outpatient department and the hospital admits about 60 patients daily especially in medical and paediatric wards. It has 150 beds in four wards.

This municipality is holo-endemic area for malaria, with a seasonal increase of transmission of malaria during rainy season. The houses mostly consist of traditional six roomed concrete structures shared by several families with common service facilities in the backyard.

Topography consists of clay soil lying on unevenly distributed coral, which accommodates various water collection sites during rainy season as the water table is high. The sanitation facilities are underdeveloped, to maintain adequate sanitation for the dense population. Slackening vector control activities during the past decade of hardships has enabled the *Anopheles mosquitoes* to multiply from the numerous breeding sites as well as swelling up of the numbers of nuisance *Culex* mosquitoes which breed in latrines and septic tanks as these contain organically polluted water.

3.1.3 Selection of study area

Dar-es-salaam was picked as the study region because of being holoendemic for malaria; it is also centre where a malaria control programme was conducted from 1988 to 1995 by Japanese aided malaria control project.

3.1.4 Sampling method

By simple random sampling, Temeke municipality was selected among three municipalities namely Kinondoni, Ilala and Temeke. The three names were written in 3 different pieces of papers and Temeke municipality was randomly picked. Temeke Hospital was the only public hospital in the municipality; therefore the study was then scheduled to be done in that hospital. It has all laboratory facilities; laboratory technicians, pharmacist, doctors and nurses.

Temeke hospital introduced the New Tanzania National Guidelines for Malaria Diagnosis and Treatment in October 2001.Therefore the study time could involve the month of October 2001 to month of April 2002. But because of time constraints a simple random sampling was done to select the month of March for data collection. To avoid seasonal variation bias a month of March 2001 was selected to be a comparable month before the adoption of the new National Guidelines for Malaria Diagnosis and Treatment.

3.1.5 Source of information

The source of information included were:

All patients' files (recorded cases) of hospitalized patients at Temeke hospital from first to thirty first of March 2002 (after introduction of National Guidelines for Malaria Diagnosis and Treatment) and from first of March to thirty first of March 2001 (Before introduction of new National Guidelines for Malaria Diagnosis and Treatment).

Names and registration numbers of patients who were admitted at Temeke hospital during the whole month of March 2001 and the whole month of March 2002 were obtained from the register book at the reception office, later the names and registration numbers were confirmed at the inpatient registers of each of the four wards. The names and registration numbers confirmed were then taken to the records office where the files of the patients admitted during this time were obtained.

All the files of patients admitted at Temeke hospital from first of March 2001 to thirty first of March 2001, and from first of March 2002 to thirty first of March 2002 were collected from the record office. Sorting of files of the patients who were diagnosed to have malaria were further done and detailed information on management and outcome obtained from those selected files with malaria diagnosis.

3.1.6 Research instrument

The data were collected by the investigator (author) and two-research assistants using a checklist (see Appendix B). The aim of this checklist was to help explain in depth any problem of diagnosis or irrational prescribing of malaria drugs. Developed checklist included all data that were required according to the set objectives.

3.1.7 Pre-testing of research instrument

Pre-testing of the checklist was conducted at Mwananyamala and Temeke hospitals to find out whether; the wordings of the questions were clear and the sequence of questions was logical. After pre-testing, some modification of the checklist and methodology was done.

3.1.8 Data collection

The research assistants were recruited at the Temeke Municipal Office and one of the two research assistants was a health personnel from Temeke Municipality. The training of the research assistants was done two weeks before data collection. During data collection, the checklist was used.

Data collection was done in the medical records office from 9:00 am to 3:30 pm, Monday to Friday, which are the working days for hospital record office. All files of hospitalised patients diagnosed to have malaria, admitted on March 2001 and March 2002 were collected. The required information was then recorded using checklist (see appendix b). Care was taken so as not to interfere with the routine work of the wards or hospital.

