REPUBLIC OF RWANDA

MINISTRY OF HEALTH

NATIONAL INTEGRATED MALARIA CONTROL GUIDELINES

Rwanda Biomedical Centre

Healthy People, Wealthy Nation

Edition 2020

National Integrated Malaria Control Guidelines

Edition 2020

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List of Abbreviations

ACT	Artemisinin-based Combination Therapy
AL	Artemether Lumefantrine
ANC	Ante-Natal Care
AQL	Acceptance Quality Limit
SBCC	Social Behavior Change Communication
CDC	Center for Disease Control
CHAN	African Nations Championship
CHW	Community Health Worker
CPDS	Coordinated Procurement and Distribution System
DHS	Demographic and Health Survey
EPI	Expanded Program on Immunization
EQA	External Quality Assurance
FY	Fiscal Year
GF	Global Fund
GoR	Government of Rwanda
HBM	Home Based Management
HBMA	Home Based Management in Adults
HHs	Households
HMIS	Health Management Information System
HSSP III	Third Health Sector Strategic Plan
ICCM	Integrated Community Case Management of Malaria
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Net
IVM	Integrated Vector Management
LLINs	Long-Lasting Insecticide Nets
LSM	Larval Source Management
MCHIP	Maternal and Child Health Integrated Program

MCP	Malaria Contingency Plan
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government
MIP	Malaria In Pregnancy
MIS	Malaria Indicator Survey
MoH	Ministry of Health
MOPDD	Malaria and Other Parasitic Diseases Division
MPPD	Medical Procurement and Provision Division
MSP	Malaria Strategic Plan
MTEF	Mid-Term Expenditure Framework
NRL	National Reference Laboratory
NSP	National Strategic Plan
NTD	Neglected Tropical Diseases
PCR	Polymerase Chain Reaction
PMI	President's Malaria Initiative
PSM	Procurement and Supply chain Management
PW	Pregnant Women
QC	Quality Control
QMIA	Quality Management Improvement Approach
RAB	Rwanda Agriculture Board
RBC	Rwanda Biomedical Center
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
REMA	Rwanda Environment Management Authority
RSB	Rwanda Standard Board
SBCC	Social Behavior Change Communication
SOP	Standard Operating Procedure
TWG	Technical Working Group
UC	Universal Coverage
ULV	Ultra-Low Volume
WHO	World Health Organization
WHOPES	WHO Pesticides Evaluation Scheme

Preface

Since establishing the Malaria Contingency Plan in 2016, the Ministry of Health has made significant progress in health indicators including a reduction in overall child mortality and reductions in the incidence of malaria and other infectious diseases. Achievements in the Rwanda health sector are the result of innovative practices including implementation of evidence-based interventions for the control of infectious disease, expansion of community-based care, introduction of initiatives to increase access to community health insurance, use of performance-based financing, and others. These groundbreaking innovations have been implemented with the intention to improve access to quality health care through the delivery of effective and efficient health services.

In Rwanda, the epidemiological pattern of malaria has changed over the last few years with more than 50% decrease in severe malaria and malaria-related mortality compared to 2016. Severe malaria cases decreased from 10,748 severe malaria cases in FY2017/2018 to 7,035 severe malaria cases in 2018/2019. Similarly, malaria case fatality rates declined from 17 deaths per 100,000 malaria cases in FY2015/2016 to 7 per 100,000 in FY2018/2019. This reduction in severe cases and fatality rates is inversely related to the proportion of cases diagnosed and treated at the community level, which increased from 13% to 57% in 2015-2016 and 2018-2019, respectively, indicating that community care allows for earlier detection and treatment of malaria thus avoiding more severe cases and preventing deaths. Malaria incidence has also reduced by 23% from 418 per 1,000 people in 2016-2017 to 321 per 1,000 in FY 2018/2019. From July 2018 to June 2019, at total of **3,969,881** uncomplicated malaria cases were reported and treated representing a 14.6% decrease in cases from FY 2017/2018. Notably, according to the MIS 2017, more than 11% of malaria prevalence occurs in people of 5-14 years.

Despite this progress, Rwanda continues to face a significant malaria burden in endemic areas. For this reason, it is very important that the National Guidelines for the treatment of malaria in Rwanda serves as the standard by which quality care is delivered and provides indicators by which quality can be assessed.

Through the use of proven methods for prevention, diagnosis and treatment of malaria, these guidelines bring together current knowledge essential for health care providers to deliver evidence-based services for malaria patients at all levels of the health system. This updated version introduces a strategy of administering artesunate suppositories for pre-transfer treatment of severe malaria among children. This change was made to prevent complications from severe malaria and address challenges when moving patients from the Health Facility level to District Hospitals.

This edition of the National Guidelines for the treatment of malaria in Rwanda is meant to be used at all levels of healthcare, both in the public and private sectors, throughout the country, and will guide healthcare professionals in their treatment choices. This is a comprehensive document, designed to serve as a clinical guide as well as an educational tool for health professionals. I believe that it will bring us closer to ensuring the proper management of all patients suffering from malaria throughout Rwanda in a manner that is evidence based, standardized, high quality and cost-effective.

Executive Summary

The National Guidelines for the treatment of malaria in Rwanda provides up-to-date, WHO – recommended practices aligned with the Rwanda national malaria control strategies for all health facilities on malaria diagnosis and treatment. The guidelines cover the diagnosis and treatment of uncomplicated and severe malaria for all malaria types.

The first edition of National Guidelines for the treatment of malaria in Rwanda was published in 2006 and recommended using artemisinin-based combination therapy (ACTs) in conformity with WHO guidelines. Rwanda introduced ACTs with artemether-lumefantrine (AL) as the first-line treatment of uncomplicated malaria

The second edition introduced the recommendation of a parasitological laboratory test to diagnose malaria in all malaria suspect cases and a requirement for testing to confirm malaria before treatment was initiated. A new classification of malaria was also established in addition to the traditional "simple malaria" and "severe malaria."

The third version of the national treatment guidelines introduced artesunate for the treatment of severe malaria. It also highly recommended renewed focus on compulsory laboratory diagnostic testing for all malaria cases including severe malaria in all age groups. It also defined the new classification as "simple malaria with minor gastrointestinal symptoms" which took into consideration the clinical experiences of health care providers.

This fourth edition introduces the use of rectal Artesunate during pre-referral for severe malaria cases in children from 6 months to 6 years at the community level. It also introduces the real time notification of severe malaria and stock status by community health workers through RapidSMS. The introduction of Fludora Fusion 56.25WP for the Indoor residual spraying, the G2 and PBO LLINs was an additional change to these guidelines. Malaria must be confirmed by laboratory test: Blood smear by identifying species and densities at healthy facility level.

Recommended revised dose of parenteral Artesunate in young children weighing <20kg to receive a higher dose of Artesunate(3mg/kg bw per dose) than larger children and adults(2.4mg/kg bw per dose) to ensure equivalent exposure to the drug.

In revising the guidelines, comments and observations made by the health care providers during their training or during their day-to-day work have been taken into consideration.

This revised and simplified manual aims to improve the quality of malaria care in Rwanda by serving as a guide for staff working in health facilities for the management of malaria in adults, pregnant women and children.

Foreword

The Ministry of Health and Rwanda Biomedical Center (RBC) would like to take this occasion to express its deep appreciation and sincere thanks to everyone who contributed to the compilation of the edition 2020 of the Rwanda Integrated Malaria Control Guidelines.

We thank you all for your support in the fight of eliminating Malaria in Rwanda.

Dr. Daniel NGAMIJE
Minister of Health

PURPOSE AND SCOPE OF THE NATIONAL GUIDELINES

The purpose of these guidelines is to to serve as a guide for health workers at all level of health care in reducing morbidity and mortality due to malaria in Rwanda. The National Guidelines for malaria will be used at all levels of healthcare, both in the public and private sectors. Further, these guidelines apply countrywide and hold specific content for high burden districts.

The MoH through Rwanda Biomedical Center (RBC) is responsible for managing medical technology and infrastructure, including management and implementation of all policies related to malaria control in Rwanda.
Any update or change to these guidelines whether initiated by the MoH, health facility (private or public) or any other third party should be coordinated by the MoH to ensure all policies are followed.

TARGET AUDIENCE

These guidelines are intended for use across all health facilities down to the community level including health professionals (doctors, nurses, pharmacists, clinical officers, community health workers, etc.). Management at central level, data managers, and other public health/ policy professionals working on malaria control in hospitals, research institutions, and non-governmental organizations will find it a useful reference.

Part one:

MALARIA
CASE MANAGEMENT

1. DEFINITION AND CLASSIFICATION OF MALARIA CASES

1.1. Simple and/or Uncomplicated Malaria

This is an illness characterized by axillary temperature higher or equal to 37.5 °C (hot body) or history of fever in the last 24 hours with or without the following signs: headache, weakness, chills, loss of appetite, stiffness, joints pain and muscular pains. The parasitological confirmation of Plasmodium by either blood smear or rapid test is compulsory without any exception. Signs of severity and other illnesses must be looked for and excluded systematically.

1.2. Simple Malaria with Minor Digestive Symptoms

An illness characterized by signs of simple malaria where the patient additionally has vomiting prevents oral medication with or without associated moderate diarrhea. The parasitological confirmation of Plasmodium by either blood smear or rapid test is compulsory without any exception. Signs of severity and other illnesses must be looked for and excluded systematically.

1.3. Severe Malaria

Severe malaria is characterized by positive plasmodium parasitaemia, accompanied by one or more of the following signs of severity as per table 1 below. Signs of severity and other illnesses must be looked for and excluded systematically

Table 1: Danger Signs and Symptoms of Severe Malaria

Sign	Definition/ Clinical Manifestation
Pediatric Danger Signs	Inability to drink or suckle; Vomiting everything; Convulsions (at least 2 in 24 hours); Lethargy and unconsciousness
Impaired Consciousness	Glasgow coma score <11 in adults or a Blantyre coma score <3 in children
Prostration	Generalized weakness where the person is unable to sit upright, stand or walk without assistance
Acidosis	Base deficit of >8 mEq/L or, if not available, a plasma bicarbonate level of <15 mmol/L or venous plasma lactates at 5 mmol/L Severe acidosis manifests clinically as respiratory distress (rapid, deep, labored breathing)
Hypoglycemia	Blood or plasma glucose <2.2 mmol/L (<40 mg/dL)
Severe malaria anemia	In children under 12 years of age, hemoglobin concentration ≤5 g/dL or a hematocrit of ≤15% with a parasite count >10,000 parasites/µL with signs of compensation In adults, hemoglobin concentration <7g/dL or a hematocrit of <20% with a parasite count >10,000 parasites/µL with signs of compensation

Renal impairment	Plasma or serum creatinine >265 µmol/L (3 mg/dL) or blood urea >20 mmol/L
Jaundice	Plasma or serum bilirubin >50 µmol/L (3 mg/dL) with a parasite count >100 000 parasites/µL
Pulmonary edema	Acute respiratory distress syndrome, radiologically confirmed or air oxygen saturation <92% with a respiratory rate >30/min in adult, often with chest in drawing and crepitation on auscultation
Significant bleeding	Recurrent or prolonged bleeding from the nose, gums or venipuncture sites; hematemesis or melena
Shock	Compensated shock is defined as capillary refill >3 sec or temperature gradient on leg (mid to proximal limb), but no hypotension Decompensated shock is defined as systolic blood pressure <70 mm Hg in children or <80 mm Hg in adults, with evidence of impaired perfusion (cool peripheries or prolonged capillary refill)
Hyperparasitae-mia	*P. falciparum* parasitaemia > 10%

Criteria for severe malaria are marked by the presence of signs of vital distress. This form of malaria is an extreme emergency and requires hospitalization in a district or referral hospital.

2. MALARIA DIAGNOSTIC TESTS

All cases of suspected malaria should have a parasitological test (Microscopy or Rapid Diagnostic Test (RDT)) to confirm the diagnosis.
With the appropriate training, RDTs are simple to use and are sensitive in detecting low parasitaemia. The RDT for *P. falciparum* detects histidine-rich protein 2 (HRP2) & pLDH. Microscopy remains **gold standard** as it allows direct visualization of malaria parasites species and density.
Both microscopy and RDTs should be supported by quality assurance programme.

2.1. In the Community

- Community Health Workers managing malaria cases at Community Level (Binomes) are recommended to use RDTs
- Since the PfHRP2& pLDH -based RDTs are unable to distinguish new malaria infection from recently and effectively treated malaria infection, all patients who come back to the CHW with clinical manifestations compatible with malaria after treatment in the previous month will be referred to the Health Facility for microscopy examination[1]
- ***Quality Assurance of RDTs in community:*** For Community Health Workers, all quality assessment activities for RDTs should be done by direct observation of Community Health Workers' competence in performing an RDT during supervisory visits using a standardized checklist (see Annex18). Supervisory visits should be made routine at a minimum of every 6 months or, if possible, quarterly. Corrective action should be taken during the visit, which might include retraining in blood collection, RDT preparation, and interpretation of the result.

1 RBC, Amahugurwa y`abajyanama b`ubuzima ku buvuzi bw`ibanze bukomatanyije ku ndwara z`abana. February 2017, Kigali.

2.2. At the Health Facility

- Microscopy allowing direct visualization of malaria parasites species and quantification of the density of parasites is recommended as the ***Gold Standard*** of malaria diagnosis
- At Health Facility Level, well-trained Laboratory Technicians will use Microscopy (Blood Smear) to determine malaria parasites, stages of the parasites, quantification and species identification of the parasites.
- RDTs should be recommended for use at health facilities to allow rapid diagnosis when microscopy is not feasible (Absence of Laboratory Personnel, non-availability of microscopy, night duties, lunchtime, workload at HF, mass screening at facility level in case of outbreaks, etc.)
- If the initial blood film examination is negative in patients with manifestations compatible with severe malaria, a series of 2 blood films should be examined at 6-12 h intervals or an RDT should be performed.
- If a patient is referred for severe malaria from a lower level to a higher level of care, the patient`s examined blood film should be sent with the patient for confirmation of diagnosis and to avoid double reporting.
- The BS sent with the patient is re-examined at referral facility laboratory. If negative and the patient received a recent pre-transfer malaria treatment, an RDT should be performed as well (BS is likely to be negative).
- If both blood smear and RDT results are negative, malaria is extremely unlikely, and other causes of illness should be sought and treated.

Microscopy Test Reporting System

Thick and thin blood films for parasite counts should be obtained and examined. The thick blood smear for malaria screening will be used to count the numbers of asexual parasites and white blood cells in a limited number of microscopic fields.
The adequate parasitaemia is at least one parasite for every three white blood cells, corresponding to approximately 2000 asexual parasites per microlitre, for high transmission areas or at least one parasite for every six white blood cells, corresponding to approximately 1000 asexual parasites per microlitre, for low-to-moderate transmission areas.
If more than 500 parasites have been counted before 200 white blood cells have been reached, the count will be stopped after the reading of the last field has been completed.

Parasite density, expressed as the number of asexual parasites per µl of blood, will be calculated by dividing the number of asexual parasites by the number of white blood cells counted and then multiplying by an assumed white blood cell density (typically 6000 per µl).

$$\text{Parasite density (per µl)} = \frac{\text{number of parasites counted} \cdot (6000)}{\text{Number of leukocytes counted}}$$

2.3. At the National Level (National Reference Laboratory)

Although microscopy remains the ***Gold Standard*** diagnostic test for malaria in clinical settings, the Polymerase Chain Reaction (PCR)-based assays can have 100-fold greater sensitivity, useful in the setting of low parasitaemia or subclinical infections. The Rwanda National Reference laboratory is in the process of building capacity on malaria PCR diagnosis mainly for research purpose, but no clinical management uses.

