MOH &CW

GUIDELINES FOR MANAGEMENT OF MALARIA IN ZIMBABWE

DIAGNOSIS, MANAGEMENT OF UNCOMPLICATED AND SEVERE MALARIA

[REVISED DECEMBER 2009]

FOREWORD

In Zimbabwe malaria continues to be a major public health problem. Over half of the population of 12 595 418 million is at risk of contracting malaria. It is the third commonest cause of morbidity and mortality in our country, coming after HIV and AIDS and Tuberculosis across all age groups. Annually close to 1.5 million malaria episodes are reported whilst an average of 1000 people die from this

disease. Malaria accounts for 30% of outpatients at clinics and 40% of hospital admissions.

Various strategies have been put in place to prevent and control malaria. Case management is one of the extremely important strategies alongside such strategies as integrated vector control; prevention of malaria in pregnancy; information education communication and advocacy; epidemic preparedness and response; monitoring and evaluation and operational research.

Malaria case management is guided by treatment guidelines which are a set of instructions directing the utilization of antimalarial drugs in the country. The guidelines are continuously reviewed and updated whenever appropriate by the case management subcommittee (CMS) which advises the MOHCW through NMCP on malaria case management issues. The CMS directs the development of treatment guidelines and case management policies. Zimbabwe changed its malaria treatment policy following a wide spread resistance to chloroquine and sulfadoxine/Pyrimethamine to artemisinin based combination therapy- Coartemether, the more efficacious anti-malaria drug for treating uncomplicated malaria. The policy also stipulates that all suspected malaria cases are to be confirmed with rapid diagnostic tests (RDTs) and/or microscopy before receiving Coartemether.

It is against this background that the malaria treatment guidelines were developed to guide and standardise the implementation of the malaria treatment policy from rural health centres to central hospitals. The treatment guidelines cover all the aspects of malaria case management including diagnosis, management of uncomplicated and severe malaria and intermittent preventive treatment in pregnancy.

It is my sincere hope that all the health workers will adhere to these guidelines in the management of malaria and prevent unnecessary loss of lives.

BRIGADIER GENERAL (DR) G. GWINJI
SECRETARY FOR HEALTH AND CHILD WELFARE

Acknowledgements

Co-authors

DR. C. P. Pasi. MBchB MMED (Med) DTM&H

DR. L. Katsidzira MBchB MMED (Med) DTM&H

These guidelines where reviewed and commented on by the following people

Dr. S M Midzi	Director Epidemiology and Disease Control	MOHCW
Dr.H Mujuru	Paediatrician	UZ Dept. of Paediatrics
Dr. J Mberikunashe	Malaria Program Manager	MOHCW
Dr. P L Hazangwe	PEDCO Matebeleland North	MOHCW
Dr. R C Choto	Public Health Officer	MOHCW
Dr. L S Charimari	Malaria Program Officer	WHO
Mrs. F Manjoro	IEC Officer	MOHCW
Mrs. N Mujuru	Deputy Coordinator	CCM Secretariat
Maj. A Tafirenyika	Military Malaria Coordinator	ZNA
Dr. S L Mutambu	Acting Director	NIHR
Dr. J Namboze	IST	WHO
Mr. J Musana	Laboratory Technician	MOHCW
A Chadambuka	Asst. MPH Field Coordinator	MOHCW
Mr. P Chifamba	RGN/HPO	CHITUNGWIZA
Dr. T L Magwali	Obstetrician & Gynaecologist	UZ Dept. Obs&Gynae.

Background information

Malaria is a disease caused by infection with the parasite of the genus *Plasmodium*. This occurs when one is bitten by an infected female anopheles mosquito. The most common infection in Zimbabwe is with the species *Plasmodium Falciparum*. There are other species of parasites that are

not common in this country such as *Plasmodium vivax, malariae and ovale.* These infections may be acquired if one travels to countries where these parasites are found. Malaria is a major public health problem in Zimbabwe with about 50% of the population staying in malaria transmission areas. It accounts for 20 to 30% of outpatient attendances and 12% of inpatients. The most effective control and prevention strategy for malaria is through the control of mosquito population (vector control). This is done through programs such as residual spraying and avoiding mosquito bites through the proper use of treated bed nets. If however someone contracts malaria, proper case management is very important.