3.1.9 Data processing and analysis

After the fieldwork, the investigator arranged and assigned serial numbers in the checklists. The data was processed and analyzed using EPI-INFO programme Exploration analysis was carried out on the variables, before and after introduction of new National Guidelines for Malaria Diagnosis and Treatment. Proportions were compared by chi square test, significance set at 0.05 level of significance. Data were presented using tables and figures (see results)

3.1.10 Study limitations

1. The process of reading files was difficult. This is due to lack of properly recorded information, lack of trained registry assistants and lack of proper record keeping in record office
2. The doctors were also sometimes not recording patient particulars correctly. . For example files with missed age or diagnosis necessitated follow up in the ward or register book for missed information. Similarly missed information had to be obtained from registers in the wards.
3. Routine systems of laboratory services do not exceed 8.00 pm. This practice was a hindrance to our side as we obtained some cases of malaria treated without blood slide taken. To minimize this problem those blood slides that were taken on day of admission and were read the next day, their results were taken as the result of blood slides investigated the same day of admission.

3.2 Ethical consideration

The research clearance was obtained from College's ethical Committee. Before starting the actual fieldwork, the following was done; a letter to introduce the researcher was handled to MMOH who granted permission. The MOH offered the investigator with a letter of introduction to Temeke hospital, which informed the hospital in-charge about the aim of the study and how it could have been conducted. As this was a retrospective study involving patient records, their informed consent could not be obtained, however, strict confidentiality was observed with patient records.

4. CHAPTER FOUR

4.1 RESULTS

A total number of 1047 cases Hospitalized during a period of March 2001were analyzed. Out of these 551 (52.6%) records had a diagnosis of malaria. A total of 1322 cases hospitalized during a period of March 2002 were analyzed. Out of these 619 (46.8%) were records of hospitalized cases of malaria. The proportion of malaria admissions was less in the month of March 2002 and the difference was statistically significant ($X^2 = 7.87$, P= 0.005), see table 1.

Table 1: The proportion of malaria and non-malaria cases among Hospitalized patients' records of March 2001 and March 2002, at Temeke Hospital

	March 2001		**March 2002**	
Admitted Cases	**No. of patients**	**%**	**No. of patients**	**%**
Malaria cases	551	52.6	619	46.8
Non malaria cases	496	47.4	703	53.2
Total admission	**1047**	**100**	**1322**	**100**

4.1.1 Demographic characteristic of the study population

Age and Sex distribution of malaria cases had almost a similar trend in both two periods. More females in the age group 15-49 were diagnosed to have malaria. About 307 (55.7%) of all the malaria recorded cases were between the age of 15 – 49 in March 2001, this number was reduced to 321 (51.9%) in March 2002. The difference is significant in the age group 0 – 14 where more cases were seen 264 (42.6%) in March 2002 than March 2001 whereby there were 189 (34.3%) recorded cases ($X^2 = 13.78$ $P = 0.001$), see table 2.

Table 2: Age and sex distribution of malaria cases Hospitalized at Temeke hospital in March 2001 and March 2002.

Age group (years)	March 2001			March 2002		
	Sex			Sex		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
0 - 14	110 (50)	79 (23.9)	189 (34.3)	154 (54)	110 (32.9)	264 (42.6)
15 - 49	91(41.4)	216 (65.2)	307 (55.7)	119 (41.7)	202 (60.4)	321 (51.9)
50 and above	19(8.6)	36 (10.9)	55 (10)	12 (4.2)	22 (6.6)	34(5.5)
Total	**220(100)**	**331(100)**	**551 (100)**	**285(100)**	**334(100)**	**619 (100)**

For age group $X^2 = 13.78$ $P=0.001$. For sex distribution $X^2=4.44$ $P=0.04$.

Note:

- Age 0-14 represent patients admitted in paediatric ward.
- Age 15-49 represent adult admitted in male and female medical wards.
- Age 50 and above represent elderly admitted in male and female medical wards.

4.1.2 Diagnosis of Malaria

Out of all diagnosed cases of malaria, 367 (66.6%) were complicated malaria in March 2001 while March 2002 severe or complicated malaria were 411 (66.4%). Patients who were diagnosed to have uncomplicated malaria were 184 (33.4%) in March 2001 while in March 2002, there were 208 (33.6%), see table 3.

Table 3: Type of diagnosis of malaria seen in records of Hospitalized patients at Temeke in March 2001 and March 2002

Diagnosis of malaria	March 2001 n = 551		March 2002 n = 619	
	No. of patients	%	No. of patients	%
Uncomplicated malaria	184	33.4	208	33.6
Complicated malaria	367	66.6	411	66.4
Total malaria cases	**551**	**100**	**619**	**100**

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Complicated malaria	367	66.6	411	66.4
Total malaria cases	**551**	**100**	**619**	**100**

4.1.3 Manifestation of malaria

Severe Falciparum malaria 245 (66.8%) was the commonest manifestation in March 2001. While in March 2002, severe Falciparum malaria was significantly reduced to 233 (56.7%) of all complicated cases hospitalized due to malaria. Cerebral malaria was significantly increased in March 2002, to about 35 (8.5%) of hospitalized cases due to complicated malaria compared to 3 (0.8%) of hospitalized cases noted in March 2001, see table 4.