Visual Algorithms for Diagnostics and Next Steps

FIGURE 1: DIAGNOSTIC ALGORITHM FOR MALARIA AT HEALTH CENTER

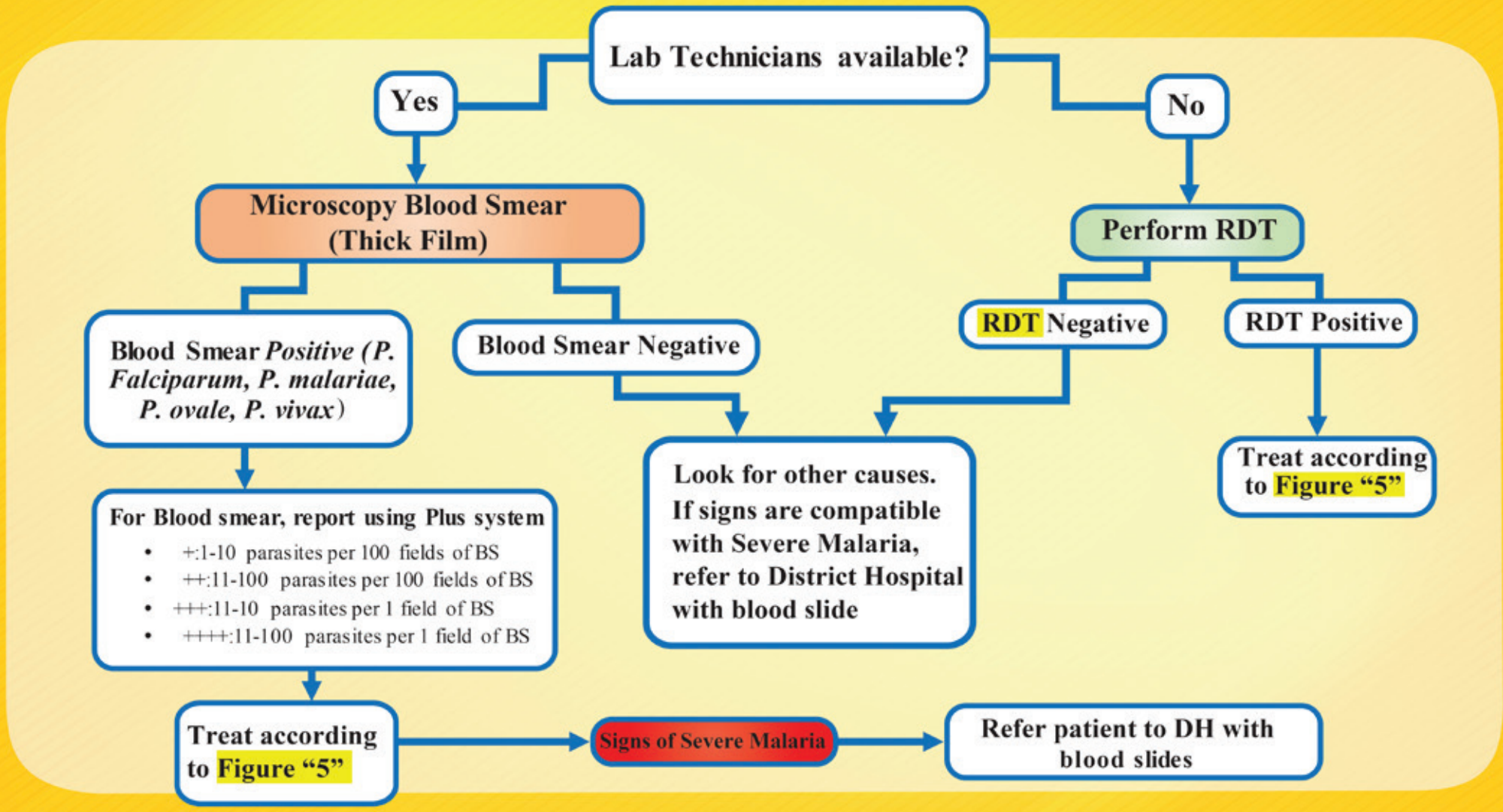


FIGURE 2: DIAGNOSTIC ALGORITHM FOR SUSPECTED MALARIA AT DH, PH, AND RH

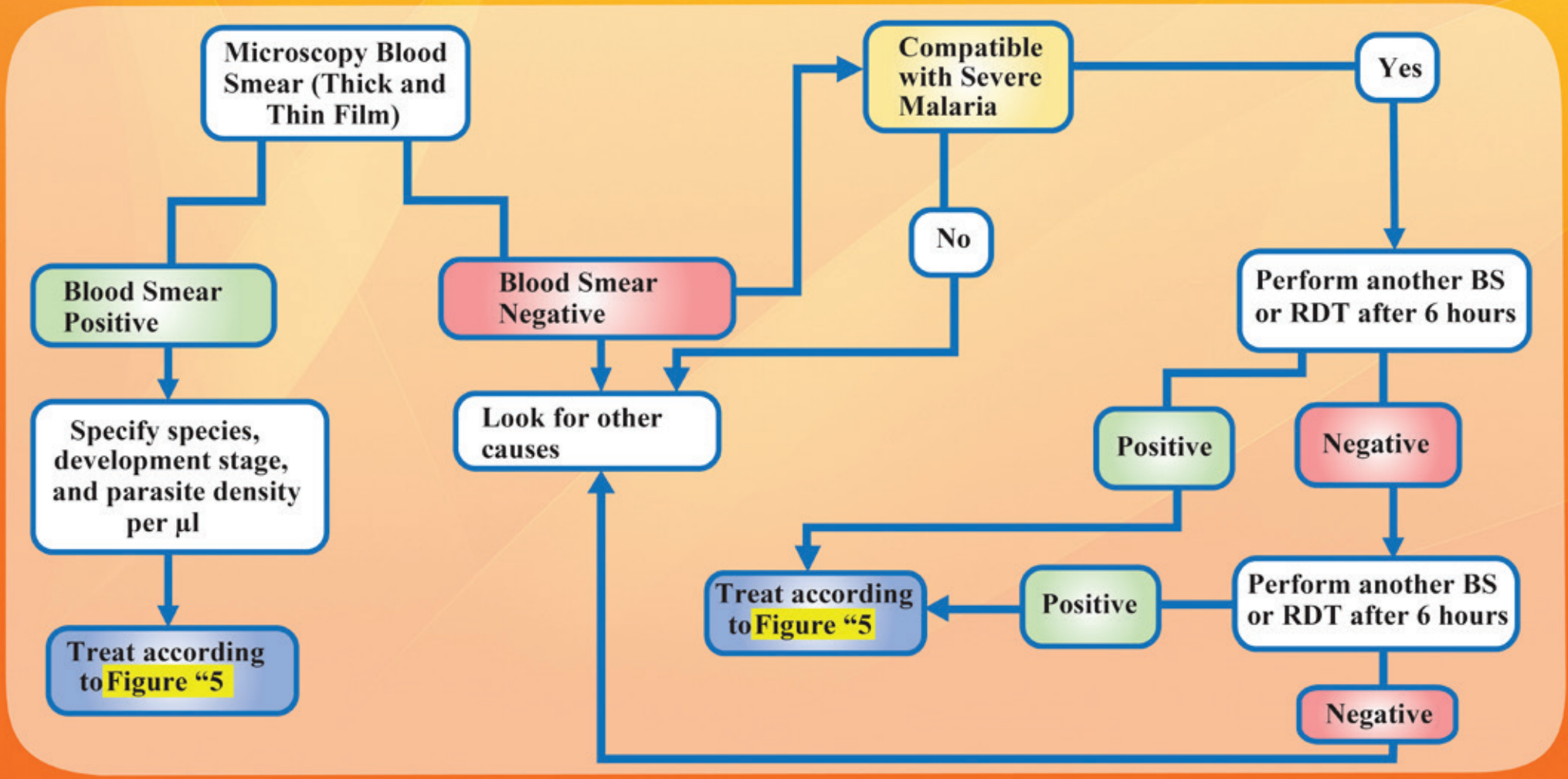


FIGURE 3: DIAGNOSTIC ALGORITHM FOR REFERRAL MALARIA CASES AT DH, PH, AND RH

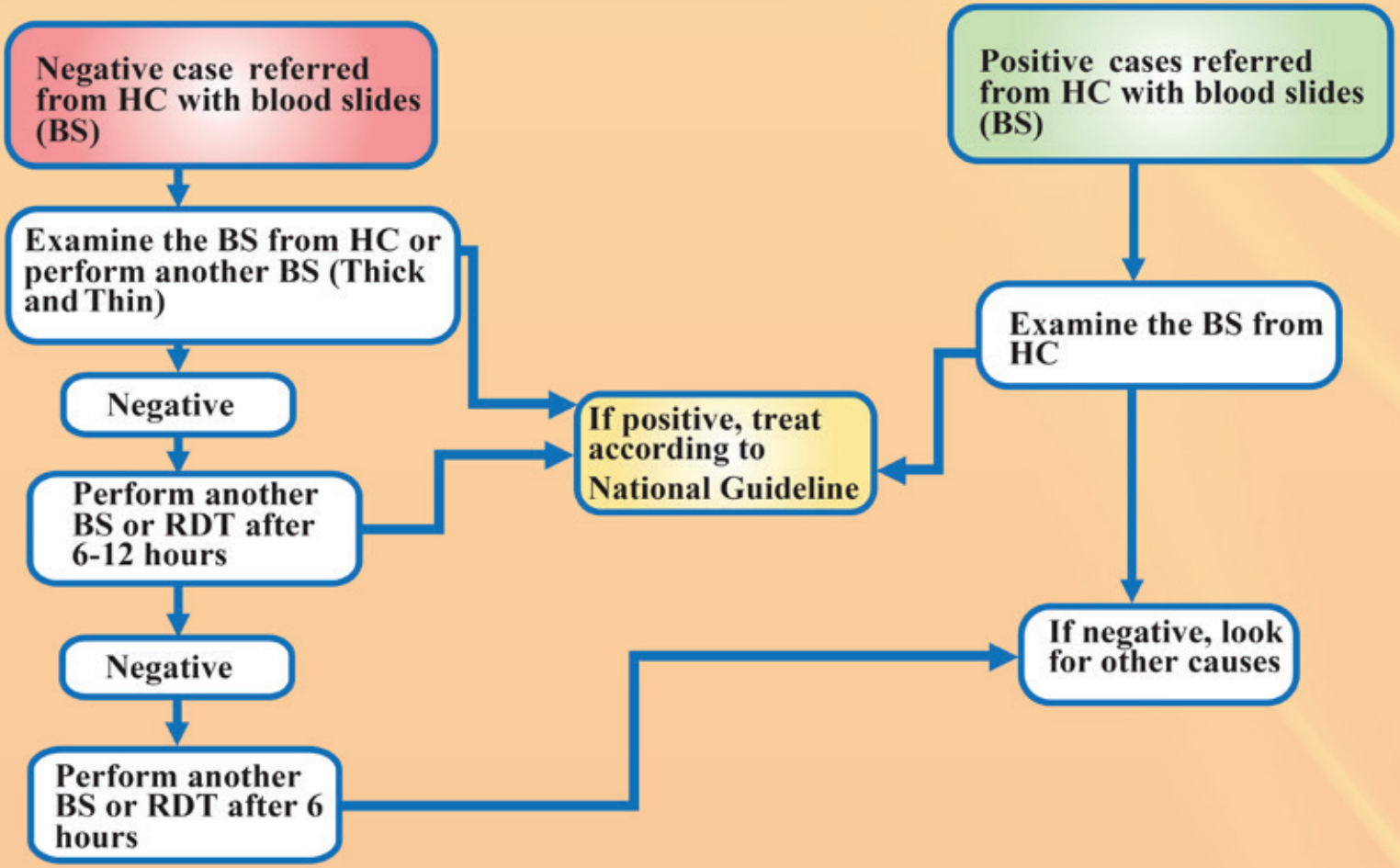
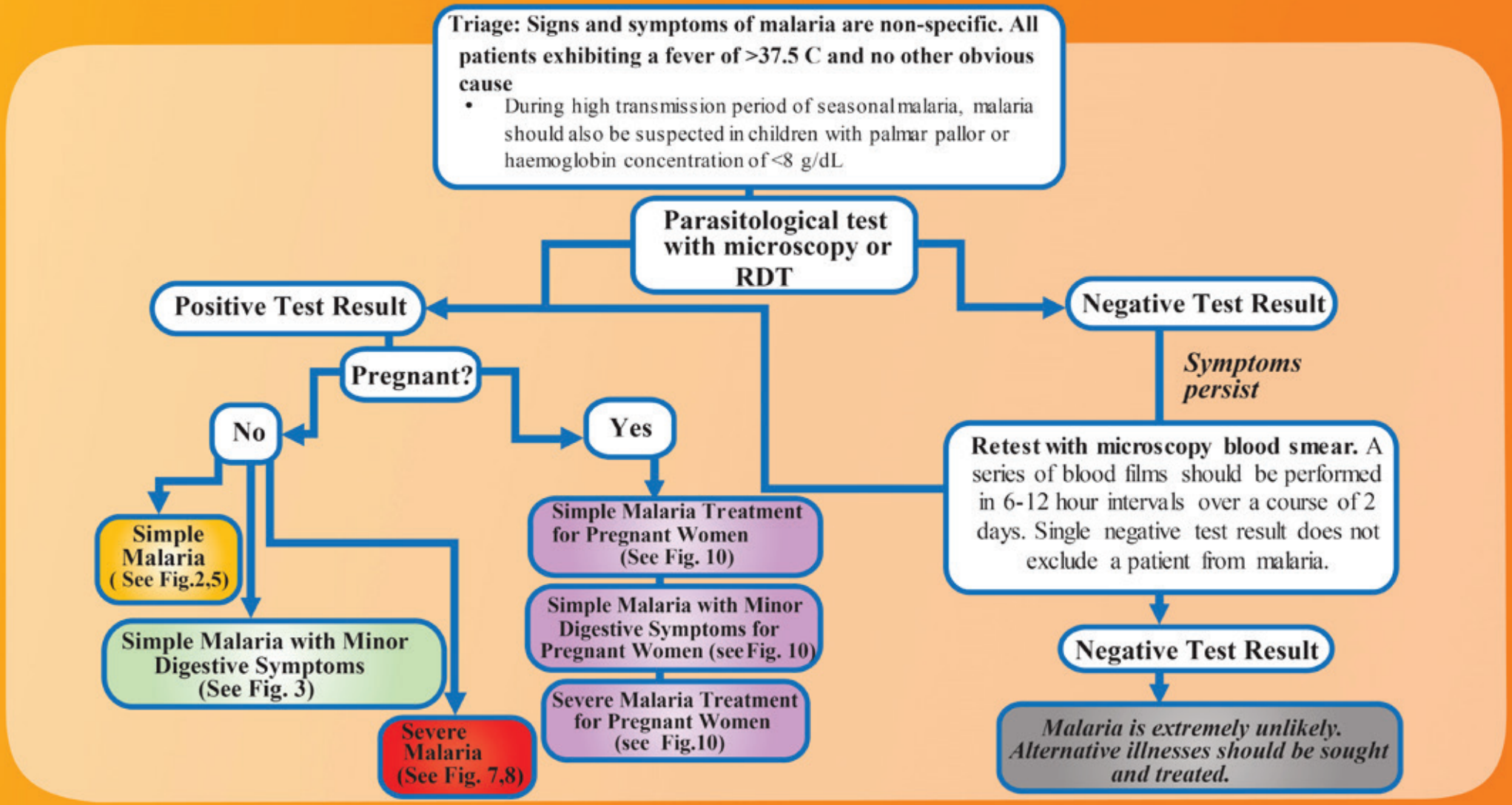


FIGURE 4: ALGORITHM FOR GENERAL PATHWAY OF MALARIA DIAGNOSIS AND TREATMENT AT HC,DH, PH, AND RH



3. TREATMENT AND MANAGEMENT OF SIMPLE MALARIA

3.1. At the Family Level

Amongst the patient's family, emphasis will be made on social behavior change communication. (See Part 5)

- Recognition by the family members of the signs/symptoms of simple malaria, simple malaria with minor digestive symptoms and severe malaria is imperative
- If fever is present, use tepid sponging, remove clothes, bathe with mild warm water
- After reducing fever, seeking care in a timely manner from a community health worker or the nearest health facility

3.2. Community level

The role of the community health worker is to:

- First, confirm malaria diagnosis using a rapid diagnostic test (RDT) and then treat under the framework of home based management of fever (HBMF) or integrated community case management (iCCM), and, if necessary, refer to a health facility.
- The first line of treatment: artemisinin combination therapy (ACT) comprising of Artemether 20mg + Lumefantrine 120mg is administered *only* after obtaining a positive rapid diagnostic test, taken preferably during meals.

  - ***Dispersible Artemether Lumefantrine is available for use in the pediatric age (this formulation will be dissolved in a small amount of water on a spoon). The formulation is used for both 6x1 tablets for infants and children weighing <15 kg body weight (BW) and 6x2 tablets for children weighing 15 to <25 kg body weight.***

- Other causes of fever should be sought systematically according to ICCM algorithm and treated accordingly.
- Transfer patients to nearest Health Center if needed

3.3 Health Center Level

3.3.1 Diagnosis

Prescribe the first line of treatment only after obtaining a positive blood smear or positive rapid diagnostic test in case of emergency or no availability of microscopy. A negative blood smear does not exclude the diagnosis of malaria, so another blood smear should be taken within 12hours, 24 hours. After three consecutive negative blood smear result, other causes of fever should be sought systematically and treated accordingly. In this case, glycaemia and hematocrit/ hemoglobin are recommended.

3.3.2 First Line Treatment

The first line recommended treatment for all malaria positive cases is an **artemisinin combination therapy (ACT) comprising of Artemether 20 mg and Lumefantrine 120 mg**, taken preferably during meals. See Table 3 below for dosage specifications. The ACT is administered orally, twice a day for 3 days.

- *Dispersible artemether is available for use in the pediatric age (this formulation will be dissolved in a small amount of water on a spoon). The formulation is used for both 6x1 tablets for infants and children weighing <15 kg body weight (BW) and 6x2 tablets for children weighing 15 to <25 kg body weight.*

Table 2: ACT Treatment Dosage Timeline and Specifications

Category of body weight of the patient in kg	Arthemether (20mg) + Lumefantrine (120mg) Blisters	Number of tablets of AL per dose					
		Day 1		Day 2		Day 3	
		First dose	8 hours after	24 hours after	36 hours after	48 hours after	60 hours after
< 15 kg	6x1	1	1	1	1	1	1
15 kg to < 25 kg	6x2	2	2	2	2	2	2
25 kg to < 35 kg	6x3	3	3	3	3	3	3
≥ 35 kg	6x4	4	4	4	4	4	4

3.3.3 Second Line Treatment

In case of allergy to artemether and/or lumefantrine in the combination, give a second line ACT: Dihydroartemesinin - Piperaquine (DHAP), with a target of dose(range) of 4 (2-10) mg/kg bw per day dihydroartemisinin and 18(16-27) mg/kg bw per day piperaquine given once a day for 3 days for adults and children weighing >= 25kg. The target doses and ranges for children below 25kg are 4 (2.5-10) mg/kg per day dihydroartemisinin and 24 (20-32) mg/kg bw per day piperaquine once a day for 3 days.

If there is no improvement after 48 hours of treatment with dihydroatemisinin + piperaquine probably due to associated pathologies other than malaria, evaluate and treat or refer the patient to the nearest District hospital or referral hospital.

Table 3: Dosage of Dihydroartemisinin +piperaquine per body weight:

Body weight (kg)	Dihydroartemisinin+ piperaquine dose(mg) given daily for 3 days
5 to <8 Kg	20+160
8 to <11 Kg	30+160
11 to <17 Kg	40+320
17 to <25 Kg	60+480
25 to <36 Kg	80+640
36 to <60 Kg	120+960
60 to <80 Kg	160+1280
>80 Kg	200+1600

3.3.4 Treatment Failure

Treatment failure is defined as failure to achieve the desired therapeutic response after initiation of therapy. Treatment failure should be suspected if a patient deteriorates clinically at any time, or if symptoms persist after initiation of treatment according to the guideline. Treatment failures may result from drug resistance, or inadequate drug exposure (sub-optimal dosing, poor adherence, vomiting, unusual pharmacokinetic properties or substandard medicines).
Treatment failure must be confirmed preferably with microscopy while RDTs is not recommended.
Patients with uncomplicated *P.falciparum* malaria who deteriorate by developing features of severe disease while taking AL should be considered as having severe malaria, admitted to hospital, investigated and treated as appropriate.
If no improvement on AL after 3 days, verify if the patient swallowed the drugs correctly, re-examine the patient carefully and do another peripheral blood smear;

- If the test is **positive**, change the treatment to **oral dihydroartemisinin + piperaquine** (DHAP), with a target of dose(range) of 4 (2-10) mg/kg bw per day dihydroartemisinin and 18(16-27) mg/kg bw per day piperaquine given once a day for 3 days for adults and children weighing >= 25kg. the target doses and ranges for children below 25kg are 4 (2.5-10) mg/kg per day dihydroartemisinin and 24 (20-32) mg/kg bw per day piperaquine once a day for 3 days.
- If the test is **negative,** and AL have been taken correctly and completed in 3 days; exclude and treat other causes of illness and/or refer the patient to the nearest district hospital.

If treatment failure occurs after 28 days, distinction between recrudescence or a new infection can only be made by PCR parasite genotyping of the initial and recurrent infections. As PCR are not routinely used in patient management, all presumed treatment failures after 4 weeks of initial treatment should, from an operational standpoint, be considered new infections and be treated with AL.

Note:

Oral Monotherapy using artemisinin derivatives is not allowed and is banned for the management of simple malaria in Rwanda.