Malaria can rapidly deteriorate from uncomplicated to severe disease if it is not promptly diagnosed and appropriately treated. The appropriate management of severe malaria is very crucial as mortality of untreated severe malaria is almost universal. There are also vulnerable groups such as children and pregnant women who are at high risk of severe morbidity and mortality from malaria if not properly managed. Inappropriate overuse of first line drugs for malaria over years has led to the emergence of resistant strains of *Plasmodium Falciparum* in almost all parts of the world where it is found, including Zimbabwe. The clinical approach to the diagnosis of malaria has been replaced by emphasising confirmed parasitological diagnosis by Rapid Diagnostic Test (RDT) in the outpatient setting including microscopy for inpatients. This prevents the unnecessary treatment of those who do not have malaria thereby allowing an alternative diagnosis to be sought early. This approach makes the management of malaria safe and cost effective. These guidelines have therefore been made for clinicians to fulfil the following objectives:

1. To standardise the approach to diagnosis and management of malaria.
2. To provide information on the appropriate drugs, doses and supportive management of malaria for both uncomplicated and severe disease.
3. To provide health workers with a quick reference text for the management of uncomplicated and severe malaria.

UNCOMPLICATED MALARIA

Introduction

The effective and correct treatment of uncomplicated malaria is critical for the following reasons:

1) To effect complete cure of the infection.
2) Prevent progression of the infection to severe complicated disease and mortality.
3) Reducing infection transmission in the community by reducing the infectious reservoir of parasite carriers.

4) Prevent emergence of resistant malaria parasites, thus safeguarding the current anti-malarial drugs.

The drugs used for the treatment should be: Safe, Tolerable, easily administered, have a fast therapeutic response with minimal side effects.

Clinical diagnosis of uncomplicated malaria

The diagnosis of malaria is dependent on an appropriate history and symptoms suggestive of malaria, appropriate clinical signs supporting the diagnosis and then confirmation by Rapid Diagnostic Test (RDT) or light microscopy.

Symptoms suggestive of uncomplicated Malaria include the following:

- Fever
- Chills
- Rigors
- Headache
- Nausea/Anorexia
- Joint pains
- Lethargy/malaise
- Sweating

Signs of Malaria may include:

- High temperature (usually above 37.5 degrees Celsius)
- An enlarged spleen especially in children (and in adults without immunity to malaria)

A complete history should be taken, in addition to specifically enquiring about:

- The above symptoms
- Travel to malaria areas within 1-6 weeks or usual residence in malaria area.
- Pregnancy (pregnant women are more prone to contracting malaria and tend to easily progress to severe malaria).
- HIV Sero-positivity (patients with advanced immunosuppression are more likely to contract malaria and also progress to severe disease).
- Malnutrition -: Malnourished children might not have a fever, presenting with rather non specific complaints. Enquire about history of exposure and proceed to confirm by RDT.
- Also ask about previous treatment.

A Diagnosis of uncomplicated malaria should be made if there is fever and other suggestive symptoms as listed above in addition to:

- Travel to or residence in malaria area.
- High temperature.
- Chills and rigors.
- Enlarged spleen in the non immune, semi-immune or in children.
- A positive RDT or positive slides for malaria smear on light microscopy.
- Absence of signs and symptoms of severe malaria (*see information on severe malaria on pages 9 - 11).*

If the RDT is negative and malaria is still suspected perform microscopy. If the smear is negative consider other causes of fever. Re-assess the patient and consider repeating the test if other causes of fever are not found and there is persistence of symptoms.

Malaria Parasitological Diagnosis

Advantages of a confirmed parasitological diagnosis over clinical diagnosis

- Cost-effective particularly if health workers believe negative results.
- Enables alternative diagnoses to be sought earlier.
- Prevents unnecessary exposure to drugs and associated side effects.
- Reduces chances of resistance through selection pressure.
- Leads to more accurate health information by reducing over-diagnosis of malaria.

Microscopy versus Rapid Diagnostic Tests

Microscopy is still the gold standard but it requires technical expertise and can be time consuming when the case loads are high. Present day rapid diagnostic tests have a high specificity and sensitivity, approaching that of microscopy. They are based on the detection of malaria parasite proteins in patients' blood. The tests currently in use in Zimbabwe are based on histidine rich protein (HRP) which is stable at high temperatures and detects P*. Falciparum* only. However these tests remain positive for two weeks after treatment. (*See treatment of uncomplicated malaria*) Other RDTS' that are able to detect other species of malaria e.g. *P. Vivax* in addition to *P. Falciparum* are still being evaluated.

Where RDTs should be deployed

- All rural clinics.
- District and provincial hospitals in the outpatient setting.
- Central Hospital in emergency departments.
- Community pharmacies.
- Private health institutions.
- Emergency departments in Private health institutions.

Microscopy should still be used for:

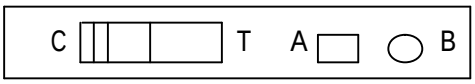
- All admitted malaria patients to improve follow up.
- When co-infections are suspected.
- Those with a recent travel history to countries where other malaria species (e.g Vivax) are reported.
- In suspected treatment failure.
- In patients who have received treatment within the preceding 2 weeks.