Table 4: Manifestations of admitted patients seen in case records admitted with a diagnosis of complicated malaria at Temeke Hospital in March 2001 and March 2002.

Manifestation	March2001 n = 367	March 2002 n = 411
Cerebral malaria	3 (0.8%)	35 (8.5%)
Severe anemia	62 (16.9%)	77 (18.7%)
Severe pneumonia	57 (15.5%)	66 (16.1%)
Severe Falciparum malaria	245 (66.8%)	233 (56.7%)
Total	**367 (100%)**	**411(100%)**

$X^2 = 27.12$ $P<0.0001$

4.1.4 Laboratory investigation of malaria

A total of 333 (60.4%) of hospilized case records were diagnosed to have malaria using laboratory investigation of blood slides and 218 (39.6%) were diagnosed to have malaria on clinical grounds in March 2001. While in March 2002, there were 350 (56.5%) of the hospitalised case records diagnosed to have malaria by using blood slides investigation. There was however, no statistically significant difference in both two periods regarding use of blood slides to confirm diagnosis of malaria, see table 5.

Table 5: Use of blood slides to confirm diagnosis of malaria at Temeke Hospital in March 2001 and March 2002 for those diagnosed as malaria

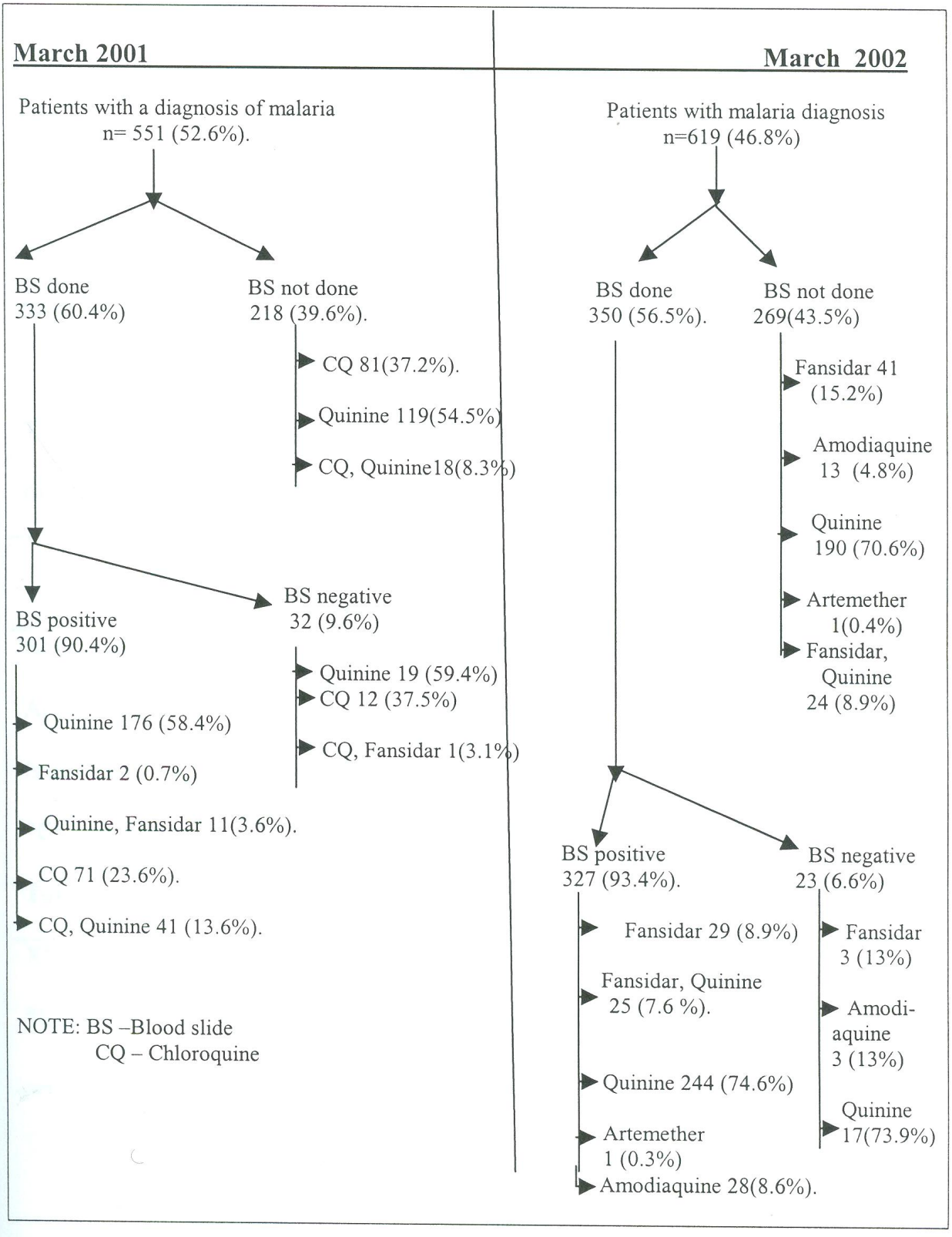
Blood slides	Year 2001 n=551		Year 2002 n=619	
	Cases	%	Cases	%
Done	333	(60.4%)	350	(56.5%)
Not done	218	(39.6%)	269	(43.5%)
Total	**551**	**(100%)**	**619**	**(100%)**