FIGURE 5: SIMPLE MALARIA TREATMENT

Nonspecific Symptoms include:fever, sweats/ chills, malaise, myalgia, headache, diarrhea, cough, minor jaundice.

Simple malaria is a febrile parasitic illness with manifestation of any of the above attributes without the presence of severe malaria symptoms.

Adult/ Child/ Infant

Artemisinin Combination Therapy (ACT) treatment of artemether and lumefantrine with dosage following the adjacent table for 3 days

- **Medication should be taken with meals/ milk**
- **For pediatric administration use dispersible tablet formulation**
- **The second dose of AL should be taken 8 hours afters the first dose**

WHO 2015 Treatment Recomended Dosage based on Weight Class

Weight	*Arthemether (20mg) + Lumefantrine (120mg)*
<15 kg	1 tablet x 2/day
15 kg to <25 kg	2 tablet x 2/day
25 kg to <35 kg	3 tablet x 2/day
≥35 kg	4 tablet x 2/day

NB: The 2nd dose of AL should be taken 8 hours afters the first dose

Supportive Treatment

- If patient cannot tolerate oral treatment, treatment may require parenteral or rectal administration for 1 - 2 days until patient can swallow and retain oral medication
- Paracetamol is recommended over Ibuprofen/ aspirin to reduce fever
- Anti emetics should be used with caution
- Patients, especially children, that have >2 seizures within 24 hours should be treated for severe malaria

Monotherapies are not advised as first line treatment

4. TREATMENT AND MANAGEMENT OF SIMPLE MALARIA WITH MINOR DIGESTIVE SYMPTOMS

4.1. Community Steps

The role of the community health worker is to:

- Test for confirmation using an RDT.
- Notify using trough Rapidsms in order to inform the health center of the emergency case.
- For children of 6months to 6 years of age, treat with Artesunate suppository as pre-transfer treatment (see severe malaria) if no diarrhea then transfers to Health Center.
- For children U5, provide oral rehydration solution (ORS/Zinc).
- Rapid transfer of the patient to the nearest health center,
- If patient presents fever, reduce fever by using tepid sponging prior to transfer.

4.2. Health Center Level

4.2.1 Diagnosis

The management of simple malaria with minor gastrointestinal symptoms is done at the health center, or when not possible, at the district hospital. The patient must be admitted in the health center where he/she will receive treatment for 24 hours. Diagnose malaria with microscopy or rapid diagnostic tests and measure hemoglobin level and where possible FBC (full blood count). It is indicated to administer antimalarial treatment (artesunate injectable) only after obtaining a positive blood smear or positive rapid diagnostic test. After 24 hours, a clinical and paraclinical re-evaluation is done to assess if the patient can be discharged to home (if improvement), or can be transferred to the district hospital (if no improvement).

4.2.2 Treatment

The first line recommended treatment for all malaria positive cases with minor gastrointestinal symptoms is **Artesunate by intramuscular injection or intravenous injection.** Administered as dose of 2.4 mg/kg (or 3.0 mg/kg for children <20 kg) IV given on admission (time = 0), then at 12h and 24h.

- ***If the patient's condition does not improve within 24 hours of treatment, refer the patient to the nearest district hospital. If the patient's condition improves, change to oral Artemether-lumefantrine twice a day for three consecutive days.***

4.2.3 Second Line Treatment

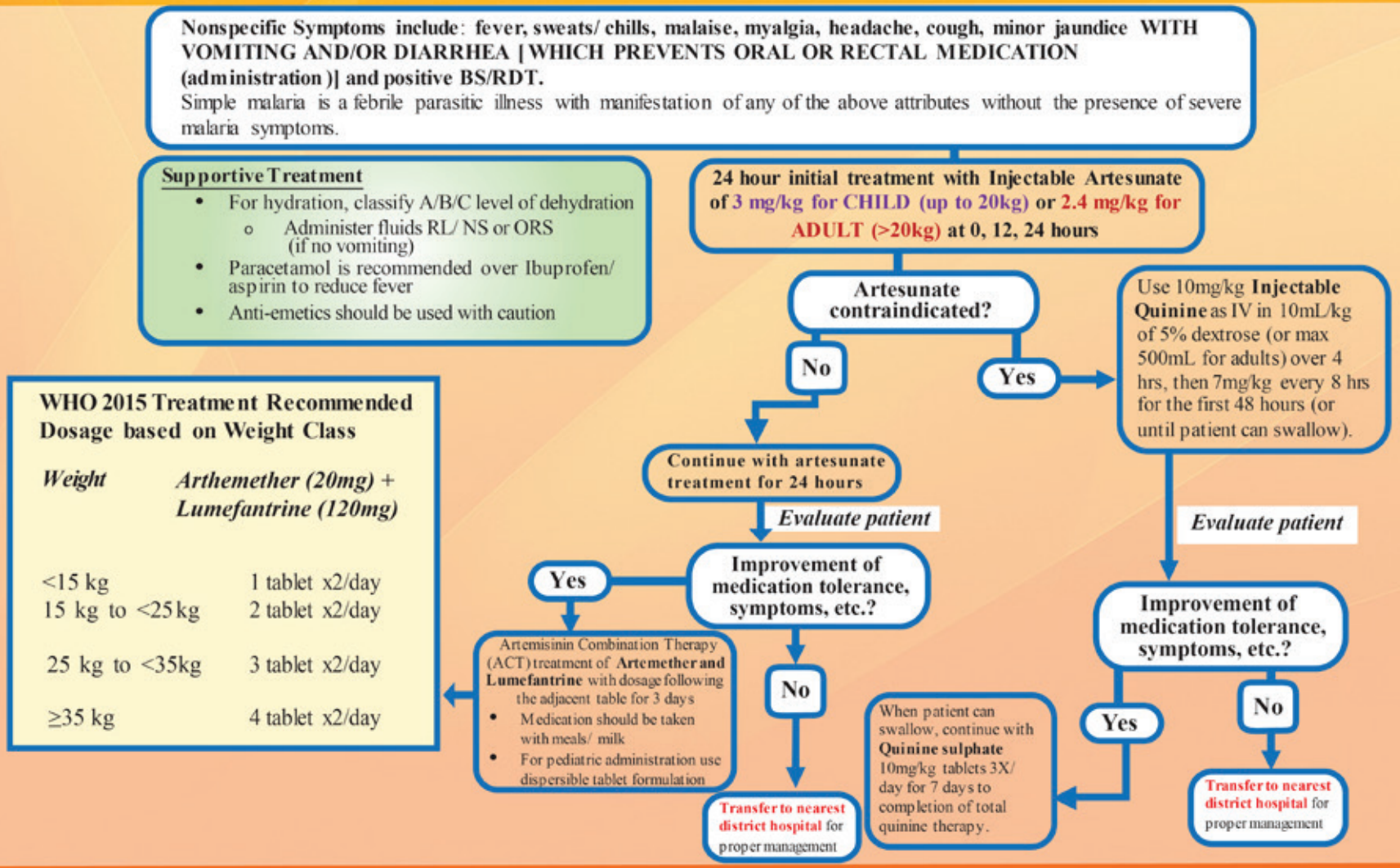
If Artesunate is contra indicated, Use 10mg/kg **injectable quinine** as IV in 10mL/kg of 5% dextrose (or max 500mL for adults) over 4 hrs, then 7mg/kg every 8 hrs for the first 48 hours (or until patient can swallow).

4.2.4 Supportive Treatment

In case of diarrhea and/or vomiting:

- Evaluate and monitor the hydration status of the patient
- Rehydrate patient with oral rehydration salts (ORS) or other available liquids (normal saline, ringer lactate), zinc if diarrhea, encourage breast feeding and other modes of feeding and if necessary use a nasogastric tube
- Anti-emetics should be used with caution
- In case of fever, give oral/suppository Paracetamol 15 mg/ kg, or any other antipyretic as may be indicated

FIGURE 6: TREATMENT OF SIMPLE MALARIA WITH MINOR DIGESTIVE SYMPTOMS



5. TREATMENT AND MANAGEMENT OF SEVERE MALARIA

5.1. Community level

- Test for malaria confirmation using a rapid diagnostic test (RDT)
- Notify through Rapidsms in order to inform the health center of the emergency case, and request the health center authority to call the ambulance for a rapid transport
- Administer Artesunate suppository.

Suppository Dosage

Some patients cannot tolerate oral treatment and will require rectal Artesunate administration for 1-2 days, until they can swallow and retain oral medication reliably. Although such patients do not show other signs of severity, they should receive the same initial antimalarial treatments recommended for severe malaria. Artesunate suppository is indicated only as an initial (pre-referral) treatment of severe malaria and recommended for use only in children aged 6 months to 6 years.
If an artesunate suppository is expelled from the rectum within 30 min of insertion, a second suppository should be inserted and, especially in young children, the buttocks should be held together, for 10 min to ensure retention of the rectal dose of artesunate.
For children: One or more artesunate suppositories inserted in the rectum as indicated below.

Table 4: Dosage for Initial (Pre-Referral) Treatment in Children

Age	Artesunate Dose (mg)	Single Dose Regimen
06 – 36 months	100	One 100-mg suppository
37 – 72 months	200	Two 100-mg suppository

When rectal Artesunate is used, patients should be transported immediately to a higher-level facility where intramuscular or intravenous treatment is available. If referral is impossible, rectal treatment could be continued until the patient can tolerate oral medication. At this point, a full course of the recommended 3-day course of ACT should be administered.

5.2. Health Center and Pre-Transfer

5.2.1 First Line Treatment

- Administer antimalarial treatment only after obtaining a positive blood smear or positive rapid diagnostic test.
- Artesunate will be administered as a single dose before transferring the patient:

  - ***Dosage is 2.4 mg/kg (or 3.0 mg/kg for children <20 kg) IV or IM given on admission (Ho=time of administration), and refer the patient to the nearest district hospital***

5.2.3 Supportive Treatment at Health Center

High Fever

If the temperature is higher or equal to 38°C:

- Do tepid sponging;
- Give Paracetamol 15 mg /kg by oral route or suppository form, or any other antipyretic that may be indicated.

Hypoglycemia

To treat /prevent hypoglycemia (characterized by loss of consciousness, severe weakness):

- The threshold for intervention is glucose <3 mmol/l for children <5 years and 2.2 mmol/l for older and adults or when unable to get blood sugar test:
    - In adults, give 20-50 ml of 50% glucose by intravenous injection administered over 5-10 minutes;
    - In children, give 5 ml/kg of 10% glucose or if not available dilute 1 ml/kg of 50% glucose in 4 ml/kg of normal saline or in 9 ml/kg of glucose 5%;
    - Or administration of water with 10% sugar per mouth or with nasogastric tube, at a rate of 10 ml/kg for children and 50 -100 ml for the adults;
    - Water with 10% sugar is readily prepared in the following way: take 100 ml of boiled clean water and add 10 g of sugar or measure of 2 coffee spoons.

Convulsions

In case of convulsions:

- For children, administer Diazepam 0.5 mg/kg Intrarectal, and
- For adults, administer Diazepam 10 mg IV slowly;
- If convulsions persist, give Phenobarbital 10-15 mg/kg IM; there must be capabilities to support breathing before giving phenobarbital as it can cause respiratory arrest;
- Maintain airways as necessary;
- Refer the patient to the nearest district hospital or referral hospital.

5.3. District or Referral Hospital

Death from severe malaria often occur within hours of admission to a hospital or clinic, so it is essential that therapeutic concentrations of a highly effective antimalarial drug be achieved as soon as possible. In all patients with suspected severe malaria with or without fever or history of fever, parasitological diagnosis is recommended. The treatment must be initiated based on malaria positive blood microscopy or rapid diagnostic test (RDT) results.

5.3.1 First Line Treatment

- Verify When, What and How the pre-transfer treatment administered to patient before to administer another dose of antimalarial drugs based on patient health condition;
- Artesunate will be administered at 2.4 mg/kg IV or IM following the first dose administration at admission (time = 0). For children weighing below 20 kg, they will receive a higher dose of Artesunate at 3 mg/kg.
- For all patients, artesunate 2.4 mg/kg BW IV or IM given on admission (time = 0) (for children <20kg, give artesunate 3mg/kg/dose), then at 12h and 24h. Then once a day is the recommended treatment for a maximum of 7 days, until the patient is able to take oral medication.

- Give parenteral anti-malarials in the treatment of severe malaria for a minimum of 24h, once started (irrespective of the patient's ability to tolerate oral medication earlier), and, thereafter, complete treatment by giving a complete course of: Artemether + lumefantrine per os twice a day for three days.

5.3.2 Second Line Treatment

- If there is a contra indication to artemisinin derivate or if artesunate is not available, administer quinine IV infusion as a loading dose of 20 mg per kg body weight to run in 4 hours (not exceeding a total dose of 1200 mg for the loading dose) then continue with maintenance dose of 10mg/kg;
- In children, use intrarectal route of quinine 20mg/kg bw diluted in water or saline only if an IV line cannot be established, administered with a 5 ml syringe without needle. The drug is gently guided through the anus and the buttocks are held together for 5 minutes to prevent the premature reflex expulsion of the drug.
    - If the drug is expelled within the first 10 minutes following its administration, administration is repeated using half the original dose. Diarrhea and anal lesion limit the utilization of this route for the administration of drugs.

Notes on Quinine

The intramuscular use of Quinine is prohibited in all health centers in Rwanda. Quinine must never be given by IV bolus injection as lethal hypotension may results.

- Ideally consider weighing patients, never exceed 2 g of daily dose of quinine.
- For the patient with over 60 kg bodyweight, give the loading dose at 1200 mg and then decrease dose to 400 mg every 8h making sure not to exceed 2000 mg per 24h. Continue with IV quinine sulfate 10 mg/kg every 8h for 48h.
- The loading dose of quinine is not administered if the patient received quinine in the past 12 hours or Mefloquine in the 7 past days.
- The recommended dose for oral quinine is 10 mg quinine salt per kg body weight every 8 hours for 7 days.

5.4. Management of severe malaria complications

See Figure 7 below.