How to perform an RDT

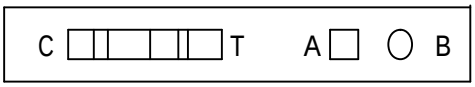
As indicated earlier there are various types of RDTs and each comes with specific instructions. It is therefore important to read the instruction manual/insert that comes with each kit.

(Example below is for Paracheck®)

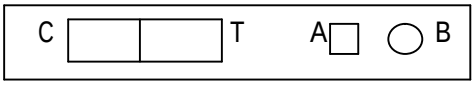
1. Bring the kit components to room temperature. If they had been stored at 2-8˚C wait for at least 30 minutes to bring the components to room temperature.
2. Open the packaging. The device must be used immediately once opened.
3. Check that the desiccant is still blue in colour. If it has turned pink or colourless discard the device and use another one.
4. Tighten the vial cap of the clearing buffer provided with the kit in the clockwise direction to pierce the dropper bottle nozzle.
5. Clean the pulp of the finger with a cotton wool swab and then use a dry swab to dry it.
6. Prick the finger with a sterile needle or lancet.
7. Squeeze a drop of blood then wipe it off to remove any traces of chemicals.
8. Gently squeeze again to obtain a second drop of blood.
9. Touch the sample applicator to the drop of blood until a loop full of blood is retrieved.
10. Blot the blood on the sample pad in sample well 'A'.
11. Dispense six drops of the clearing buffer into well 'B' by holding the plastic dropper vertically.
12. Wait for 15 minutes and read the results as follows: (*see the diagram below)*
    a. Negative for P. Falciparum malaria: Only one pink coloured band appears in the control window 'C'
    b. Positive for P. Falciparum malaria: Two bands appear, one in the control window 'C' and another one in the test window 'T'
    c. Invalid: No bands appear on the device. Repeat the test with a new device, making sure the procedure is properly followed



Negative: only one pink band appears in the control window (C)



Positive: In addition to a band in the control another pink band appears in the test window (T)



Invalid: no bands appear on the test (T) or control (C) windows

Treatment of Uncomplicated malaria

Treatment should be given to those patients where the diagnosis of malaria has been confirmed by a Rapid Diagnostic test or positive slide for malaria. This is to safeguard against high costs of treating those who do not need the anti-malarial drugs and possible subsequent development of resistant parasites in the community. Confirmation of the diagnosis of malaria also safeguards against giving the patient the wrong treatment.

First line treatment of simple uncomplicated malaria is Artemether-lumefantrine (*Coartemether)*
Each tablet of co- formulated Coartemether contains artemether 20mg and 120mg lumefantrine.

Treatment schedule for Coartemether: children >5kg (above 6 months and Adults)

Weight in Kilograms	Age in Yrs	Dosage (Number of tablets taken Orally)					
		Day One			Day Two	Day Three	
		STAT DOSE	AFTER 8 HOURS	AM	PM	AM	PM
5-14	6 months-3yrs	1	1	1	1	1	1
15-24	>3-8	2	2	2	2	2	2
25-34	9-14	3	3	3	3	3	3
>35 and Adults	>14	4	4	4	4	4	4

- Do not give Coartemether to children below 5kg as its safety in these patients has not been established(*see under treatment of special groups- infants below 5kg on page 9).*
- Coartemether is taken twice a day for three days (Total of 6 doses).
- Always ensure that a full course of three days (6 doses) is taken even if the patient is feeling better.
- If the initial dose (stat dose) of Coartemether is vomited within 30 minutes repeat the dose.
- ***If vomiting is persistent treat as severe malaria***
- To ensure compliance it is desirable to give the initial dose (stat dose) as a Directly Observed Therapy (DOT).
- If there is no improvement after 48 hours change to second line treatment for uncomplicated malaria (*see under second line treatment on page 7-8).*
- If there is reappearance of signs and symptoms suggestive of malaria within 14 days, after the patient initially recovered, transfer to a centre where there is microscopy for treatment with second line.

Second line treatment of uncomplicated malaria in Adults is Oral Quinine with doxycycline or clindamycin

Each Quinnine tablet contains quinine sulphate 300mg
Doxycycline is 100mg per tablet.
Clindamycin is 150mg per tablet.

Treatment schedule for second line therapy: Adults

DRUG	DOSE	DOSING FREQUENCY	TREATMENT DURATION
Quinine Tablets	600mg	Every 8 hours	7 Days
Doxycycline tab or	100mg	Once daily	7 days
Clindamycin tab	300mg	Every 8hrs	7days

- If for any reason Quinine is given as monotherapy (without doxycycline or clindamycin) it should be given for a total of seven days.
- Doxycycline is contraindicated in children below age of 8 years and in pregnant women.