$x^2 = 1.8$ P.value = 0.18

4.1.5 Antimalaria treatment

Of 333 cases who were investigated for blood slides, In March 2001, about 301 (90.4%) were blood slide positive. Quinine use among blood slide positive were 176 (58.4%) in March 2001. Of 333 hospitalised cases investigated for blood slides in March 2001; 32 (9.6%) were blood slides negatives. Blood slide was not done to 218 (39.6%) of the hospitalized cases in March 2001, but they also received antimalaria treatment. Among drugs given were quinine 119 (54.5%) and chloroquine 81 (37.2%). Of 350 cases who were investigated for blood slides, about 327 (93.4%) were blood slide positive, in March 2002. and the drug mostly used was quinine 244 (74.6%). Of 350 cases who were investigated for blood slides, in March 2002, 23 (6.6%) were blood slides negative. Blood slides was not done in 269 (43.5%) of the hospitalised cases diagnosed to have malaria in March 2002, however, were given antimalaria treatments and the drug commonly used was quinine 190 (70.6%) see figure 1.

Figure 1: Malaria treatment seen in case records of admitted patients with a diagnosis of malaria at Temeke hospital in March 2001 and March 2002



4.1.6 Supportive treatment

Supportive treatment consists of antipyretic, anticonvulsant and intravenous fluids. Intra venous fluids were used more in March 2001, by about 246 (44.6%) hospitalized cases. The combinations of treatment, either antipyretic or intravenous fluids were used more by hospitalized cases 189 (30.5%), in March 2002. There was no statistically significant difference in supportive treatment given to hospitalized cases in both two periods, see table 6.

Table 6: Supportive treatment seen in case records of patients admitted with a diagnosis of malaria at Temeke Hospital in March 2001 and March 2002.

Supportive treatment	Year 2001 n=551	Year 2002 n=619
Antipyretic	157 (28.5%)	178 (28.8%)
Anticonvulsant	6 (1%)	9 (1.5%)
Intravenous fluids	246 (44.6%)	243 (39.3%)
*Combination of treatments	143 (25.8%)	189 (30.5%)
Total	**551 (100%)**	**619 (100%)**

X^2=4.6 P. value=0.1

*Combination of Treatments involves giving of all the three drugs above.

4.1.7 Outcome of hospitalized patients diagnosed to have malaria

All patients who were hospitalised with a diagnosis of malaria at Temeke hospital received treatment. The outcome of these patients were cured, referred to Muhimbili National hospital, absconded (run away) or died. Of the recorded cases due to malaria 472 (85.7%) out of 551 were successful managed and discharged in March 2001, while about 26 (4.7%) patients died and 44 (8.0%) were referred to Muhimbili National Hospital for further management. About 504 (81.4%) of the hospitalised cases were successful managed and discharged in March 2002.There were 46 (7.4%) deaths, and 54 (8.7%) were referred to Muhimbili National Hospital for further management, see table 7.