FIGURE 7: SEVERE MALARIA MANAGEMENT ACROSS HEALTH LEVELS

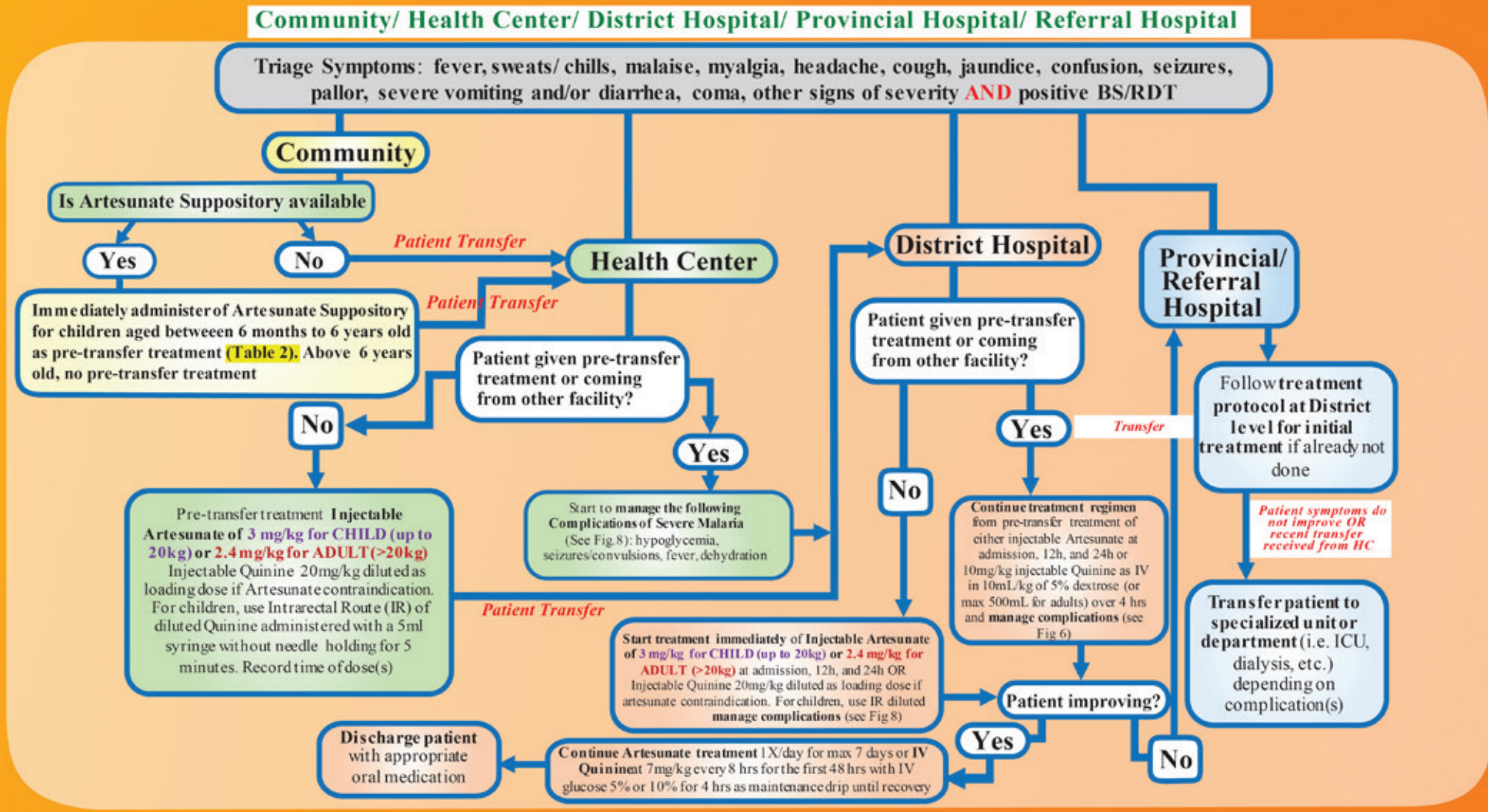


FIGURE 8: MANAGEMENT OF SEVERE MALARIA COMPLICATIONS

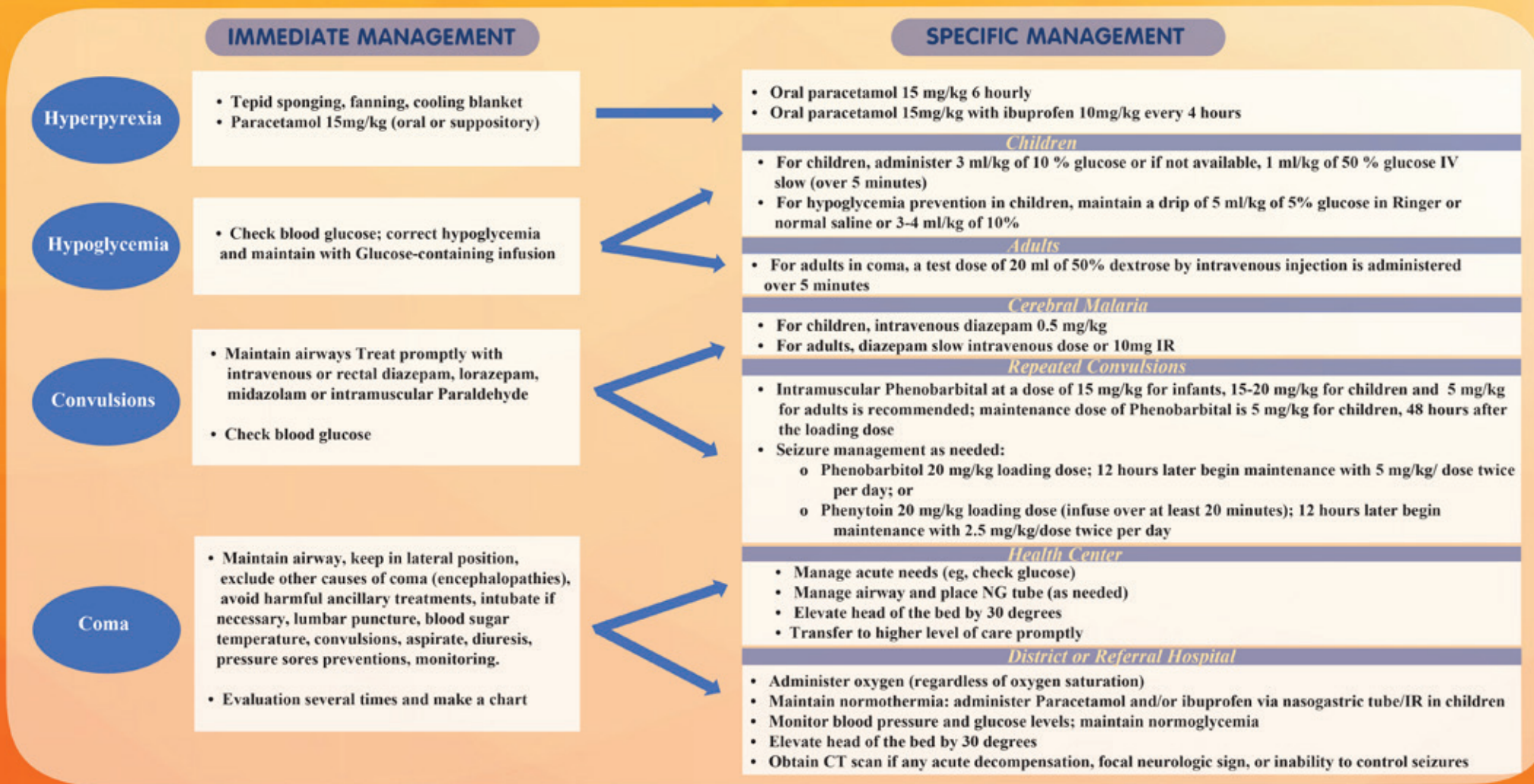


FIGURE 9: MANAGEMENT OF SEVERE MALARIA COMPLICATIONS (CONTINUED)

	IMMEDIATE MANAGEMENT	SPECIFIC MANAGEMENT
Severe Anemia	• Transfusion must be considered if haematocrit <18% or concentration of haemoglobin is <5.1 g/dl; or in presence of the clinical signs of cardio respiratory distress (pallor, tachypnoea, and tachycardia)	• For children, transfusion with packed cells is recommended at 10 ml/kg for 2 hours • In case of lack of packed cells, transfuse with whole blood at a rate of 20 ml/kg body weight • For children with severe malnutrition, transfusion with whole blood is recommended at 10ml/kg body weight over ≥ 3 hours
Shock	• Suspect septicaemia, take blood for cultures; give parenteral broad-spectrum antimicrobials • Correct haemodynamic disturbances	• Normal saline or Ringer Lactate 20ml/kg to run less than 15 minutes • For malnourished children (kwashiorkor or marasmus), give dextrose 5% in Ringer lactate 10 ml/kg for 1 hour
Acute Pulmonary Edema	• Verify the level of haemoglobin and treat anaemia • Treat possible cardiac failure or pulmonary oedema, if necessary give a diuretic/ stop intravenous fluids • In life-threatening hypoxaemia, intubate and put on ventilator on positive end-expiratory pressure or continuous positive airway pressure	• Prop patient up at an angle of 45° • Administer oxygen at >5 litres per minute continuously until improvement • Furosemide 1mg/kg (adults iv 40mg) • Consider associated infection if respiratory distress persists
Acute Kidney Injury	• Exclude pre-renal causes • Check fluid balance and urinary sodium; monitor the daily diuresis in order to timely detect possible renal insufficiency • Add haemofiltration or haemodialysis; or, if not available, peritoneal dialysis	• Transfer patient to national referral hospital • If patient is on quinine with persisting acute kidney injury or no improvement by 48h the dose of quinine should be reduced by one third, to 10mg/kg every 12h
Spontaneous Bleeding	• Perform FBC (Hg level, platelet) and liver function test • Transfuse fresh whole blood (cryoprecipitate, fresh frozen plasma and platelets, if available) • Give Vitamin K injection	• Consult indication for blood transfusion: o Fresh frozen plasma: 10-15ml/kg o Platelets: 5-10ml/kg o Vitamin K: S/C, 2.5-10 mg at maximum 25mg
Metabolic Acidosis	• Evaluate level of dehydration • Perform blood gases • Exclude or treat hypoglycaemia, hypovolaemia and septicaemia	• Rehydrate accordingly the level of dehydration. See available protocol at health facility • See indication of acute haemodialysis/ haemofiltration • Transfer to ICU unit for appropriate management

6. MALARIA IN PREGNANCY

Administer antimalarial treatment only after obtaining a positive blood smear or positive rapid diagnostic test.

6.1. Simple Malaria Management in Pregnancy

Because malaria during pregnancy can aggravate latent anemia, it is recommended to do a complete clinical exam.

- Administer quinine sulfate per os 10 mg/kg/dose, 3 times a day for 7 days during the first trimester of pregnancy 7 days. ACTs for three days are used when quinine is not tolerated;
- ACTs are indicated during the 2nd and 3rd trimesters of pregnancy;
- In case of fever, administer paracetamol tablets, 500 mg three times per day;
- See Figure 7 for more information.

6.2. Simple Malaria with Minor Digestive Symptoms in Pregnancy

The symptomatology of this type of malaria is similar to the one described earlier in children and adults. The alteration of the general status can be accentuated by the vomiting and other symptoms related to the pregnancy.

6.2.1 First trimester

- Use quinine injectable 10 mg/kg/dose every 8 hours, diluted in 5 to 10 ml of 5% or 10% glucose up to 48 hours; if improvement, switch to quinine per os 10 mg/kg/dose every 8 hours per day over 7 days;
- In case of any contraindication to quinine, use artesunate injectable 2.4 mg/kg 3 times (h0; h12; h24) over 24 hours followed by ACTs per os for 3 days;
- See Figure 6 for more information.

6.2.2 Second and third trimester

- Artesunate IV injection of 2.4 mg/kg BW IV or IM given at 0h then at 12h and 24h;
- Once patient improves, change to oral Artemether-lumefantrine twice a day for three consecutive days;
- See Figure 9 for more information.

Supportive treatment

Diarrhea or Vomiting

- Evaluate and monitor the state of hydration;
- Rehydrate with ORS or other available liquids and even introduce nasogastric tube if necessary;
- Anti-emetics are not recommended.

High Fever

- Administer paracetamol 15 mg/kg orally or any other antipyretic that may be indicated.

6.3. Severe Malaria in Pregnancy

6.3.1 Health Center

- Treatment must not be delayed
- Parenteral Artesunate will be administered as a single dose (Dosage is 2.4 mg/kg IV or IM) before transferring the patient to the nearest District hospital.

6.3.2 District Hospital

- Use Artesunate IV injection of 2.4 mg/kg BW IV or IM given at 0h then at 12h and 24h;
- Once the patient improves, change to oral Artemether-lumefantrine twice a day for three consecutive days;
- See Figure 10 for more information.

Note: Whatever the medicine and the mode of administration used, if the state of health of the patient doesn't improve in 24 hours, do a rapid diagnostic test or blood smear and refer the patient with the referral note or treatment file, giving detailed information on the treatment provided so far, to the nearest next level hospital.

6.3.3 Supportive Treatment

High Fever

If the temperature is higher or equal to 38°C:

- Do tepid sponging;
- Give Paracetamol 15 mg /kg by oral route or suppository form, or any other antipyretic that may be indicated.

Hypoglycemia

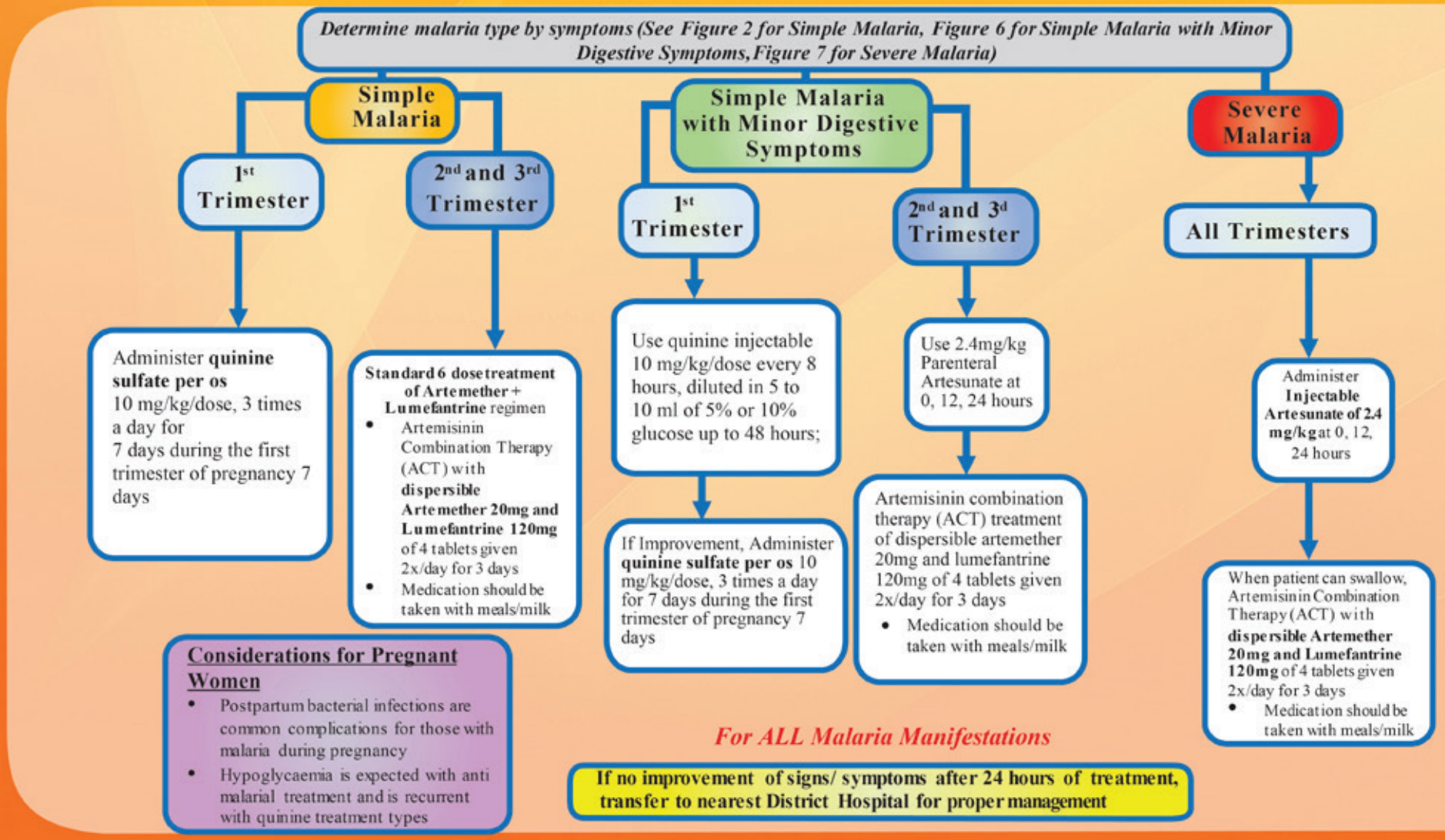
To treat/prevent hypoglycemia (characterized by loss of consciousness, severe weakness):

- The threshold for intervention is glucose is 2 mmol/l for adults or when unable to get blood sugar test:
    - Give 20-50 ml of 50% glucose by intravenous injection administered over 5-10 minutes;
    - Or administration of water with 10% sugar per mouth or with nasogastric tube, at a rate of 50 -100 ml for the adults;
    - Water with 10% sugar is readily prepared in the following way: take 100 ml of boiled clean water and add 10 g of sugar or measure of 2 coffee spoons.

Convulsions

- Administer Diazepam 10 mg via IV slowly;
- If convulsions persist, give Phenobarbital 10-15 mg/kg IM; there must be capabilities to support breathing before giving phenobarbital as it can cause respiratory arrest;
- Maintain airways.

FIGURE 10: : TREATMENT OF MALARIA IN PREGNANT WOMEN



7. OTHER RISK GROUPS

See Table 5 below for more information on specific risk groups.

Table 5: Treatment of Other Risk Groups

Risk group	Treatment	Special attention
Malnourished young children	Artemisinin derivative are safe and well tolerated by young children therefore, the choice of ACT is determined largely by the safety and tolerability of the partner drug. Always determine gastrointestinal tolerability. In malnourished children investigations and drugs administration are the same as other children.	Delay in treating P. falciparum in infant and young children can have fatal consequences.
Obese adults	In principle dosing of large adults should be based on achieving the target mg/kg dose for each antimalarial regimen however do not exceed maximum dosage therefore obese patients will receive the dose as lighter patients.	
Patients with HIV	Studies of administration of quinine/AL with Lopinavir/Ritonavir or ritonavir alone in healthy volunteers gave conflicting results. In our settings patients with HIV infection on treatment who get infected with malaria are treated as the same as the other patients.	They should be monitored closely as there is a risk of recurrent malaria episode. In the immune-compromised adult with HIV whose respiratory distress persists, think about a lung infection due to *Pneumocystis jiroveci* (opportunistic infection) or pulmonary tuberculosis.
Patients with TB	Rifampicin or Efavirenz; Rifampicin is potent CYP3A4 inducers with weak antimalarial activity. There is insufficiency evidence at this time to change the current mg/kg dosing recommendations.	These patients are at higher risk of recrudescence infections they should be monitored closely.
Non-immune travelers	Treat travelers with uncomplicated P. falciparum malaria returning to non-endemic setting with ACT.	

Congenital malaria	**Clinical features:** The most common clinical findings in cases of congenital malaria are fever, anemia, and splenomegaly. The bilirubin level may be elevated, depending on liver dysfunction or hemolysis. When malaria occurs during the first few months of life, it is frequently complicated by other illness, such as pneumonia, septicemia, and diarrhea. Symptoms can be nonspecific and confused with bacterial sepsis. Diagnosis requires high level of suspicion as malaria can look like neonatal sepsis. **Treatment:** Artesunate at a dose of 3 mg/kg/dose at 0, 12, and 24 hours then every 24 hours, followed by Arthemether-lumefantrine: adjust dose to goal total dose of 5-25 mg/kg body weight for artemether and 29-114 mg/kg for lumefantrine.	Congenital malaria can be acquired by transmission of parasites from mother to child during pregnancy or perinatally during labor. Newborns with congenital malaria can present as early as 8 hours to as late as 8 weeks of age and may not have fever, but can present with symptoms similar to neonatal sepsis. Congenital malaria may occur in infants of mothers who are asymptomatic. Parasitemia is often not demonstrable in the mother. Most infants with congenital malaria have the onset of the first sign or symptom at 10 to 28 days of age. However, passively transferred maternal antibody in the neonate may lengthen the incubation period.
Recurrent malaria	Recurrent malaria can be due to recrudescence or new infection. The only way to distinguish between the two is via PCR testing. • If patient had malaria <28 days ago, treat with DHA-Piperaquine. • If patient had malaria >28 days ago, treat with AL. Patients with more than 1 recurrence of malaria must have blood sent to a reference laboratory for specification of parasites and, if available, PCR.	
Asymptomatic patients	All people should be treated with safe, effective anti-malarial medicines that will clear all asexual stage parasites. For P. falciparum infections, treatment to clear sexual stage parasites (gametocytes) should also be given. Currently available artemisinin-based combination therapy (ACT) is effective against developing stages 1–4 gametocytes but not the infectious stage 5 gametocytes, which require a gametocytocide (i.e. single-dose primaquine at 0.25 mg/kg of body weight), which can prevent the transmission to mosquitoes of sexual stage parasites present in the blood.	In general, in areas of high transmission, people usually experience repeated infections from early in life and develop a significant degree of immunity with increasing age and exposure. Acquired immunity tends to limit parasite replication but rarely leads to sterilizing immunity. As such, in areas with significant levels of acquired immunity, a high proportion of the population can harbor parasites in the absence of significant clinical manifestations.

8. CHEMOPROPHYLAXIS FOR TRAVELERS

Since Rwanda is country-wide endemic for malaria, chemoprophylaxis is recommended to all travelers specifically from no-malaria endemic countries including Splenectomized and Sickle cell disease patients.
The recommended treatment is Atovaquone/Proguanil (Malarone); Doxycycline; or, Mefloquine (Lariam) with different dosage as per the table below:

Table 6: Chemoprophylaxis Dosages

Medicines	Dosage
Adults	
Atovaquone/Proguanil (Malarone): 250mg atovaquone plus 100mg proguanil	1 tablet/day
Doxycycline	100 mg/day
Mefloquine Lariam (228mg base and 250mg salt)	1 tablet/week
Children	
Atovaquone/Proguanil (Malarone): 62.5mg atovaquone plus 25mg proguanil	5–8 kg: 1/2 pediatric tablet daily > 8–10 kg: 3/4 pediatric tablet daily >10–20 kg: 1 pediatric tablet daily >20–30 kg: 2 pediatric tablets daily >30–40 kg: 3 pediatric tablets daily >40 kg: 1 adult tablet daily
Doxycycline*	100 mg/day
Mefloquine Lariam (228mg base and 250mg salt)	1 tablet/week

*Doxycycline should not be used by pregnant women nor should it be given to children under the age of 8 years.
*For children above 8 years, the clinician will calculate the correct weekly dose for child based on the child's weight.