- Clindamycin is used in place of doxycycline in pregnancy during the first trimester .*(see under treatment in special groups- uncomplicated malaria in pregnancy on page 8)*

Second line treatment for Children is Oral Quinine ALONE given for total of seven days

Treatment schedule for second line therapy: Children

DRUG	DOSE	DOSING FREQUENCY	TEATMENT DURATION
QUININE (Oral)	10mg per Kg body weight	Every 8 hours	7 days

TREATMENT IN SPECIAL GROUPS

Uncomplicated malaria in infants not eligible for treatment with Coartemether

Treatment of infants under 5kg body weight

INFANTS UNDER 5KG BODY WEIGHT			
DRUG	DOSE	DOSING FREQUENCY	TREATMENT DURATION
QUININE (Oral)	10mg per Kg body weight	Every 8 hours	7 days

Uncomplicated malaria in pregnancy

TRIMESTER/APPROXIMATE GESTATION								
1st trimester-before quickening		**2nd and 3rd trimester –after quickening**						
Drug		Drug	DAY1		DAY2		DAY 3	
			STAT	After 8 hrs	AM	PM	AM	PM
Quinine tab	600mg every 8 hrs for 7 days	Coartemether (No. Of tablets)	4	4	4	4	4	4
Clindamycin tab	300mg every 8hrs for 7 days							

SUPPORTIVE THERAPY

Supportive therapy appropriate for age to relieve symptoms such as headache, fever and nausea may be given in addition to the above anti-malaria drugs. Take note that drugs such as aspirin may not be appropriate in children; however Paracetamol or paediatric formulations of Ibuprofen can be prescribed. Consult ***EDLIZ*** for further information. Physical means such as tepid sponging and fanning may be useful for pyrexial children as they are more likely to develop febrile convulsions.

SEVERE MALARIA

The mortality of untreated severe malaria is almost 100% and death often occurs within a few hours after admission. It is therefore critical that the diagnosis be made early and treatment instituted as soon as possible. Almost any organ system is affected in severe malaria.

Signs and Symptoms

The presence of at least one of the following indicates severe malaria:

- Hyperpyrexia (temperature greater than 39 degrees)
- Prostration (Inability to sit or stand. Children will also be unable to breastfeed)
- Circulatory collapse (shock, low blood pressure, difficult to feel and rapid pulse)
- Respiratory distress (rapid or difficult breathing)
- Impaired consciousness
- Convulsions/ fits
- Abnormal bleeding
- Jaundice
- Haemoglobinuria ''Coca-cola'' urine

Investigations

The presence of at least one of the following also indicates severity:

- Anaemia (FBC)
  Haemoglobin levels of less that 5.5gm/dL in patients who normally stay in areas of all year round transmission of malaria, and Hb ≤7.5gm in patients who are non immune are significant and require transfusion. The rate of fall of the Hb may be more important than absolute figures on determining transfusion.
- Hypoglycaemia (glucometer, Dextrostix or RBS)
  Glucose levels less than 3.4 mmol/l. Actual blood sugars and glucometres are more accurate than dextrostix.
- Renal impairment (U&Es)
- Hyperparasitaemia (Microscopy)
  Generally patients who stay in moderate to high transmission areas tend to tolerate high parasite counts in their blood. This is however not so in non immune patients or those who stay in low transmission areas as they rapidly progress to severe malaria. A count of ≥10% for patients who stay in moderate to high transmission areas and ≥5% for those in low transmission areas is generally accepted as hyperparasitaemia.
- Acidosis (Arterial blood gases or plasma lactate)
- Pulmonary oedema (CXR)

It is important to realise that the frequency of occurrence of these severe features differ between children and adults. These differences are shown in Tables 1 and 2 below:

Table 1 Frequency of severe clinical manifestations in children and adults.

	Children	Adults
Prostration	+++	+++
Impaired consciousness	+++	++
Respiratory distress	+++	+
Multiple convulsions	+++	+
Circulatory collapse	+	+
Pulmonary oedema	+/-	+
Abnormal bleeding	+/-	+
Jaundice	+	+++
Haemoglobinuria	+/-	+

Table 2 Frequency of severe manifestations (laboratory features)

	Children	Adults
Severe anaemia	+++	+
Hypoglycaemia	+++	++
Acidosis	+++	++
Hyperlactataemia	+++	++
Hyperparasitaemia	++	+
Renal impairment	+	+++

Warning signs in children under 5 years

The following are particularly important signs of severity in children:

- Hyperpyrexia
- Unable to drink or breastfeed
- Persistent vomiting
- Unable to sit or stand
- Fits or convulsions
- Lethargy or unconsciousness

Treatment of Severe Malaria

Severe malaria is a medical emergency. A rapid assessment should be done and treatment commenced promptly. The following are important aspects of initial management:

Secure airway in unconscious patients and assess breathing and circulation

- Detailed clinical examination. The coma scale should be recorded as appropriate. The Glasgow coma scale in adults and the Blantyre coma score in children should be used *(see annexure 1 for coma scales)*.
- Recording the coma scale provides a benchmark for subsequent assessment of neurological improvement.
- Weigh the patient. Fully grown adults who are unable to stand are estimated to be 60kg for purposes of administering Quinine.
- An intravenous line should be established.
- Check the glucose level immediately; (glucometer or dextrostix)
- Also take blood for HB, microscopy for parasitaemia and check renal function.
- A lumbar puncture should be done in unconscious patients.
- Blood culture
- Commence intravenous fluids and administer according to fluid balance status. Remember that over-enthusiastic fluid replacement can be harmful.
- Commence Quinine following the regimens shown in Table 3 below.

Table 3: Dosage for Intravenous Quinine

CHILDREN IV DOSE	**ADULTS IV DOSE**
Loading Quinine 20mg/kg diluted in 10mls/kg body weight Normal Saline or 5% Dextrose over 4	Loading Quinine 20mg/kg body weight diluted in 500mls Normal Saline or 5% Dextrose water

hours	over 4 hours
<u>After 8 hours</u> Quinine 10mg/kg body weight diluted in10mls/kg weight Normal saline or 5% Dextrose water over 4 hours	<u>After 8 hours</u> Quinine 10mg/kg body weight diluted in 500ml Normal saline or 5% Dextrose water over 4 hours
<u>Repeat Doses</u> Quinine 10mg/kg diluted in 10mls/kg of Normal saline or 5% Dextrose water every 8 hours. Each dose given over 4 hours until patient is able to take orally to complete 7 days.	<u>Repeat Doses</u> Quinine 10mg/kg body weight diluted in 500mls Normal saline or 5% Dextrose water every 8 hours. Each dose is given over 4 hours until patient is able to take orally to complete 7 days.

Note: *Do not give a loading dose of quinine if the patient has been taking quinine in the preceding 24 to 48 hours. This also applies if the patient has been on mefloquine prophylaxis.*

Avoid using IV infusion of quinine in young children as pre referral treatment at the local health centre because monitoring of fluid balance may be inadequate in addition to tendency to develop hypoglycaemia.

- In children, give maintenance fluids in between the Quinine infusions using ½ DD (2.5% or 5%), infused at a rate of 5mls per KG body weight per hour.
- In adults alternating Normal saline with 5% dextrose (125mls/hr) i.e. 1litre eight hourly will provide sufficient fluids for maintenance.
- Monitoring for hypoglycaemia should be done every 4 hours and managed appropriately. If the blood sugar is less than 3.4mmol/litre give 20mls of 50% dextrose.
- In children use 25% dextrose that is made by diluting 50% dextrose with water for injection in the ratio of 1:1 and give 2mls/kg of the 25% solution.
- Once the patient is able to take oral medication, doxycycline 100mg daily where appropriate or clindamycin 300mg TDS should be given for seven days.

DRUG INFORMATION /POTENTIAL ADVERSE EFFECTS OF DRUGS USED IN TREATMENT OF MALARIA

Artemether + Lumafantrine (Coartemether)

Coartemether is generally well tolerated. It may cause the following minor side effects: Abdominal pain, nausea and vomiting, sometimes diarrhoea. Headache and dizziness may also occur. Unfortunately most of these symptoms are also associated with malaria, making it difficult to differentiate side effects from the actual disease. Coartemether is well absorbed when taken with a fatty meal e.g. glass of milk.

Quinine
The commonest side effect of quinine is tinnitus associated with muffled (reduced) hearing that is reversible on completion of the treatment. In addition there may be dizziness with vertigo resulting in nausea and sometimes vomiting. The above side effects usually set in within 2 to three days of treatment and there is no need to discontinue treatment. Hypoglycaemia is a recognised side effect particularly in the severely ill patients requiring intravenous quinine. Hypotension may ensure after excessive or rapid infusion. Cardiotoxicty causing dysrythmias is uncommon but can occur in patients who were on mefloquine for prophylaxis.

Doxycycline
Doxycycline may cause a photosensitive dermatitis in some patients. Abdominal discomfort, anorexia and vomiting may occur. Doxycycline should not be prescribed to pregnant women and children less than 8 years of age as it causes dental discolouration.