Table 7: Outcome of admitted patients seen in case records with a diagnosis of malaria at Temeke Hospital in March 2001 and March 2002

Outcome	March 2001 n =551	March 2002 n = 619
Cured	472 (85.7%)	504 (81.4)
Referral	44 (8.0%)	54 (8.7%)
Absconded	9 (1.6%)	15 (2.4%)
Deaths	26 (4.7%)	46 (7.4%)
Total	**551 (100%)**	**619 (100%)**

P.Value=0.15.

4.1.8 Mortality of malaria cases

The age group 0-14 had more death due to malaria than any other age group in both periods. In March 2001, there were 17 (65.4%) deaths for the age group 0-14 due to malaria, while in March 2002 there were 28 (58.5%) deaths for the age group 0-14, see table 8.

Table 8: Results of mortality by age of admitted patients with a diagnosis of malaria at Temeke Hospital in March 2001 and March 2002.

Age	March 2001 n=26		March 2002 n=47	
	No. of Deaths	%	No. of Deaths	%
0-14	17	65.4	28	58.5
15-49	5	19.1	18	39
50 and above	4	15.4	1	2.5
Total	**26**	**100**	**47**	**100**

5.CHAPTER FIVE

5.1 DISCUSSION

This study was conducted in an area of holo-endemic malaria situations in an attempt to compare the management and outcome of malaria among hospitalized patients before and after introduction of new National Guidelines for Malaria Diagnosis and Treatment in Temeke hospital. In recent years, the cornerstone for malaria control in Tanzania has been early diagnosis and prompt treatment of cases to prevent mortality and morbidity (MOH, 2000).

The results have shown no significant difference of malaria management after adoption of new National guidelines for malaria diagnosis and treatment. Bearing in mind the study limitations, we could not ascribe any differences to the change of policy, rather we can consider the study as a monitoring exercise or baseline data, which will need repeating in order to evaluate the new policy.

5.1.1 Malaria admission

Hospital admissions due to malaria were 52.6% in the year 2001 and 46.8% in the year 2002. These figures show that malaria is still the first cause of hospital admission for children and adults as previously shown by Kitua *et. al.,* (1999), where malaria was the first cause of admissions ranging from 35% to 54%.

There was significant difference in overall proportion of malaria among admitted patients; the proportion of children 0-14 age group was greater in March 2002 as compared to March 2001. If these relative increase of children admitted with malaria

is real it could be ascribed to lack of SP treatment at home. Unlike Chloroquine, where about 50% of febrile cases were treated at home, SP was used only in 3% of fever cases (Nsimba *et. al.*, 1999).

Findings from this study indicate that, women of age group 15-49 comprised about 216 (65.2%) of all women admitted due to malaria in March 2001 while in March 2002 women of age group 15-49 comprised about 60.4%. This being the reproductive age group their immune system is compromised during pregnancy and therefore susceptible to more severe malaria with its consequent complication such as anaemia, low birth weight babies, abortion and stillbirths. There was no significant difference when comparing the rate of female admission of this age group in both two years.

5.1.2 Laboratory diagnosis of malaria

Regarding diagnosis of malaria using microscopy, there was no significant difference between the two periods. Although the new treatment Guidelines recommends greater use of microscopic confirmation of clinical diagnosis before treatment, to our surprise less than half of the cases were diagnosed on clinical grounds only. It is suggested that, this is followed by a follow up study to determine reasons for slow or no implementation of the new National Guidelines for Malaria Treatment and Diagnosis. It is regrettable to find lack of microscopic examination to confirm diagnosis at district hospital.

5.1.3 Severity and types of malaria complications

There was no significant difference in relationship between proportion of malaria complicated and uncomplicated in Overall malaria cases in the two periods. However, the types of complications (manifestations) were the same. The only difference was in cerebral malaria which had a proportion (8.5%) compared to (0.8%) in 2002 and 2001, respectively. This can be explained by the increase of child admission aged 0-14 (42.6%) in March 2002 instead of (34.3%) in March 2001. Another explanation can be, possibly there was delay in treatment given to patients especially children with malaria. Previously mothers were used to chloroquine and home-based treatments were commonly practiced. With the newly introduced policy, SP was introduced and thus mothers were not well informed about the new drug especially concerning home treatments. Chloroquine was a well known, accepted drug in both urban and rural communities and has been used to treat all types of fever for many years while fewer people and communities have little knowledge of SP because it has not been readily available in most part of Tanzania. SP does not have the same antipyretic effects as a chloroquine and would not produce the rapid fever reduction that patients and their caretakers have come to expect. SP has no effect on non-malaria fevers, apart from its antimicrobial action. This has led to concerns that SP is rejected. This potential gap between antiparasitic efficacy of SP and its perceived efficacy in the community has important implications for early and appropriate management of malaria, especially at the household level (Nsimba et. al., 1999).