8.1. Malaria Prevention in children under 5 and pregnant women

Currently, Rwanda is no longer implementing the IPT-p since 2008 due to the resistance to Sulphadoxine-Pyrimethamine. In line with WHO guidance, Rwanda will continue the routine distribution of LLINs during ANC visit and EPI service to pregnant and children under one year. In addition, the home-based care management for malaria will be continued for early diagnosis and treatment of all suspected malaria cases.

8.2. Malaria vaccine

There is currently no WHO recommendation policy for the large-scale use of malaria vaccine. However, pilot implementation program is ongoing in sub-Saharan countries for children aged 5-17 months for further evaluation including operational feasibility by the organization.

Part two:

SUPPLY CHAIN MANAGEMENT OF MALARIA COMMODITIES

1. LEVELS OF SUPPLY CHAIN

Malaria commodities follow the same supply chain channel as for other health commodities. There are three levels in the supply chain of malaria commodities in Rwanda:

Central Medical Store Medical Procurement Production Division (MPPD)/ Private Wholesalers

This is the first level of supply chain in charge of procurement, distribution, and storage of health commodities at national level. MPPD provide malaria commodities to the district pharmacies, the second level of the supply chain in Rwanda.
The private wholesalers and/or retailers provide health commodities not available in MPPD.

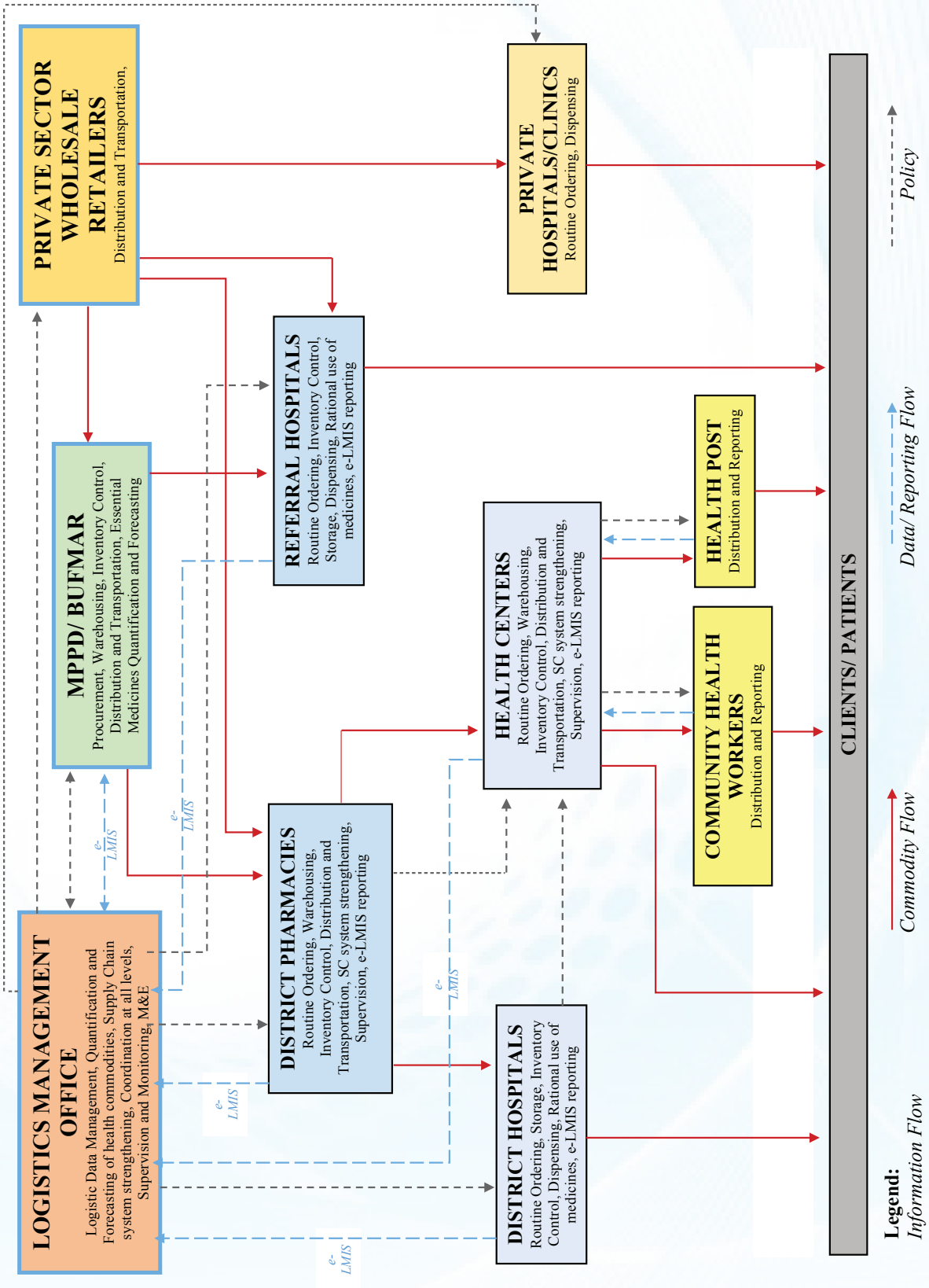
District Pharmacy (DPs)

This is the intermediate level of the supply chain which oversees the supply chain of malaria commodities at district level. All the DPs should request malaria commodities through MPPD or must obtain a written notice to buy in private sector when MPPD do not have product.

Health Facilities

The third level of the supply chain includes provincial hospitals, district hospitals, Health Centers and private clinics. All public health centers and hospitals as well as accredited private facilities receive commodities from the public sector that are supplied by the district pharmacies. Private clinics are supplied by the private wholesalers. The third level of the supply chain is responsible for storing and distributing malaria commodities to the end user directly or indirectly through community health workers or health posts.

FIGURE 11: RWANDA SUPPLY CHAIN NETWORK



2. QUANTIFICATION AND MONITORING

Quantification of commodities is done annually by the malaria quantification committee which is composed of different stakeholders involved in malaria commodities management (MoH, MOH Partners, MPPD, Districts). A continuous monitoring to ensure uninterrupted availability of malaria commodities and to avoid losses due to expiry is done through quarterly supply plan reviews and monthly stock status assessment.

3. PROCUREMENT OF MALARIA COMMODITIES

3.1. Procurement and Technical Specifications

Once the annual quantification exercise is completed, a procurement plan for one year commodity needs is shared with procuring entities to start the supply acquisition. The procurement is based on both WHO criteria and funding partners' specific regulations. Commodities arriving in country should have at least:

- 85% of the specified shelf life upon delivery at port/airport of entry for goods with a shelf life of more than two years and
- 75% for goods with a shelf life of two years or less of remaining shelf life.

3.2. Routine ordering

Health facilities request commodities to the district pharmacy monthly through e-LMIS. District pharmacies request commodities to MPPD via e-LMIS monthly as well. The upper level receiving requests should have the following accurate data available to validate the request:

- Stock at the beginning of the month
- Quantity received during the month
- Number of days of stock out
- Quantity consumed during the month
- Physical quantity at the end of the month

To avoid stock out or expiry of commodities, the MOH supply chain system was designed to have:

- A maximum stock lasting for 2 months and a minimum of 1 month at each health facility (health centers and hospitals)
- A maximum stock lasting for 3 months and a minimum stock of 2 months at district pharmacies

Keeping a huge stock at health facilities may results not only in risk of expiration but also a risk of stock out for other health facilities due to irrational distribution of malaria commodities. At the end of each month, it is recommended to assess the status by month left of stock to ensure the correct order amount to bring the maximum quantity back up to 2 months. During the stock status review, when the quantities in stock are estimated to last 0.25 months, a health facility should make an emergency order to the district pharmacy.

4. DISTRIBUTION AND STORAGE

Monthly active distribution occurs from MPPD to DPs and from DPs to the health facilities.
Since ACTs and RDTs arrive in-country with ~18 months and their consumption trend varies seasonally, it is important that these specific drugs and tests be monitored regularly during monthly physical inventory by health center and district pharmacies.

Drugs and/or tests should be returned to their next upper level of care (i.e. health center return to district pharmacy) once commodity has 4 months of remaining shelf life; however, exceptions are made per facility if average monthly consumption of drugs/tests is forecasted to be used before expiry date.
Distribution is done using the principle of first expire first out (FEFO); commodities in the stock with closest expiry dates must be the first out to avoid expiration in the health facility. If expired product is found, the head of facility needs to notify and submit a report to next upper level supply chain management and proceed with incineration of those products.
Malaria commodities among other health commodities must be kept in storage conditions as per good storage practice and storage conditions required for the specific product. This is especially pertinent for ACTs and RDTs as they must be stored out of humidity and high temperature.
Special consideration to RDTs: in line with Ministerial instruction regulating the distribution of malaria drugs and RDTs in health facilities and community for HBM strengthening, the distribution of RDTs from DP to health facilities and community will be done as follow:

- 15% of all RDTs will be distributed to Health Posts
- 85% of all RDTs will be Distributed to Health Centers.
- 95% of the total RDTs received at HC will be distributed to CHWs.
- 5% of total RDTs received at HC will be used at HF.

5. QUALITY CONTROL OF COMMODITIES

5.1. Antimalarial drugs

The QC of antimalarial drugs is done once a year by the Malaria Program as per GF recommendation to make sure antimalarial drugs retain proper quality through the supply chain down to community level. To account for these quality standards, samples are collected from districts pharmacies/district hospitals, health centers, and community and then taken to the approved laboratory to perform the QC tests. At random, samples are taken to the international laboratory prequalified by WHO.
Antimalarial drug QC per product is performed at in-country arrival of commodities before distribution to districts by Central Medical Store.

5.2. Malaria RDTs

The QC of malaria RDTs is done once year as per GF recommendation to make sure tests used in country have good quality. RDTs samples are collected from district pharmacies/ district hospitals, health centers, and community and then taken to the international laboratory prequalified by WHO for QC tests.
RDT QC is performed at in-country arrival of commodities before distribution to districts.

6. KEY SUPPLY CHAIN DEFINITIONS:

- **Stock out of a product** is the absence of stock of a product so that a facility is unusable to treat patients in need of that product.
- **Expiration date of a product/commodity:** An expiration date or expiry date is a previously determined date by the manufacturer after which the commodity should no longer be used.
- **Security stock or buffer stock** is the stock of commodities that can be used while waiting for the replenishment or supply of enough stock, in Rwanda context, we use a security stock of buffer stock equal to 25% of the monthly consumption of a facility.

- **Months of stock of a product/commodity** is number that represents a period in which a quantity of product/commodity available in stock can last. This is calculated by dividing the available stock on hand in quantity unit of measure by the quantity consumed for each health commodity for the current month.
- **Consumption data** is the quantity of product/commodity that has been dispensed or used directly for the patients testing or treatment.
- **Distribution data** is the quantity that has been distribution from one storage place to another. This is intended to be distributed later to patients.

7. TECHNICAL SPECIFICATIONS OF COMMODITIES

See Annex 18 for specifications per product.

Part three:

VECTOR CONTROL AND MALARIA PREVENTION

1. INTRODUCTION

WHO recommends the use of vector control (i.e. stopping mosquitoes from biting human beings) or chemoprevention (i.e. providing drugs that prevent infections) in specific population subgroups (i.e. pregnant women, children and other high-risk groups) or travelers and in other specific contexts (elimination). The primary core methods to prevent mosquito bites are sleeping under an ITN/LLIN with universal coverage and spraying the inside walls of dwellings with a residual insecticide – an intervention known as Indoor Residual Spraying (IRS) with targets of high endemic areas. Additionally, the chemoprevention in pregnancy could be used also as a malaria preventive measure. The larval source management including the environmental management is recommended as supplement of core malaria preventive interventions in specific habitats.

In Rwanda, malaria vector control core interventions are implemented under the Integrated Vector Management (IVM) strategy as an approach for the management of vector borne diseases including malaria. There are implemented as public interventions and the remaining are considered as supplemental vector control interventions with target groups or habitats. The approach seeks to improve the efficacy, cost-effectiveness, ecological soundness, and sustainability of disease-vector control. The rationale of the IVM is the need to overcome challenges experienced with conventional single-intervention approaches for vector control and the opportunities for promoting multi-sectorial approaches to human health.

Personal protective measures will include those giving individual protection to reduce the human-mosquito contacts, for example the use of mosquito repellents using the topical (lotion, creams, gels, ointments, sprays, roll-ons, wipes, bathing soaps, etc…) or spray (coils, mat vaporizers, sprays, candles, bracelets etc…) applications and local herbs (i.e *Geranium*, Lemon grass), protective clothing, insect proofing houses , insecticide space sprays etc…,.

2. LONG LASTING INSECTICIDE-IMPREGNATED NETS

2.1. Definition

A Long Lasting Insecticide-Impregnated Net (LLIN) is a bed net treated with an insecticide which forms a physical and chemical barrier around people sleeping under it.

a. **The physical barrier**: mosquitoes cannot have access to individual sleeping under the net.
b. **The chemical barrier**: the insecticides incorporated/coated into the net fabrics kill mosquitoes. The insecticides also repel mosquitoes, reducing the number that enter the house and attempt to feed on people inside.

However, in Rwanda, since 2012, mosquitoes were found resistant to pyrethroid insecticides which are the only type used in the impregnation of nets.

As a way of controlling insecticide-resistant mosquito populations,since 2020 MOPDD has deployed two new types of ITNs-PBO synergist and dual insecticide (i.e.,Interceptor G2 and Royal Guard) ITNs with proven mosquito killing effect as they become available on the market as an alternative to pyretroid ITNs.

A LLIN is designed to remain effective for 3-5 years and in Rwanda, based to the results of the LLINs monitoring survey, the replacement period was set to two years without re-treatment. In order to be effective, WHO recommends the universal coverage (1 LLIN for every 2 people in the targeted population).

c. **Shelf life of LLIN:** The Shelf-Life of the net is the period for which the net stored in its original bag or package retains its properties. This Shelf-life is assessed by each manufacturers using Laboratory Data.

The National Malaria Control Program recommends all manufacturers of LLINs supplied to Rwanda to determine the production date as well as the Shelf-life of their products that should not go below 2 years.

It is important to note that in case LLINs are kept in correct storage conditions can maintain their chemical content longer. Passed this period of shelf life, a net can be retested to assess its chemical content or simply be used as physical barrier.

d. **Lifespan of LLIN:** According to WHOPES/WHO PQ, the Lifespan of the net also called **Usefulness** refers to 20 standard washes or 3 years in the field (on field use in 'serviceable' condition exposing the insecticide to a gradual decay).

The Malaria and Other Parasitic Diseses Division (MOPDD) recommends all manufacturers of LLINs supplied to Rwanda to determine the shelf life and Lifespan or Usefulness of their products.

2.2. Implementation

The implementation of LLINs activities is done by the following institutions:

- **MOH/RBC:** The Ministry of Health and RBC through MOPDD provide leadership and guidance through the Malaria Strategic Plan which guides government entities and partners involved in planning and implementation of LLINs activities. These activities include provision of quantities needed, technical specifications, organizing distribution campaigns (HH), implementation of the routine distribution (EPI, ANC), supervise the LLINs selling in the private and public sector, oversight on the HH use routine monitoring, mobilization of required funds and conduct operational research;
- **District hospitals and health centers:** Conduct the needs assessment to provide the number of LLINs and beneficiaries in the community, implement the LLIN distribution campaigns in their respective operational areas, supervise the distribution to children under one year and pregnant women through EPI and ANC services, community mobilization, and utilization monitoring on a routine basis;
- **MOH partnership organizations:** Resources mobilization, funds mobilization, participation in the distribution campaigns, community mobilization.
- **Local leaders:**

  Ensure LLINs are distributed according to their needs
  Ensure proper use of LLINs in the community

2.3. Recommended LLINs Technical Specifications

Since 2006, Rwanda is procuring LLINs produced by WHO recommended manufacturers and based also to the country needs. Technical specifications are developed in collaboration with partners and approved for implementation. Currently, the WHO approved LLINs are Pyrethroid impregnated, and double treated LLINs with Pyrethroid/ PBO, and Chlorfenapyr and Alpha-cypermethrin. For the Rwanda approved technical LLIN specifications, please see Annex 7 (Rectangular LLIN), Annex 8 (Conical LLIN) and Annex 9 (Conical Extra-Large LLIN). However, as Rwanda is implementing the LLINs social marketing, private sector should sell customized LLINs (LLINs with special technical specifications) in order to satisfy the market need.

2.4. Procurement of LLINs

2.4.1 Quantification

According to WHO recommendation, an overall ratio of 1 LLIN for every 1.8 people in the targeted population should be used to calculate overall LLIN need for the household mass campaign distribution in order to reach the universal coverage. This important quantity should be decided on the basis of net durability (which in Rwanda currently is 2 years), and only WHO-recommended LLINs should be procured and distributed. The government and partners should consider maintaining stocks of LLINs for local replacement, which requires a modest additional number of LLINs over the calculated procurement. Addition to the quantity needed for mass campaign distribution, the children under 1 years and pregnant women are protected by receiving LLINs through routine distribution and the needed quantity for those vulnerable groups is calculated as follow:

- **For children under one year:** the needed quantity is calculated on the basis of the average of children attending the first immunization (BCG1) during the 4 last years multiplied by the annual increase rate of 4.8%;
- **For pregnant women:** the needed quantity is calculated on the basis of the average of new ANC registration of PW attending the ANC during the 4 last years multiplied by the annual increase rate of 4.8%;

2.4.2 Procurement Process

The procurement process will be done by 2 sectors as follow:
For public sector

- The procurement is done by the National Medical Procurement Entity based on the country needs and technical specifications submitted by the MOPDD following the national procurement regulations.

For private sector

- This will be done by any private institution to a LLIN WHO-approved manufacturer according to the approved national technical specifications. Additionally, any private distributor will seek a waiver from the MoH according to the regulations in place. Provisions of LLINs through private sector (both manufacturing and selling) is another option for maintaining and sustaining the universal coverage of LLINs in Rwanda.

2.5. Quality Control and Quality Assurance of LLINs

As per the WHO guidance and country regulation, all procured LLINs will be subject to the QC/QA before it's reception and distribution to the population. For LLINs procured for the public sector, the Medical Procurement Entity has the responsibilities to conduct the QC/QA and those procured by the private sector will be inspected by the MoH. Three type of QC/QA will be followed:

2.5.1 QC/QA before Shipment

The supplier is responsible for pre-shipment physical and chemical testing using a WHO-approved laboratory.

2.5.2 QC/QA at Arrival In-Country

At arrival, the procuring entity in collaboration with the MOPDD and RSB has the mandate to conduct the physical and chemical testing for LLINs procured through the public sector while the MoH have the mandate to conduct the QC/QA of LLINs procured by the private sector. This will be measured through 2 aspects as follow:

a) Physical Inspection Methodology

- **Inspection Team**

The inspection team will be composed by the procuring entity, the MOPDD and the third party (RSB).