Clindamycin
Clindamycin should be discontinued if a patient develops diarrhoea after commencing treatment (this may progress to life threatening antibiotic associated pseudomembranous colitis). Abdominal discomfort, nausea, anorexia and vomiting may also occur but does not warrant discontinuation of treatment unless very severe. Mild skin rash is unimportant but progression to erythema multiforme may rarely occur.

PREREFERRAL TREATMENT

Introduction

Rapid and effective treatment of Malaria is very important to prevent long standing disability or death. Patients with severe malaria can rapidly deteriorate if treatment to reduce the level of parasitaemia is not quickly instituted. This is particularly so in those who stay far from health centres were anti-malaria injectables can be given. Deterioration from fever and subtle early symptoms of severe malaria to severe complicated disease with CNS involvement can occur within hours especially in the non-immune, in pregnancy and young children.

Pre-referral treatment at community level

When a patient presents with signs and symptoms of severe malaria as a referral from the community health worker he/she may have been given rectal artesunate if they were unable to take any medication orally and time to get to the referral centre was more than 6 hours.

- **Rectal artesunate is given as follows**:

  The dose of rectal artesunate is 10mg per Kg Body weight.

- Where the weight of the patient is not immediately known use the table below:

AGE	ARTESUNATE DOSE	ROUTE
6 months-1 YEAR	50MG STAT	PER RECTUM
>1 -3 YEARS	100MG STAT	PER RECTUM
>3 -5 YEARS	200MG STAT	PER RECTUM
>5-13 YEARS	300MG STAT	PER RECTUM
14-15 YEARS	400MG STAT	PER RECTUM
≥16 YEARS	600MG STAT	PER RECTUM

The weight of patients above 16yrs and all fully grown up adults has been assumed to be an average of 60kg. When artesunate is given according to known body weight do not exceed 1200mg.

- Do not give rectal artesunate to children weighing less than 5kg (less than 6 months).
- Artesunate suppositories come in doses of 50mg, 100mg and 400mg per suppository.
- To get to the required dose, 1 or more suppositories can be given in combination to get to the total dose required being considerate not to exceed three suppositories.
- If the suppository is expelled within 30 minutes, the dose should be repeated by insertion of another suppository.
- In children the buttocks can be held together for ten minutes to ensure retention.
- Once the rectal artesunate has been given the patient is immediately referred to the nearest health centre for further management without further delay.

PRE-REFERRAL TREATMENT AT THE PRIMARY HEALTH CENTER

- All severe cases of Malaria should be referred to hospital for further treatment.
- After a positive RDT also make a blood slide and label it with the patient's name and date, both sets to accompany the patient to hospital.
- **IN ADULTS** administer quinine in any one of the following ways :

  1. IM quinine loading dose of 10mg per Kg body weight given every 4 hours for 3 doses then 10mg per Kg body weight given 8 hourly. The usual dose frequency for IM quinine is every 8 hours but to enable quick attainment of therapeutic blood levels the patient is loaded by giving the first three doses every 4 hours.

2. IV quinine loading dose of 20mg per Kg body weight diluted in 500ml of Normal saline or 5% dextrose water infused over 4 hours. Do not exceed 1200mg of loading dose. After 8 hours subsequent doses should be administered at 10mg per Kg body weight diluted in Normal Saline or 5% dextrose water.

- **IN CHILDREN** administer quinine in the following way :

1. IM quinine loading dose of 10mg per Kg body weight given every 4 hours for 3 doses then 10mg per Kg body weight given 8 hourly. The usual dose frequency for IM quinine is every 8 hours but to enable quick attainment of therapeutic blood levels the patient is loaded by giving the first three doses every 4 hours.

Intra muscular quinine can be an irritant causing abscess formation if given without dilution. Properly dilute 2ml of quinine injection 300mg per ml with 8 ml of water for injection to give a 10 ml solution of quinine 60mg per ml.

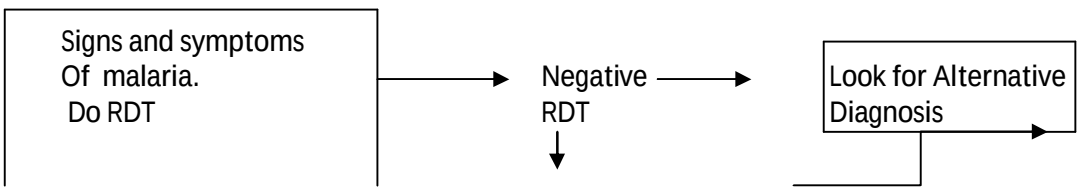
It is advisable to divide the volume between two injection sites (both anterior thighs) particularly in children.