5.1.4 Malaria treatment

There is evident change in malaria treatment and no Chloroquine is used in March 2002 as compared to March 2001. Chloroquine was used un treating 23.6% of those with blood slides positive and 37.5% of blood slides negatives and 37.2% of those where Blood slide was not done. Chloroquine was used by more than a third of patients admitted in March 2001 with a diagnosis of malaria. In 2002 SP was used in only 16.5% of blood slides positives, 13% of blood slides negatives and 24.1% of the blood slides not done group. There is therefore a lag behind in place of CQ as suggested by the new Guidelines of Malaria Diagnosis and Treatment. It seems Quinine use has covered some of those who used to receive CQ. Quinine was the most frequently used drug for patients who were admitted in the hospital. This is contrary to the study done by Nabiswa *et al.*, (1994) in Eldoret district hospital in Kenya, whereby after introduction of new protocol for treatment of malaria there was a noted decrease in the use of quinine as first choice drug 19% after introduction compared to 54% before introduction of antimalaria treatment protocol.

Amodiaquine a second line drug after introduction of new National Guidelines for Diagnosis and Treatment, seems slow to take off. Artemether is also a new drug, which appear in March 2002 while absent in March 2001, but for less than 1% of cases. Giving antimalaria to patients who have not done blood slides investigation, 43.5% of cases in March 2002 and 39.6% in March 2001. These indicate worsening of situation or no improvement. Although from verbal discussions it was seen that these had similar clinical features to those with blood slides being done. The absence of blood slides facilities in the weekends, public holidays and at nighttime could

account for some of the reason for such a big number. It seems that the new National Guidelines for Malaria Diagnosis and Treatment has left the loophole by allowing no microscopy or use of microscopy as the matter of convenience.

There was no significant difference in supportive treatment given in March 2001 and March 2002. One would have expected anticonvulsant to increase due to increase in cerebral malaria and also increase of antipyretics due to use of Sulfadoxine/Pyrimethamine. There is only a slight increase in use of antipyretics from 300 (54.3%) to 367 (59.3%), which was not significant. Use of intravenous fluids did not change in both March 2001 and in March 2002. It is encouraging to see the new policy being implemented although there are apparent gaps to be filled in improving diagnosis and treatment.

5.1.5 Outcome of treatment

There was no significant difference in outcome of treatment in cure, referrals, and death rates. It would have been expected that the new policy would have led to fewer deaths from malaria, however, this was not the case, it is perhaps too early and too small a study to attain a significant changes.

6. CHAPTER SIX

6.1 CONCLUSIONS

i. This study has shown that malaria remains a major health problem and there is no evidence that the introduction of the new policy has changed the pattern of malaria mortality and morbidity.

ii. SP has been adopted and CQ is no longer used in Temeke Hospital but there is more use of quinine and amodiaquine, rather than SP in place of CQ and Quinine is the most frequently used drug for patients who are admitted in the hospital.

iii. The use of SP has not been well adapted in Temeke hospital.

iv. The study also found that malaria complications example severe anaemia are of the same magnitude even after introduction of new National Guidelines for Malaria Diagnosis and Treatment.

v. Supportive treatment was also the same in the two periods.

vi. Microscopy use for malaria diagnosis is the same in the two periods covering about half of all malaria admissions.

vii. Outcome of treatment (deaths, referrals and cure) are of the same rate in both two periods.