- **Definition of Defects**

For defect standardization and clarity, the following definitions are being used:

Major defect: A defect that is likely to result in a material failure or to render the product not fit for its intended purpose. Major defects in workmanship and material such as holes, shape, etc. are shown in Annex 12.

Minor defect: A defect that is not likely to reduce the usability of the product for its intended purpose or a deviation from established standards of quality, having little bearing on the effective use or operation of the product. Minor defects in workmanship and material such as color, stains, etc. are shown in Annex 12.

Other observations will be included for review of the supplier and to give feedback to manufacturer for continuous improvement. Further, it is still the supplier's responsibility to ensure the product delivered is fit for purpose irrespective of the AQL levels applied at pre-delivery inspections.

b) Chemical Inspection Methodology

Samples will be tested in a WHO approved laboratory and Rwanda Standard Regulatory Agency for the parameters mentioned in the technical specifications. The methodology will refer to the WHO Guidelines for Laboratory and Field-Testing of Long Lasting Insecticidal Nets (2014).

Additionally, see Annexes 7-14 for detailed information.

2.5.3 QC/QA on field

This will be conducted by the MOPDD as the LLINs monitoring survey and LLINs durability.

2.6. Distribution of LLINs

In Rwanda, as recommended by World Health Organization, LLINs for malaria prevention should be distributed through a combination of mass free distributions and continuous distributions through multiple channels such as antenatal and immunization services.

Mass campaigns are a cost-effective way to rapidly achieve high and equitable coverage, but coverage gaps appear, requiring complementary continuous distribution channels. In Rwanda three channels are used in LLINs distribution: household campaigns every 2 to 3 years, EPI, and ANC.

2.6.1 Routine Distribution of LLINs

The routine distribution of LLINs is organized at the health center level. It targets all children aged 9 months attending the measles and rubella vaccination and all pregnant women attending the antenatal care service. The distribution will be done also to children under one year and pregnant women coming from their catchment area including "Hors Zone". The distribution of the free LLIN to the age group of 9 to 12 months is organized during **measles and rubella (MR1) immunization** visit while the distribution to pregnant women is held during **first antenatal care visit**.

2.6.2 Household LLIN Distribution

During this distribution, LLINs will be distributed taking into account the Ubudehe categorization done by MINALOC. LLINs will be distributed free of charge for the population categorized under the "Ududehe 1, 2 and 3" and sale at subsidized price for the population categorized under the "Ubudehe 4" and employees of public and private sector classified in Ubudehe 3 having a monthly salary (formal sector). The estimated quantities of LLINs needed per village are made in advance by decentralized level with the support of the community health workers (or other individuals identified qualified to implement the need assessment) and approved by local authorities. This estimation is based on needs assessment of LLINs done for each household according to the total number of household members devised by 1.8 people. The assumption used is 1 LLIN for 1.8 people according to the WHO/ RBM guidance.
All completed forms will be brought back to the health center by the community health workers (or other individuals identified qualified to implement the need assessment) for compilation and submission to the district hospital. The district hospital will compile all needs in its catchment area into one report which will be sent to the MOPDD for the identification of gaps and preparation of the supply plan for health centers.
When health centers are supplied with LLINs, they collaborate with chiefs of village and Community Health Workers to inform the public on the distribution plan using the available communication channels. The health center will compile reports of LLINs distributed and will report that to the central level through the HMIS and hard copies.

2.6.3 Distribution of LLINs to other target groups

The distribution of LLINs will also be done to other target groups (e.g. Prison, district hospitals' hospitalization wards), by the health facilities or other partners. A need assessment by the health facility / other institutions is pre-required with an approval of the Malaria and OPD Division.

The distribution is done from the central level to the health facilities and other institution (prison) using the common distribution channel.
For this distribution mechanism, it is necessary for health facilities to send to Malaria and OPD Division a report detailing the beneficiaries and the procedures used for that distribution.

In prison, the safety and security of prisoners, staff, service providers and visitors shall be ensured at all times in line with Nelson Mandela guidelines.

2.7. Usage and Management of LLINs

LLINs should be kept clean and can be washed as needed. However, 20 washes are the maximum during the utilization period. RBC recommends washing LLINs only once in a quarter (or more) and with normal soap, not detergent.

Key measures for washing LLINs:

- Wash apparatus to be used: basin and soap;
- The LLINs should be washed in cold water. Hot water weakens the fibers and accelerates the insecticide decay;

- Do not mix LLINs during their washing. Wash them individually;
- Wash hands with soap and lots of water;
- Do not wash/ rinse LLINs in or near drinking water sources, ponds, lakes, rivers, streams;
- Dispose of water for washing/ rinsing in the toilet or in a hole away from habitation, animal shelters, drinking water sources, ponds, rivers and streams;
- Let the LLIN dry flat in the shade.

Health centers must collaborate with the local authorities so that the community does not use the LLINs for other purposes within two to three years after distribution (such as fence of poultry, fishing, kitchen garden, etc.).

2.8. Environmental and Safety Considerations for LLIN Disposal

2.8.1 Disposal of LLINs Plastic Bag

For the environmental protection purpose, the health center staff will tear the plastic bag before giving the LLINs to the beneficiaries and keep them at the health center to be sent to the district hospital. Recycling companies approved by REMA will be allowed to collect all plastic bags from district hospitals. The LLINs distributed to the beneficiaries have to match with the plastic bag to be disposed. Empty plastic bags of LLINs distributed during routine activities must be well stored at health centers and brought to district hospitals during routine supervisions. The Malaria & OPDD will communicate with the approved recycling companies and district hospitals for the implementation of the collection schedule.

2.8.2 Disposal of Used LLINs

Obsolete LLINs are appropriately managed and disposed at the health facility level by proper burning or recycling . The disposal methods must follow WHO recommendations on sound management of old LLINs and the in-country environmental management policies.

2.9. LLINs in Social Marketing and Private Sector

The GoR sustains the LLIN universal coverage through distribution in the public sector and also by strengthening the availability in the private sector. This is done through two channels as follows:

2.9.1 Social marketing

Social marketing of LLINs will target part of the population with disposable income. This will include part of those in Ubudehe 4, employees of public and the private sector classified in Ubudehe 3 having a monthly salary and who else in need. The MOH will work with partners to ensure LLINs are available, socially marketed and at a given a subsidized price.

2.9.2 Private sector

The private sector will be encouraged to make LLINs available to those willing to purchase them at the market price. All LLINs procured will be required to comply with the national guidelines in terms of technical specifications, quality control and quality assurance.

3. INDOOR RESIDUAL SPRAYING

3.1. Definition

Indoor Residual Spraying (IRS) is the application of a targeted dosage (g/m^2) of an insecticide with residual action to the inside surface walls of human habitations for a given duration, in order to kill the adult vector mosquitoes that land and rest inside houses. The primary effects of IRS towards curtailing malaria transmission are 1) to reduce the lifespan of vector mosquitoes so that they can no longer transmit malaria parasites from one person to another, and 2) to reduce the density of the vector mosquitoes and reduction in overall vectorial capacity and thus malaria transmission.

For IRS to be effective:

- There must be a high coverage of wall sprayable surfaces in all targeted structures;
- The vector (mosquitoes) must feed and rest indoors house;
- The targeted vectors must be susceptible (i.e. not resistant) to the insecticide to be used for spraying.

According to WHO 2017, all programs for malaria control should establish and maintain their capacity to conduct IRS for rapid clearance of transmission in high malaria endemic areas even where ITNs/LLINs are the core vector control intervention, especially in areas in which the vectors are resistant to pyrethroids. A significant advantage of IRS for the containment of malaria transmission is that it does not require human behavioral change, except when people refuse access to their houses or re-plaster their house walls soon after spraying. Unlike ITNs/LLINs, which remain effective during several transmission seasons, the effectiveness of IRS may depend on the residual period of insecticide formulation and spray surface. Failure to achieve high coverage and high-quality implementation of either ITNs/LLINs or IRS should not be compensated by adding another intervention.

3.2. Usage of IRS

The Revised Malaria Contingency Plan 2017-2020 and the Extended Malaria Strategic Plan 2013-2020 recommend 15 districts with high malaria burden to be regularly sprayed. IRS target districts are chosen based on epidemiological, and entomological data for the areas with high malaria burden; and the target districts are annually reviewed and determined based on the available budget and following the top incidence of malaria.

The annual spraying rounds are determined by the residual efficacy of the insecticide used. For example, Pirimiphos Methyl/Actellic 300 CS and Fludora® Fusion 56.25 WP are sprayed once year as the efficacy monitoring has proven that they can cover two malaria transmission peaks occurred in Rwanda (May-June and November-December).

It is important to note that other areas (boarding schools, prisons, health facilities, refugee camps, security force barracks, private households, and other places) can be sprayed through targeted IRS and depending on the need, evidences and availability of funds.

3.3. Selection of IRS Insecticides

Insecticides that are selected must be pre-qualified by WHOPES/WHO for IRS. All selected insecticides must be duly registered and locally evaluated for the purpose of IRS in Rwanda. The local vector populations in the IRS target areas must be susceptible to the selected insecticide formulation. This shall be ascertained through standardized WHO or CDC protocols on susceptibility tests. WHO guidance for the interpretation of susceptibility results will be followed. Where resistance exists,

an insecticide with a different mode of action will be used to manage the resistant vector strain. Evidence-based/ operational research on new insecticide formulations are used for suitability assessment and to generate local evidences. The annual cost per structure sprayed which includes the cost of insecticide as well as the operational cost associated to a given insecticide has also to be considered in the selection of insecticide.

The choice and rotation of insecticide for IRS is guided by the national insecticide resistance management strategy, which is elaborated with closer consultation of all involved stakeholders and following the results of insecticide resistance monitoring carried out on annual basis. The current innovative and non-pyrethroid insecticides such as Actellic or Pirimiphos methyl, Fludora fusion, SumiShield, Chlorfenapyr can be considered for rotation strategy once they are registered for use in Rwanda and based on the WHO-PQ list, the cost effectiveness and local evidences.

3.4. IRS Implementation

- ***MOH/RBC:*** The Ministry of Health/RBC provides leadership and guidance through the development of strategic plan which guides the government entities and partners involved in planning and implementation of IRS activities. Also, MOH/RBC is involved in mobilization of required funds.
- ***Administrative districts and local leadership:*** Ensure community mobilization, provide at free of charge necessary infrastructures required for IRS such as offices, stores, places for soak pits constructions etc…; Participation in planning, implementation, supervision and closure of IRS implementation during the campaigns.
- ***District hospitals:*** Coordinate and implement IRS activities in their respective administrative districts.
- ***Other MoH/RBC partners:*** Plan and implement IRS activities in target districts. Conduct capacity building on IRS to MOH/RBC, district hospitals and local authorities.
- ***Other Public and Private institutions or organizations:*** Institutions such as hotels, health facilities, boarding schools, refugee camps and other temporal or agglomerated habitats are encouraged to provide LLINs and implement IRS as appropriate in compliance with the national guidelines in use.

3.5. IRS Quality Control

To determine the decay rate of insecticide and the efficacy of intervention:

- WHO cone bioassays are conducted one week after spraying for quality control and then on a monthly basis to determine the residual period, and thus until the end of effectiveness of insecticide on the surface wall (defined as WHO threshold <80% susceptible mosquito mortality rate).

To determine the IRS entomological impact indicators:

- Parity (age-grading): to monitor mosquito survivorship in the presence of IRS intervention;
- Insecticide susceptibility and mechanism of resistance conducted annually;
- Bionomic of malaria vectors:
    - Species composition, abundance, distribution and seasonality on a monthly basis;
    - Time and location of vector feeding and to understand where and when transmission is occurring;

- Sporozoite infection and the source of blood meals to determine the infection rate and preferred hosts;

- Use the malaria epidemiological data/ HMIS to monitor the impact of IRS on malaria morbidity, mortality, incidence, and prevalence.
- Meteorological data to determine the effect of climate on mosquito density and intensity of malaria transmission

4. LARVAL SOURCE MANAGEMENT

4.1. Definition and methods

The Larval Source Management (LSM) is the management of aquatic habitats (water bodies) which are also larval habitats for mosquitoes and aimed to prevent the completion of the immature/ aquatic development cycle to the adult mosquito stage. LSM is recommended in mosquito breeding habitats that are "few, fixed and findable" (WHO, 2013) in all malaria endemic areas. There is a need to develop and ensure the implementation of the mitigation plan for any human activity and/ or development projects that can potentially create larval habitats such as irrigation systems, manmade containers, quarries, construction sites, seepage from dams, poor waste water management or broken water pipes, and urban agriculture. Other forms of larval habitats to be explored might be small ground pools resulting from ground depressions filled with rain or low water table and house containers used to harvest rain water.
There are four methods of LSM: habitat modification, habitat manipulation, biological control, and larviciding.

4.1.1 Habitat Modification

A permanent alteration to the environment, aimed at eliminating larval habitats, including: Landscaping, surface water drainage, filling and land reclamation. In Rwanda, this is done through monthly community work (Umuganda). Moreover, the community members have to be mobilized to control the peri-domestic mosquito breeding sites using above described techniques.

4.1.3 Habitat manipulation

It consists of temporary environmental changes to disrupt vector breeding, and includes: Water-level manipulation, e.g. flushing, drain clearance to eliminate pooling; shading or exposing habitats to the sun and depending on the ecology of the vector. This is done through community mobilization.

4.1.4 Biological control

The introduction of natural predators into larval water habitats may include the following methods: predatory fish in fish ponds and water dams (*Clarias* spp, *Tilapia* spp, *Carpio* spp, *Gambusia affinis* and *Poecilia reticulata*), predatory invertebrates, parasites or other disease-causing organisms. In Rwanda, larvivorous fish have to be introduced in water dams for irrigation, production of hyrdropower and in fish ponds after approval by the Ministries in charge of Agriculture and livestock, and environment. Restocking of larvivorous fish requires to cover the entire targeted area of water bodies in compliance with the carrying capacity determined per species and involvement of local community based organizations.

4.1.5 Larviciding

The application of biological or chemical larvicide to water bodies may include the following methods:

- Surface oils and films, e.g. highly refined oils and biodegradable ethoxylated alcohol surfactants, or "monomolecular films" (MMF) that suffocate larvae and pupae;
- Synthetic organic chemicals, e.g. organophosphates that interfere with the nervous system of immature larval stages, such as chlorpyrifos, fenthion, pirimiphos-methyl and temephos;
- Bacteria, e.g. *Bacillus thuringiensis* subsp. *israelensis* (Bti), and *Bacillus sphaericus* (Bs) that produce insecticidal crystal proteins which, when ingested by larvae, attack the gut lining causing cessation of feeding and subsequent mortality of mosquito larvae;
- Spinosyns, e.g. metabolites extracted from the bacterium Saccharopolyspora spinosa, that act as nicotinic acetylcholine receptor (nAchR) allosteric activators and can cause mortality through both contact and ingestion;
- Insect growth regulators, e.g. diflubenzuron, methoprene, novaluron and pyriproxyfen that prevent emergence of adult mosquitoes from the pupal stage.

Rwanda does not currently implement large scale larvicide control but is actively doing advocacy for resource mobilization to allow the introduction of this strategy to complement the core vector control interventions. See Annex 16 for WHO recommended larvae insecticides.

5. OTHER VECTOR CONTROL METHODS

5.1. Repellents

Repellents are normally applied directly to skin or clothing or with spatial applications. Mosquito repellents are recommended for people staying indoor before bedtime or outdoors at night for work or leisure and those working in plantations and may be at risk during daytime. There are two categories following their mode of application:

- Topical or skin applied mosquito repellents: lotions, creams, gels, ointments, spray, roll-ons, wipes, bathing soaps, bracelets, wristbands, patches etc…
- Spatial applied mosquito repellents: coils, spray, candles, papers, liquid vaporizers, vaporizer mats, tables, liquid detergents

5.2. Protective Clothing

Long sleeve clothes are won to reduce areas exposed to mosquito bites. These are convenient in cooler areas and in the evening for outdoor activities. However, in hot climate they are uncomfortable and inconvenient to wear while working. There is little or no protection when the material used is light and mosquitoes can bite through them.

5.3. Aerosols

Aerosols are packed in pressurized cans for easy spraying or can be applied with a spray pump. Aerosols are normally sprayed indoors in the evening with doors and windows closed to allow the insecticide to knock down and kill any mosquitoes, which could be resting inside. Some aerosols are also repellents and will prevent further mosquito entry for a day or so. But in most cases the effects of aerosols are very short lived.

5.4. Natural anti-mosquito plants

Burning or planting of local herbs known to have repellent effects e.g. Citronella spp, Geranium spp, Eucalyptus spp, Pyrethrum spp and other aromatic trees fall into this category. Usually these are burned indoors or outdoors and the smoke repels and sometimes knocks down mosquitoes.

5.5. House screening/proofing

This involves screening of doors, windows and other opening eaves or holes to prevent insects from entering inside the houses. Netting materials or wire mesh are recommended to cover the windows and other ventilation areas of houses.

5.6. Prevention of breeding in and around dwellings/houses

Prevention of breeding around dwelling involve the coverage of water containers and removal of possible breeding sites near homes by filling ditches, borrow pits and holes where water collects, burying empty tins and other containers where water may be collected and act as breeding sites. The containers of drinking water or used in different purpose such as construction sites, harvesting rain water have to be always covered. Individuals or communities in rural or urban areas may apply this measure to reduce mosquito populations.

5.7. Environmental management

Environmental management involves the modification of the environment to make it unfavourable for the vectors to breed. These include draining or filling up of ponds and borrow pits, intermittent draining of irrigated areas and maintenance of irrigation channels and flushing stagnant water in drainage channels. Environmental management can effectively be used in urban and modified environment such as settings of mining areas to control mosquito breedings.

5.8. Space Spraying

Space spray employs the same principles as the small aerosols but applied in a larger scale. However, ultra-low volume (ULV) sprays or fogs are used. Space spraying is usually applied in and around houses and outdoor resting-places. Space spraying requires special equipment such as thermal foggier and motorized knap-sacks. Sometimes large pumps mounted on vehicles are used for the purpose. They are fast acting and therefore highly recommended in outbreak situations.

5.9. Insecticide wall paints.

The insecticide wall paint is recommended and using paints evaluated and approved by the Ministry of health/Rwanda Biomedical Center with local evidences on their effectiveness and residual efficacy.

5.10. Electronic and electrical mosquito control system

The electronic or electrical-discharge mosquito systems attract mosquitoes and other insects with light and then kill them with a “zap” of electricity. They use ultraviolet light, or neon or mercury lighting, which mosquito and other insects seem to be drawn to then killed.