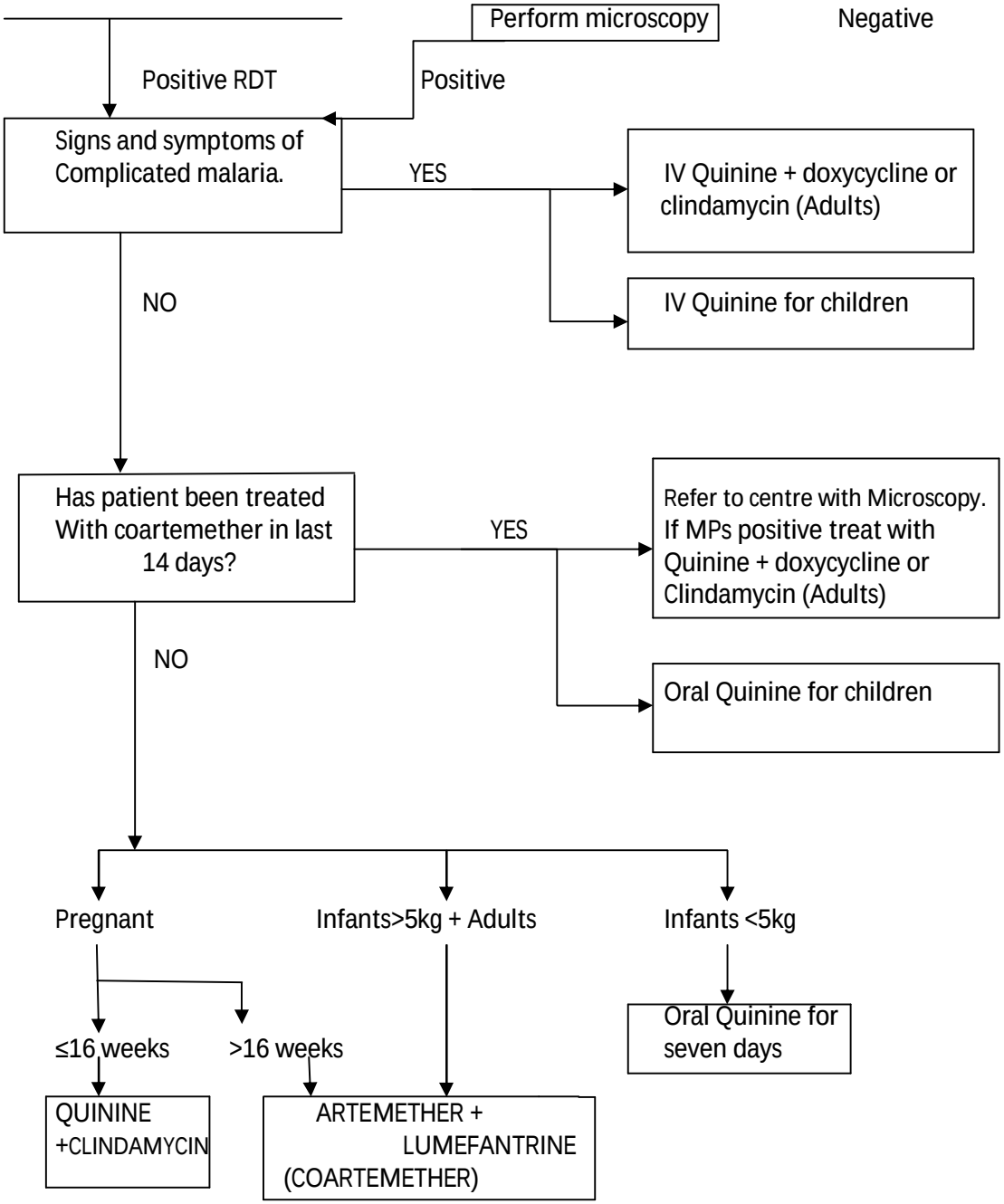
Additional Supportive measures for patients with severe malaria

- Maintain airway by appropriately positioning the patient in a left lateral position with the chin extended if patient is in a coma or convulsing. Administer oxygen if available. Patients with pulmonary oedema should be propped up and given IV diuretics.
- Give IV 50% dextrose water for hypoglycaemia in children as 1ml 50% dextrose per Kg body weight diluted 1:1 with water for injection. This can also be given orally or via nasogastric tube if IV access is not readily secured. Where the child is still able to; continue to breastfeed.
- Parenteral anti-emetics can be administered in adults with persistent vomiting.
- Address hyperpyrexia through physical means such as tepid sponging and fanning. Antipyretics such as Paracetamol may be given where appropriate.
- Where available treat convulsions with either intravenous or rectal diazepam.