6.2 RECOMMENDATIONS

The findings suggest that malaria is still a problem in Temeke even after introduction of new malaria chemotherapy. The author suggests/recommend the following:

i. There should be on going training of all practitioners about the correct management of malaria cases at Temeke hospital.

ii. There should be 24 hours laboratory services so as to allow timely blood tests for malaria in Temeke Hospital.

iii. New guidelines for malaria diagnosis and treatment booklet should be available at all health facilities and all health workers should have on going training on SP and treatment of severe and complicated malaria for better outcome of malaria management.

iv. To minimize complicated malaria cases due to delay in seeking treatment, adequate Information, Education, and Communication (IEC) messages and material should be developed and distributed to all health facilities, and to community members, so as to create awareness and also to reduce worries which members in the communities have, through anecdote reports that SP is not working.

v. The use of IMCI algorithm that recommends treatment of antimalarial drugs to children with fever especially in holo-endemic areas like Temeke should be allowed only in places where microscopy is not available.

vi. To conduct a research on:

a. The community attitude and perception affected by a policy change from chloroquine to SP, as first line antimalarial therapy.

b. Operations research on accurate keeping of medical records and management of malaria.

REFERENCES

Armstrong, S. J. R. M., Smith, J., Alonso, P. L., Hayes, R. J. (1994). What is clinical malaria? Finding case definitions for field research in highly endemic areas. *Journal of Parasitology Today,* **10** (11): 439-442

Bloland, P.B. (1999). Making malaria treatment policy in the face of drug resistance. *Annals of Tropical Medicine and Parasitology,* **93** (1): 5-23

Bloland, P.B., Kazembe, P.N., Oloo, A.J., Himonga, B., Barat, L.M., Ruebush, T.K. (1998). Chloroquine in Africa: Critical assessment and recommendations for monitoring and evaluating chloroquine therapy efficacy in Sub-Saharan Africa. *Journal of Tropical Medicine and International Health* **3** (7): 543-552

Brewster, D.R., Greenwood, B.M., (1993). Seasonal variation of pediatric diseases in Gambia, West Africa. *Annals of Tropical Paediatrics,* **13**: 133-146.

Font, F., Alonso, M. S., Natha, R., Kimario, S., Lwila, F., Ascaso, C., Tanner, M., Menendez, C., Alonso, P.L. (2001). Diagnostic accuracy and case management of clinical malaria, in the primary health services of rural area in south-eastern Tanzania. *Journal of Tropical Medicine and International Health,* **6** (6): 423-428.

Greenwood, B. (1999). Malaria mortality and morbidity in Africa. *Bulletin of the World Health Organization,* **77**(8).

Greenwood, B., Daniel, C., Shabbar, J. (2002). Use of clinical algorithms for diagnosing malaria: *Journal of Tropical Medicine and International Health,* **7** (1): 45-52.

Greenwood, B.M., Marsh, K., Snow, R.W. (1991). Why do some African children develop severe malaria? *Journal of Parasitology Today*, **7** pp 277.

Greenwood, B.M., Greenwood, A.M., Bradley, A.K., Byass, P., Jammeh, K., Marsh, K., Tulloch, S., Oldfield, S.J and Hayes, R. (1987). Mortality and morbidity from malaria among children in a rural area of the Gambia West Africa. *Transactions of the Royal Society Tropical Medicine and Hygiene,* **81**: 478-487.

Hedberg, C.W., Levine, W.S., White, K.E. (1993). Malaria in Montagnard refugees North Caroline. *Journal of Infectious Diseases,* **167**: 107-11

Intergrated Management of Childhood illness (IMCI, 1998). *Bulletin of the World Health Organization,* **75**: 7-24

Kitua, A., Mwita, A., Premji, Z., De Savigny, D., Abdulla, S., Eseko N., Msengi.,, Kibasa, C., Njau, R. (1999). The rationale for change and guide to the process of policy implementation. Task Force Report. *Tanzania Health Research Bulletin* **2** (1).

Koram, K., Alonso P.L. (1995). Safety in infants of SP166, a synthetic malaria. *Health,* **4**: 377-382.

Louise, H., Miller., Michael, F. G. and Genevieve, M. (1994). Malaria parthogenesis. *Journal of Science,* pp 264.

Mabeza, G.F., Thuma, P.E. and Bhat, G.J.(1995). Children with Cerebral malaria, in Zambia. *Journal of Tropical med. Parasitology,* **89**: 221-228.

Manson-Bahr, P.E.C. and Bell, D.R. (1987). Manson`s Tropical diseases. 19th edition. *Balliere Tindall.* London.

Marero, M. (2000). Malaria case management: Assessment of the existing diagnostic and implications in prioritising malaria control in Ilala municipal health plan. MPH Dissertation, University of Dar- es salaam, Tanzania.