6. INSECTICIDE RESISTANCE MANAGEMENT

Continuing the usage of LLINs, including scaling-up, as an insecticide treated bed nets is always better than no protection against human-vector contact, even in an area with insecticide resistance. In areas with vectors resistant to pyrethroids, where ITNs/LLINs are used as the primary intervention, IRS will use a different class of insecticide. In addition, the insecticide used in IRS will be rotated every 2 to 3 years with a different class of insecticide to manage the resistance.

To mitigate against the insecticide resistance, there will be an increasing role of inter-sectoral collaboration with other government Ministries and agencies such as the MINAGRI/RAB, REMA, RSB and private sector. Routine insecticide susceptibility monitoring will be undertaken annually and preferably every 6 months in the situation of high malaria transmission using WHO test tubes protocol or CDC-bottle assays.

The interpretation of WHO, 2016 susceptibility results are as follows:

a) To determine phenotypic resistance frequency
Susceptibility test with discriminating concentration (1×)

- 98-100% mortality: Susceptible population
- 90-97% mortality: Possible resistance within the population of mosquito tested and confirmation of resistance is required by other tests.
- < 90% mortality: Resistance individuals within the population of mosquito species tested

b) To determine resistance intensity
Susceptibility test, with intensity concentration (5×)

- ≥ 98% mortality: low intensity resistance
- < 98% mortality: moderate to high intensity resistance

Susceptibility test with intensity concentration (10×)

- ≥ 98% mortality: Moderate intensity resistance
- < 98% mortality High intensity resistance

c) Synergist-insecticide bioassay comparing insecticide versus synergist-insecticide exposures

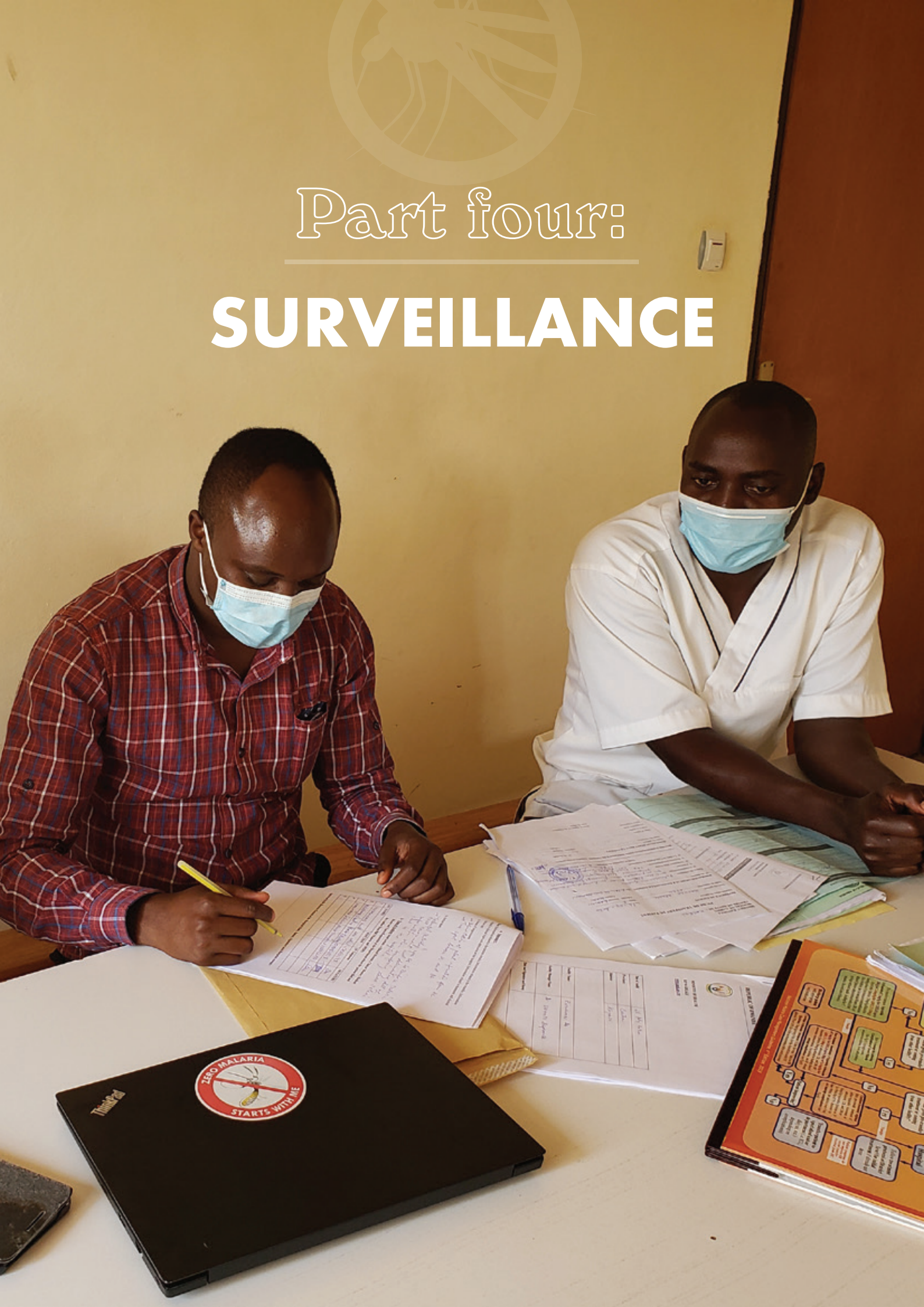
- Insecticide-synergist mortality not higher than for insecticide-only: Metabolic mechanism not involved
- Insecticide-synergist <98% mortality but higher than for insecticide-only: Metabolic mechanism partially involved
- Insecticide-synergist ≥98% mortality and higher than for insecticide-only: Metabolic mechanism fully involved

7. VECTOR CONTROL IMPLEMENTATION PLAN

All the vector control products imported into the country will be subject to evaluation of their quality at the point of entry according to national or international standards. See Annex 17 for implementation chart for vector control.

Part four:

SURVEILLANCE



1. INTRODUCTION

In case management, several approaches at both community and health facility levels have been implemented. A malaria surveillance system consists of the tools, procedures, people and structures that generate information on malaria cases and deaths, which can be used for planning, monitoring and evaluating malaria control programs. Effective malaria surveillance system will enable health centers, district, provincial, referral hospitals and national program to:

- Identify the areas or population groups most affected by malaria;
- Identify trends in cases and deaths that require additional intervention; and
- Assess the impact of control measures.

The design and implementation of a malaria surveillance system depends on two factors: (i) the level of malaria transmission and (ii) the resources available to conduct surveillance.

2. KEY MALARIA INDICATORS BY MALARIA STRATEGIES

2.1. Malaria case management

- Proportion of suspected malaria cases that receive a parasitological test at public sector health facilities
- Confirmed malaria cases treated (number and rate, disaggregated by age, sex and location)
- Inpatient malaria cases (number and rate, disaggregated by age and sex)
- Inpatient malaria deaths (number and rate, disaggregated by age and sex)
- Malaria test positivity rate (RDT and/or blood slide, disaggregated by health facility and community level and by age and sex)
- Percentage of cases due to P. falciparum
- Percentage of inpatient cases with a discharge diagnosis of malaria
- Percentage of inpatient deaths due to malaria
- Annual blood examination rate (RDT and Microscopy)
- Completeness of health facility reporting
- Timeliness of health facility reporting

2.2. Malaria prevention

- LLINs distributed (disaggregated by PW, U5s, Boarding Schools, HHs Distribution)
- Proportion of PW new registered who received LLINs during ANC visits
- Proportion of children under 1 year who received LLINs in EPI
- Structures sprayed (IRS, disaggregated by District)
- Population protected by IRS, LLINs

2.3. Malaria commodities

- Malaria commodities stocks at national level (RDTs, ACTs, Quinine, Artesunate)
- ACTs consumption per malaria case
- Health facilities reporting stock-out of ACTs continuously for 1 week
- Health facilities reporting stock-out of RDTs continuously for 1 week

- Health facilities reporting stock-out of Artesunate
- Health facilities reporting stock out of Quinine
- Health facilities reporting stock out of LLINs
- CHWs reporting stock out of ACTs through Rapidsms
- CHWs reporting stock out of RDTs through Rapidsms

2.4. SBCC Indicators:

- District Coordination meeting
- Radio and TV spot
- Community outreach
- TV and Drama

2.5. Other malaria impact and outcome indicators

- Malaria Parasite prevalence (disaggregated by age and sex)
    - Malaria prevalence in U5
    - Malaria prevalence in Pregnant Women
- LLINs utilization rate (General Population, PW, U5)
    - Proportion of pregnant women, who slept under a LLIN the previous night
    - Proportion of total population who slept under an LLIN the previous night
    - Proportion of children under five years old who slept under a LLIN the previous night
    - Percentage of the population that could sleep under an ITN if each ITN in the household were used by up to two people
    - Proportion of HH with at least one LLIN
- Knowledge of malaria transmission, prevention measures, signs and symptoms
    - Proportion of women who recognize fever as a symptom of malaria
    - Proportion of women who reported mosquito bites as a cause of malaria

3. DATA COLLECTION AND REPORTING

3.1. Data source

Malaria surveillance in Rwanda is integrated into a broader system of health information or communicable disease surveillance. At the health facility level, case-based surveillance of malaria inpatient cases and deaths is undertaken with the aim of responding to cases of severe disease and attaining a target of zero malaria deaths. Cases are graphed weekly and monthly to assess the extent to which control measures are reducing the incidence of malaria.

The main sources of data are the following:

- Registers and forms at all levels of care and treatment
- Rwanda Health Management Information System (R-HMIS)
- Sentinel Surveillance Systems
- Household Surveys (DHS, MIS, Other specific surveys)

- Health Facility Surveys
- National Malaria Control Program Monitoring System (ITN, IRS....)
- Community Health Workers Activity monitoring system
- eLMIS

From Health center level to Referral level, R-HMIS will serve as the main source of data. R-HMIS is an integration of different platforms such as SISCOM, DHIS2, eIDSR, eTB which can be accessed as one comprehensive database. At national level, HMIS will be triangulated by other sources of data as listed above annually for more comprehensive understanding of the progress of programs and stratification.

3.2. Data collection and reporting tools

- **The tools includes** report forms, tally sheets, registers, patient files, computer hardware and software, documentation and training materials.
- **Procedures includes** case definitions, reporting frequency, pathways of information flow, data quality checks, incentive schemes, data analysis, mechanisms for review of performance, methods for disseminating results, using data for making decisions, supervision and planning.
- **The people includes** decision-makers both inside and outside the health service who use data from surveillance systems, the health staff who gather or use the data and the community whose details are registered.
- **The structures** includes the ways staff are organized to manage, develop and use the system.

4. DATA ANALYSIS AND DECISION MAKING

4.1. Data Use by Health Center

Data should be reviewed at least monthly in order to answer the questions below:

- Are there unusual changes in the numbers of cases?
- Do some areas have more malaria than others?
- Is there adequate use of malaria drugs compared to malaria cases?
- How can severe cases and deaths be prevented?

4.2. Data Use by District

Joint analysis between District administration and district hospitals shall be necessary. Data shall be reviewed at least monthly in two ways: for the district and for individual health facilities or geographical areas:

4.2.1 Examination of Trends

Trends in malaria should be examined throughout the district. This will enable managers to answer the following questions:

- Are testing and reporting targets being met?
- Are there trends in malarial disease that are of concern?
- Are there unusual differences between indicators?

In order to perform these analyses, districts should update five surveillance graphs every month to monitor trends in malaria cases and deaths. Data should be presented for the current year and the previous 3 years to follow changes in indicators:

- Malaria incidence rates
- Proportional malaria incidence
- General patient attendance
- Diagnostic activity
- Quality of diagnosis and reporting
- LLINs distributed

4.2.2 Comparison of Indicators

Indicators for different health facilities or geographical areas should be compared. This will enable managers to answer the following questions:

- Which health facilities are testing and reporting adequately and which are experiencing problems? For example, are some health facilities unable to increase the percentage of suspected cases tested?
- Are there unusual differences between health facilities for some indicators? For example, is the number of cases not decreasing despite an increase in ITN coverage?

Such comparisons can be made by three methods: by examining control charts for each health facility, by constructing surveillance tables for each indicator or by constructing a summary table of surveillance indicators by health facility with trend statistics.

4.3. Data Use at National Level:

National level malaria program shall conduct analyses similar to those in districts:

(i) Analysis of overall trends nationally on the five control charts,

(ii) Comparison of districts from the control tables, and

(iii) Comparison of districts from summary tables of surveillance indicators.

In addition, national level will be compared using maps. Analysis will be done **weekly, monthly, quarterly and annually**. The aims are to ascertain whether targets are being met, whether there are trends in disease that are of concern, which districts are reducing the number of cases and which are experiencing problems and any unusual differences between indicators (e.g. failure of the number of cases to decrease despite an increase in ITN coverage). When necessary, individual district control charts will be inspected to explore issues in more detail, and data will be retrieved from individual health facilities and communicated to the district.

4.4. Decision Making with Data

To ensure smooth progress and identification of loopholes in the surveillance system, regular meetings and supervisions shall be conducted.

4.4.1 Formal meetings

Given that the data generated by a surveillance system are to be used to improve the operation of malaria control program, a schedule of meetings shall be observed to review malaria trends, such as the following:

- community health workers with health facility staff: monthly;
- health facility staff with district malaria control program staff: monthly;
- district staff with national malaria control program staff: quarterly.

4.4.2 Supervision

Supervision from national and district levels will be conducted to support building of the information system, ensure the completeness of reporting, analysis and discussion of data and follow-up of recommended actions. During visits to health facilities and district team offices, supervisors should check that registers are kept up to date, with all fields completed, that data on report forms correspond to the information in registers and tally sheets, that core analysis graphs and tables are up to date and that discussions are held about interpretation of the trends and potential action. Health facility staff shall be encouraged to investigate all inpatients malaria cases and deaths.

4.4.3 Feedback

District managers should prepare feedback for health facilities on monthly basis. The feedback developed should reach all levels including private health facilities that provide data. This should not simply reflect the data submitted by the health facility but should include comparisons with other health facilities in the district and summary statistics for the district as a whole. A regular bulletin can be produced in a standard format to present district results (based on control charts) and comparisons of health facilities.

A national feedback bulletin/report shall be produced each quarter, showing indicators by district. The bulletin/report shall be widely circulated to the districts highlighting action items to be worked on by district managers, provincial hospitals and district hospitals. Not only as feedback to districts, will this also serve as information for other government departments, institutions and implementing partners. Feedback can be made immediately (monthly) in case of alerting analysis finding.
Provincial hospital compiles and analyzes data from the catchment area then gives feedback every month to the district hospitals and an analysis report containing the above graphs should be shared monthly with the lower level. Provincial hospitals will follow up on monitoring the implementation of the recommendations highlighted in the quarterly reports developed and circulated by the national level

4.4.4 Severe malaria and stock status notification:

Severe malaria cases identified by CHWs in villages will be notified through Rapidsms. The head of Health Center and in charge of CHW receive the alert notification on severe malaria cases at community level for urgent action. At the same time, the team of intervention at hospital level is notified on severe malaria case to avoid any delays (preparations to receive the patient and prompt management at district Hospital, send timely the ambulance, and technically assist the Health Center team in pre transfer management). After appropriate treatment has been provided the **Health Center Nurse** and **District Hospital Nurse** **is required to fill a diagnostic form** of each patient notified for severe malaria.
For malaria drugs and commodities, CHWs can send Stock out notification (in case he/she remains with 0 stock) or Risk of stock out notification (in case he/she remains with drugs or commodities to treat or test one patient) through Rapidsms. Upon reception of the notification, the Health Center staff (CEHO) will immediately resupply the CHW with the drugs/commodities concerned with stock out or risk of stock out. In case the Health Center does not have enough stock to supply the CHWs, an emergence request should be addressed to the District pharmacy in order to prevent stock out in community.

5. RESEARCHES FOR DECISION MAKING

The MOPDD Surveillance and Epidemiology Unit is in charge of coordinating all researches conducted in different unit (Case Management, Prevention, Vector Control, SBCC, etc.) of the Division. Results of those researches will support the program in implementation of evidence-based interventions.

6. LEVELS AND RESPONSIBILITY IN MALARIA SURVEILLANCE AND REPORTING

Table 7: Stratified Roles in Malaria Surveillance and Reporting

Levels	Role and Responsibilities	Frequency
MoH/RBC	More interested in: • Data analysis and use • Malaria trends • Data dissemination through booklet • Data Quality Audit and report • SDGs indicator related to Malaria	According to the need Annually
MoH/RBC Partners (e.g. WHO)	More interested in: • Malaria trends, stratification, mapping • Dissemination at worldwide level /Comparison with other countries • Impact and outcome indicators	Annually Every two years Every five year
Malaria Division	Conduct key malaria indicators analysis for decision making: • Malaria incidence and mortality rates (trend over time); • Proportional malaria incidence and mortality rates; • General patient attendance rates; • Blood examination rate); and • Quality of diagnosis and health facility reporting. • LLINs distributed /targeted groups • Malaria commodities stock management…	Monthly , quarterly, Annually
	• Malaria Stratification mapping	Annually
	• Provide comprehensive annual report	Annually
	• Feedback and Data dissemination (ppt presentation, graph, tables, etc.)	Monthly, quarterly Annually
	• Death audit, HBM Supervision	Quarterly, Annually
	• Capacity Building in M&E	Annually
Province	Malaria data analysis and use (malaria trends, graph, tables, etc.): • Proportional malaria incidence and mortality rates; • General patient attendance rates; • Blood examination rate; • Quality of diagnosis and health facility reporting. • LLINs distributed /targeted groups; • Malaria commodities stock status; • Data use for immediate intervention or planning purpose.	Continuously Annually

Levels	Role and Responsibilities	Frequency
District	Malaria data analysis and use (malaria trends, graphs, tables, etc.): • Malaria cases • Malaria deaths • Population protected by preventive measure (IRS, LLINs) • Availability of malaria commodities • Data use for immediate intervention or planning purpose • Feedback to District Hospital/Health centers	Any time Annually
District Hospital	Conduct Data Analysis and generation of graphs, tables. The analysis should cover the following: • Malaria incidence and mortality rates (trend over time); • Proportional malaria incidence and mortality rates; • General patient attendance rates; • Diagnostic activity (annual blood examination rate); and • Quality of diagnosis and health facility reporting. • Analysis should be also undertaken by health facility catchment area and by district in order to set priorities for malaria control activities. • Carry out Feedback to Health Centers (if needed) • Data use for immediate intervention and planning purpose **Key indicators managed:** • Severe malaria cases • Malaria deaths	Monthly Monthly Any time
Health Center	• Supervision of CHWs and review quality of data • Coordination meeting and review of data reported from the community and feedback • Data entry from community and health center/health posts **Key indicators managed:** • Fever tested • Simple malaria Cases treated • Severe malaria cases referred • LLIN distributed (PW, U5s) • Malaria commodities Stock status • IEC/BCC related indicators **Required Performance** • Timeliness and completeness reporting • Quality of data (accuracy) • Quality of cases management	Monthly basis
Community/ Health Post	• Register cases • Report cases to Health center **Key indicators managed:** • Fever cases tested (under year and above) • Simple malaria cases treated • Number of RDT received/used	Daily Monthly

Part five:

SOCIAL BEHAVIOR CHANGE COMMUNICATION

Social and Behavior Change Communication (SBCC) is the systematic application of interactive, theory-based, and research-driven processes and strategies to effect change at the individual, community, and social levels. SBCC examines challenges from multiple sides by analyzing personal, societal, and environmental factors in order to find an effective way to achieve sustainable change. SBCC also employs strategies that influence the physical, socioeconomic, and cultural environment to facilitate and remove the barriers to healthy norms and choices.