A CLEAR LEGIBLE REFERRAL LETTER STATING THE DATE, NAME OF PATIENT, BRIEF HISTORY, DIAGNOSIS AND THE PRE REFERRAL TREATMENT GIVEN SHOULD ACCOMPANY THE PATIENT TO THE NEXT LEVEL OF CARE. COMPLETE THE MALARIA REFERRAL FORM (see annexure 2)

Flow chart showing guidelines for the treatment of malaria





ANNEXURE 1

GLASGOW COMA SCALE

Response	Score
Eye opening	
• ***Opens eyes spontaneously***	**4**
• ***Opens eyes in response to speech***	**3**
• ***Opens eyes to painful/noxious stimuli***	**2**
• ***Does not open eyes in response to any stimuli***	**1**
Motor response	

• ***Follows commands***	**6**
• ***Localised movement in response to painful stimuli***	**5**
• ***Non purposeful movement in response to painful stimuli***	**4**
• ***Flexes upper limbs and extends lower limbs to painful stimuli***	**3**
• ***Extends all limbs in response to painful stimuli***	**2**
• ***No response to any painful/noxious stimuli***	**1**
Verbal response	
• ***Coherent speech***	**5**
• ***Converses but speech incoherent, may be confused***	**4**
• ***Replies with inappropriate words***	**3**
• ***Makes incomprehensible sounds***	**2**
• ***No verbal response***	**1**

- Normal score is 15
- A score that is less or equal to 8, the patient is considered to be comatose

BLANTYRE COMA SCALE (*for use in preverbal young children)*

Response	Score
Eye movement	
• ***Watches or follows (e.g. mother's face or interesting object)***	**1**
• ***Fails to watch or follow***	**0**
Best motor response	
• ***Localises painful stimuli (blunt pressure on sternum or supraorbital Ridge)***	**2**
• ***Withdraws limb from pain (horizontal pressure with pencil on nail Bed of finger or toe)***	**1**
• ***No response***	**0**
Best verbal response	
• ***Cries appropriately***	**2**
• ***Moan or abnormal cry with painful stimuli***	**1**
• ***No vocal response to painful stimuli***	**0**

- A score of 0 -3 is bad, i.e. the child is seriously ill.
- A score of 5 is Good/Normal

REFERENCES

Guidelines for the treatment of malaria; 2006 **World Health Organisation**

Gomez MF, Fiaz MA, Gyapong JO, Warsame MD, Agbenyega T, Babiker A. Pre-referral rectal artesunate to prevent death and disability in severe malaria: a placebo-controlled trial; *Lancet Feb 2009; 373:557*

World Health Organisation 2007. Artemisinin-based suppositories; Use of rectal artemisinin-based suppositories in the management of severe malaria: *Report of WHO informal consultation*

Simpson JA, Agbenyega T, Barnes KI, Di Perri G, Folb P, et al. Population pharmacokinetics of artesuante and dihydroartemisinin following intra –rectal dosing of artesunate in malaria patients; *PLoS Med 2006;3(11) e 444*

Makanga M, Premji Z, Falade C, Karbwang J, Mueller EA, Andriano K, Hunt P, De Palacios PI. Efficacy and safety of the six dose regimen of artemether-lumefantrine in paediatrics with uncomplicated Plasmodium falciparum malaria: a pooled analysis of individual patient data; *Am J Trop Med Hyg; 74(6): 991-8*

ZEDAP MOH&CW 1997. Management of Malaria; Malaria Module

Essential Drug List of Zimbabwe; 5th Edition 2006

Sinclair D, Babalwa Z, Donegan S, Olliaro P, Garner P: Artemisinin based combination therapy for treating uncomplicated malaria; *Cochrane database of systematic reviews: 2009:issue 3. Art NO CD007483. DOI 10.1002/14651858.CD007438.pub2*

Staedke SG, Mwebaza N, Kamya MR, Clark DT, Dorsey G, Rosenthal P, Whitty CJ. Home management of malaria with artemether-lumefantrine compared with standard care in urban Ugandan children: a randomised controlled trial; *Lancet 2009; 373: 1623-31*

Paracheck® Rapid Test for P. Falciparum Malaria; *Orchid biomedical systems*

Medical Laboratory & Clinical Scientists Council of Zimbabwe: Paracheck PF Rapid diagnostic Test for Plasmodium Falciparum Malaria; *Evaluation report*

Ward SA, Esperanca JP, Hastings I. Nosten F, MacGready R. Antimalarial drugs and pregnancy: Safety, Pharmacokinetics, and pharmacovigilance; *The Lancet Inf Ds 2007; 7: 136-144*

Nosten F,MacGready R, Mutabingwa T. Case management of malaria in pregnancy (Review); *The Lancet Inf Ds 2007; 7: 118-125*