Menendez, C. (1995). Malaria during pregnancy. A priority area of research and control. *Journal of Parasitology Today*,**11** pp 5.

Mike. (2000). *Life threatening severe malarial anaemia,* Review article, department of paediatrics, University of Oxford.

Ministry of Health (2000). National Guidelines for malaria diagnosis and treatment. Malaria control series.

Nabiswa, A, K., Makokha, J.D.S., Godfrey, R.C., Lore, W. (1994). Management of before and after introduction of treatment protocol at the Eloret District Hospital. *East African Medical Journal,* **71**(1): 9-13.

Najera,J.A., Liese, B.H., Hammer, J. (1993). Malaria. In: **Jamison, D.T., Mosley, W.H., Measham, A.R., Bobadilla, J.L. (1993).** Diseases control priorities in developing countries. Oxford Medical Publications, Oxford University Press, pp 281-302.

Nsimba, S.E.D., Warsame, M., Tamson, G., Maselle. A.Y., Mbatia. Z. (1999). A household survey of source, availability, and use of antimalarials in a rural area of Tanzania. *Drug Information Journal,* 33: 1025-1032.

Premji, Z., Ekvall, H., Bjorkman, A. (1995). Micronutrient and iron supplementation and effective antimalarial treatment synegirgistically improve childhood anemia. *Tropical Medicine and International Health Journal.***10** (5): 696-697.

Sabatinelli, G. (1995). Epidemiology and control of vector borne diseases in the refugee camps. UNHCR mission report (unpublished), pp 4-43.

Salum, F.M. (1994). Mortality of under five in a rural area of holoendemic malaria transmission. As cited from **Snow, R.W., Jean-Francois, T., Kevin. (2001)** The past, present and future of childhood malaria mortality in Africa. ***Trends in Parasitology,*** **17** (12).

Snow, R.W., Jean-Francois, T., Kevin. (2001). The past, present and future of childhood malaria mortality in Africa. *Trends in Parasitology,* **17**(12).

Takechi, M., Mikiko, M., Charles, Z., Allan, M., Dons, B., Inocent, L.Z., Isaack, C., Ma-Donna ,G.B. (2001). Therapeutic efficacy of sulfadoxine\pyrimethamine and susceptibility in vitro of P.Falciparum isolates sulfadoxine\pyrimethamine and other antimalarial drugs in Malawian children. *Journal of Tropical Medicine and International Health,* **6** (6): 429-434.

Tanner, M., Smith, T., Charlwood, J.D., Kitua, A.Y., Masanja, H., Mwankusye, S., Alonso, P.L. (1998). Relationships of malaria morbidity with exposure to Plasmodium Falciparum in young children in a highly endemic area. *American Journal of Tropical Medicine and Hygiene,* **59**: 252-257.

Trape, J.F. (1997). Which strategy for malaria control in Africa? *Journal of Parasitol. Today,* **13**: 125-126

White, N.J. (1999). Antimalarial drug resistance and mortality in Falciparum malaria. *Journal of Tropical Medicine and International Health* , **7** (4): 469-470.

White, N.J. (1996). The treatment of malaria. *The New England Journal of Medicine,* **335**: 800-806

White, N.J. Nosten, F., Looareesuwan, S., Watkins, W.M., Marsh, K., Snow, R.W., Kokwaro, G., Ouma, j., Hien, T.T., Molyneux, M.E., Taylor, T.E., Newbold, C.I., Ruebush II, T.K., Danis, M., Greenwood, B.M., Anderson, R.M., Olliaro P. (1999). Averting a malaria disaster. *Lancet,* **353**:1965-1967.

Waller. D., Krishna. S., Crawley. J. (1995). Clinical features and outcome of severe malaria in Gambian children. *Clinical Infectious Diseases*, **21**:577-587.

WHO. (2000). WHO expert committee on malaria. Twentieth report, WHO technical report series. **892**:1-71.

Wilson, D.B. (1936). Report of malaria unit, Tanga 1933-1934 as cited from **Snow, *et al.,* 2001.**The past, present and future of childhood malaria mortality in Africa. *Trends in Parasitology,* **17**:(12).

Zucker,J.R., Lackritz, E.M., Ruebush, T.K. (1996). Childhood mortality during and after hospitalization in Western Kenya-effect of malaria treatment regimens. *American journal of Tropical Medicine and Hygiene,* **55**:655-660.