1. SBCC FOR CASE MANAGEMENT

1.1. Introduction

In case management, several approaches at both community and health facility levels have been implemented to address the increasing number of malaria cases in Rwanda. However, there are some behavioral challenges associated with health-seeking behaviors, such as self-treatment, the use of traditional herbs, and waiting for malaria to get cured on its own, under estimating the severity of malaria as well as several myths and misconceptions that need to be addressed. It was also realized that malaria is among major causes of anemia and its increase leads to high consumption of blood from the blood bank.

1.2. Priority areas

To deal with the challenges observed in malaria diagnosis and treatment, this guideline suggests acting on the following priority areas including, increasing awareness of the signs and symptoms of malaria; promoting early treatment-seeking behavior, and demonstrating the importance of completing treatment, which is key to fighting treatment failure (prevention of malarial parasites developing resistance to drugs) as well as sensitizing the population to donate blood.

1.3. Communication channels:

Community dialogues forums (Umuganda, umugoroba w'ababyeyi, inteko y'umudugudu, etc.),
Home visit by CHWs and health facility IEC.
Mass media: radio talk shows, radio drama, radio spot, radio sketches, TV programs, community outreaches drama Shows, Mobile video etc.
National campaigns such as health week, World malaria day, Mother and child health week,...

2. SBCC FOR PREVENTION

The main prevention interventions implemented in Rwanda include the distribution of LLINs through continuous/routine channels to children under five years and pregnant women, periodic mass-distribution campaigns, IRS of insecticides in high burden districts, environmental management, early treatment, personnel protection, and mosquito repellent (mosquito coil, body lotion, repellent plants, electric, etc.). Messages on malaria prevention will focus on majors' malaria prevention interventions that are accessible and affordable by community members.

The SBCC guidelines for malaria prevention will address the following priority areas:

Priority area	Key messages	Communication channels
Address existing myths and misconceptions about LLINs and encourage household members to ensure correct and consistent use	Hang up well LLIN sand properly and sleep regularly under it	• Mass media: radio talk shows, radio drama, radio spot, radio sketches, TV programs, community outreaches drama Shows, etc. • Health facility IEC • Community dialogues forums (Umuganda, umugoroba w'ababyeyi, inteko y'umudugudu, etc.) • Home visit by CHW • National campaigns such as health week, World malaria day, Mother and child health week, • Sensitization in community meetings such as churches/mosques.
	Maintain and repair LLINs whenever necessary	
	LLINs should only be used for malaria prevention	
Increase IRS acceptance at the community and HH levels, and adherence to post-IRS recommendations	The benefits of IRS outweigh the inconvenience of moving HH items in preparation for spraying	
	IRS frees the house from malaria-transmitting mosquitoes	
	The HH head allows the entire house to be sprayed by helping the spray team members and agrees to remove HH belongings during spraying	
	Comply with post-spraying instructions to maintain the effectiveness of IRS	
	Keep using LLINs each night even after IRS.	
Promote environmental management including hygiene and sanitation to decrease mosquito breeding sites	Malaria-transmitting mosquitoes breed in stagnant water; make sure you destroy or remove all mosquito breeding sites	
Promote the prevention and control of malaria in pregnancy and children under five	Pregnant women accompanied by their partners attend all ANC visits as recommended and receive LLINs	
	Pregnant women and their partners disregard the myths and misconceptions around pregnancy because ANC visits are very beneficial to the woman and the unborn child	
	Parents and care givers ensure Children < 5 sleep under LLINs correctly and consistently as one of the key preventive measures for malaria	
	Parent and care givers take children for immunization and obtain LLIN at 9 months of age (of the child)	

ANNEXES

ANNEX 1: KEY PERFORMANCE INDICATORS FOR MALARIA

Program Area	Criteria	Description
Case Management	**Name of Indicator**	**1.1 Proportion of simple malaria cases treated at community level**
	Numerator	Number of simple cases treated at community level (a)
	Denominator	Total simple cases treated in the catchment area (Community) of HC (b)
	Purpose	To increase access to early diagnosis and treatment of malaria cases at community level to reduce severe malaria cases and mortality
	Formula	a/b*100
	Level	Health Center, DH and National Level
	Source	Registers (OPD, Inpatient register, Lab Register), Stock Cards, SISCOM, HMIS
	Frequency	Monthly
	Target	80% of simple cases are treated at community level
	Interpretation	If the proportion is less than 80%, there is a gap in early diagnosis and treatment at community level with a risk of increase of severe malaria cases and deaths
Case Management	**Name of Indicator**	**1.2 Proportion of referred severe malaria cases that received adequate pre-transfer treatment)**
	Numerator	Number of severe cases transferred with pre-transfer treatment (a)
	Denominator	Total severe malaria transferred (b)
	Formula	a/b*100
	Purpose	To ensure the quality of severe malaria management
	Level	Health Center, DH, Referral and National level
	Source	Registers (OPD, Inpatient register, Lab Register), Stock Cards, SISCOM, HMIS
	Frequency	Monthly
	Target	100%
	Interpretation	If the % is less than 100%, there is a risk to increase malaria deaths
Case management	**Name of Indicator**	**1.3 Proportion of severe malaria cases correctly managed at Hospitals (refer to malaria treatment guideline)**
	Numerator	Number of severe cases correctly managed (a)
	Denominator	Total number of severe malaria cases treated (b)
	Formula	a/b*100
	Purpose	To reduce malaria related death and increase quick recovery
	Level	Provincial/ Referral hospitals
	Source	Inpatient registers, patient file, HMIS,health facility survey (HFs)

Program Area	Criteria	Description
	Frequency	Monthly, Survey
	Target	100%
	Interpretation	If less than 100%, the gap leads to increase malaria deaths or recovery with delay and some consequences, sequelae
Case Management	**Name of Indicator**	**1.4. Proportion of confirmed death attributed to malaria (with audit report)at Hospitals**
	Numerator	Number of confirmed malaria related death with audit report (a)
	Denominator	Total Malaria deaths (b)
	Formula	a/b*100
	Purpose	To ensure the proper management and reporting of severe malaria cases
	Level	District, Provincial and Referral Hospitals and National level
	Source	Registers, Patient file, HMIS
	Frequency	Daily (immediately after death notification)
	Target	100%
	Interpretation	If the % is low, there is gap in severe malaria case management and quality of reporting
Case management	**Name of Indicator**	**1.5 Proportion of fever tested using microscopy (BS) at Health Facility level**
	Numerator	Number of Fever cases tested using BS (a)
	Denominator	Number of Fever cases tested (BS&RDTs) (b)
	Formula	a/b*100
	Purpose	To ensure the quality of malaria diagnosis through the use of gold standards (BS)
	Level	Health Center
	Source	Lab Register at Health Facility
	Frequency	Monthly
	Target	95%
	Interpretation	If the percentage is below 95% there is a gap in malaria diagnosis quality and no compliance to malaria guidelines and forecasting of RDTs
Case management	**Name of Indicator**	**1.6 Proportion of loss (value in money) of expired malaria commodities (RDT and Antimalarial Drugs)**
	Numerator	Value (in money) of expired malaria commodities annually (a)
	Denominator	Value (in money) of antimalarial commodities received annually (b)
	Formula	a/b*100
	Purpose	To ensure the quality management of malaria commodities supply chain
	Level	Health Center, DP, Central level (MPPD)
	Source	PV of expiration, Stock cards of the pharmacy's stock for community and Health center
	Frequency	Monthly, Annually
	Target	10% maximum acceptable
	Interpretation	Change in malaria morbidity especially when is reduction in malaria cases, change of drugs used in treatment guidelines which is leading to an Overstock with risk of expiration of malaria commodities. If high, there is gap in quality of stock management

Program Area	Criteria	Description
Case management	**Name of Indicator**	**1.7 Proportion of CHWs who reported no stock out for RDTs**
	Numerator	All CHWs (binome) who reported no stock out for RDT (a)
	Denominator	All CHWs (binome) who reported stock status (b)
	Purpose	To ensure the availability of RDTs for early diagnosis and treatment
	Formula	a/b*100
	Level	Health Center
	Source	CHWs' Report, Registers (Stock Cards, requisition form, SISCOM)
	Frequency	Monthly
	Target	100%
	Interpretation	If one of malaria commodities is missing, CHW are not implementing HBM adequately
Case management	**Name of Indicator**	**1.8 Proportion of CHWs who reported no stock out for ACTs**
	Numerator	All CHWs (binome) who reported no stock out for any Anti-Malarial Drugs (a)
	Denominator	All CHWs (binome) who reported stock status (b)
	Purpose	To ensure the availability of antimalarial drugs at community level for early treatment
	Formula	a/b*100
	Level	Health Center
	Source	CHWs' Report, Registers (Stock Cards, requisition form, SISCOM)
	Frequency	Monthly
	Target	100%
	Interpretation	If less than 95%, CHW are not implementing HBM adequately
Prevention	**Name of Indicator**	**2.1 Percentage of pregnant women who received LLINs through ANC services at their first ante natal care visit**
	Numerator	Number of pregnant women who received LLINs through ANC services (a)at their first ante natal care visit
	Denominator	Total number of pregnant women attended ANC service for their first visit.(New registered) (b)
	Formula	a/b*100
	Purpose	To ensure LLINs universal coverage for vulnerable group, in the case PWs
	Level	Health Center
	Source	Registers (LLINs distributed to PW), stock cards, ANC register,
	Frequency	Monthly
	Target	100%
	Interpretation	If less than 100%, some PWs are not covered by preventive measure and are at risk of developing malaria in pregnancy…

Program Area	Criteria	Description
Prevention	**Name of Indicator**	**2.2 Percentage of U1 Year old who received LLINs through EPI services at HC**
	Numerator	Number of U1Year who received LLINS through EPI during the reporting period (a)
	Denominator	Total Number of U1Year who received measles vaccination during the reporting period (b)
	Formula	a/b*100
	Purpose	To ensure LLINs universal coverage of vulnerable group
	Level	Health Center
	Source	EPI register, LLINs distribution registers, stock cards
	Frequency	Monthly
	Target	100%
	Interpretation	If less than 100%, some U1Year children are not covered by preventive measures and are at risk of developing malaria illness
Prevention	**Name of Indicator**	**2.3 Percentage of LLINs available at household level**
	Numerator	Number of LLINs available at household level (a)
	Denominator	Total number of LLINs received by Household (b)
	Formula	a/b*100
	Purpose	To maintain ownership of LLINs distributed
	Level	Health Center
	Source	CHW report at HC
	Frequency	Quarterly
	Target	80%
	Interpretation	If less than 80%, there is a gap in ownership and risk of non-utilization of LLINs for malaria prevention
Prevention	**Name of Indicator**	**2.4 Proportion of structures in public and private institutions covered by IRS (hospitals, hotels, prisons and boarding schools)**
	Numerator	Number of structure in public and private institutions sprayed (a)
	Denominator	Total number of structure in institutions (public and private) eligible for spraying (b)
	Formula	a/b*100
	Purpose	To increase IRS coverage by engaging public and private sector
	Level	Eligible Public and Private Institutions (hospitals, hotels, prisons and boarding schools)
	Source	District and RBC-MOPDD, Respective public and private institutions
	Frequency	Annually (depending of the type of insecticide product in use)
	Target	100% of targeted Structures
	Interpretation	If low, some population groups are benefitting from the full package of malaria control strategies

Program Area	Criteria	Description
SBCC	**Name of Indicator**	**2.5. Proportion of eligible targeted areas (surface) benefiting from larviciding**
	Numerator	Eligible Area (surface) treated with larvicides (a)
	Denominator	Eligible targeted area (surface) (b)
	Formula	a/b*100
	Purpose	To control of outdoor biting of Malaria vector
	Level	Low Malaria Transmission Districts (according to the WHO Recommendations)
	Source	District
	Frequency	Monthly
	Target	TBD
	Interpretation	If low coverage, outdoor malaria transmission won't be controlled leaving the population not fully protected
SBCC	**Name of Indicator**	**3.1. Number of Malaria coordination meeting organized at District level**
	Numerator	Number of Malaria coordination meeting conducted (a) at district level
	Denominator	Number of Malaria coordination meeting planned(b) at district level
	Formula	a/b*100
	Purpose	To increase awareness and ownership of district leaders in malaria control
	Level	District
	Source	District
	Frequency	Quarterly
	Target	100%
	Interpretation	If less than 100% there is a gap in malaria control awareness and ownership...
SBCC	**Name of Indicator**	**3.2. Number of IEC/BCC message aired /diffused on malaria control at district level**
	Numerator	Number of IEC/BCC messages aired/diffused on malaria control (a) at district level
	Denominator	Number of IEC/BCC messages planned to be aired/diffused on malaria control (b) at district level
	Formula	a/b*100
	Purpose	To increase awareness in the general population
	Level	District
	Source	IEC/BCC registers/Community radio archives
	Frequency	Monthly
	Target	100%
	Interpretation	If less than 100%, there is a gap in malaria control awareness

ANNEX 2: IMPLEMENTATION OF GUIDELINES

Minimum package of services:

Malaria control and management related services are integrated in existing health care delivery services. For strengthening and improvement of the services delivered to end users, the following minimum package of services to be offered to the population was defined based on the available resources financial, human capacity, evidence based recommendation from WHO and based on local settings of each level of health facility.

Level/provider	Prevention &SBCC	Case management	Surveillance
Community (CHWs)	- Ensure effective LLINs need assessment and distribution refer to the community need - Ensure the proper use of LLINs - Community mobilization on malaria prevention strategies and SBCC	- Malaria testing with RDTs - Provide antimalarial treatment for simple malaria cases - Adherence message - Provide Pre-transfer Artesunate suppo and refer severe cases to the HC	- Provide timely and correct report to HC - Real time notification of severe malaria cases - Real time notification of stock status of malaria commodities
Health Post Nurse A2	- Prevention message, Provide information to the community	- Antipyretics - Malaria testing with RDTs - Provide antimalarial treatment for simple malaria cases - Adherence message - Provide Pre-transfer and refer severe cases to the HC	- Provide timely and correct report to HC
Local leaders	- Ensure effective LLINs need assessment - Ensure the proper use of LLINs - Ensure sensitization of community focusing on the importance of malaria prevention and early treatment	- Ensure the local population seek care timely. - Ensure CHWs are regularly supplied in malaria drugs and commodities.	- Ensure the quality of data. - Use of malaria data for decision making.

Level/provider	Prevention &SBCC	Case management	Surveillance
Health centers and hospitals	- Conduct LLINs needs assessment - Ensure effective distribution of LLINs - LLINs utilization monitoring on a routine basis - Ensure the involvement of local leaders in malaria prevention interventions - Ensure sensitization of community focusing on the importance of local malaria prevention strategies and treatment	- Malaria testing RDTs or Microscopy (Blood smear) - Other complementary exam. - Provide antimalarial drugs and supportive treatment - Adherence message - Provide pre transfer treatment in case of transfer - -Refer severe cases to the upper level of care.	- Provide timely and correct report to central level via existing channels. - Data quality verification on monthly basis. - Data use for decision making.
MoH/RBC	- Provide guidelines, instructions and technical support on LLINs use and management - Provision of quantity needed of LLINs - Provide guidelines, instructions and technical support on malaria prevention messages - Resource mobilization - Follow up and Monitoring	- Provide guidelines, instructions and technical support on malaria case management. - Resource mobilization - Distribution of antimalarial drugs and commodities. - Elaboration guidelines on management of antimalarial drugs and commodities.	- Provide timely and correct report to different partner's. - Provide technical support to decentralized level in terms of data quality assurance. - Data quality verification on quarterly basis. - Data use for decision making.
MOH partnership organizations	- Funds &Resources mobilization - Coordination of LLINs need assessment and coordination	- Funds &Resources mobilization.	- Data use for decision making.

ANNEX 3:ANTIMALARIAL DRUGS RECOMMENDED IN COUNTRY

Antimalarial drug	Indication
First line treatment	
AL	• Simple malaria
Quinine tablet	• Simple malaria in case of contraindication to artemisinin • Simple malaria in Pregnant woman in first trimester
Second line	
Dihydroartemisinin Piperaaquine	• Simple malaria in case of AL failure within 28 days following the course
Artesunate injectable	• Simple malaria with minor digestive symptoms • Severe malaria

ANNEX 4: SPECIFICATIONS OF LLIN INSECTICIDES

Netting Material: Polyester (multifilament, insecticide-coated)

	Denier	Insecticide Concentration (g/kg ± 25%)	Minimum Bursting Strength (kPa)	Other Relevant Specifications
Deltamethrin	50	2.3	≥ 250	**Wash Resistance Index:** 85-99% **Wash Dimensional Stability:** ≤ 5% shrinkage/ expansion **Netting Mesh Size:** ≥ 24 holes/cm² (155 holes/in²)
	75	1.85	≥ 250	
	100	1.4	≥ 350	
Alpha-cyper-methrin	75	6.7	≥ 250	**Wash Resistance Index:** 90-101% **Wash Dimensional Stability:** ≤ 5% shrinkage/ expansion **Netting Mesh Size:** ≥ 24 holes/cm² (155 holes/in²)
	100	5.0	≥ 405	
	75	100	≥ 250	**Wash Dimensional Stability:** ≤ 5% shrinkage/ expansion **Netting Mesh Size:** ≥ 24 holes/cm² (≥ 156 holes/inch²)
Alpha-cyper-methrin with chlorfenapyr	100	200	≥ 405	

Netting Material: Polyethylene (monofilament, high-density, insecticide-incorporated)

	Denier	Insecticide Concentration (g/kg ± 25%)	Minimum Bursting Strength (kPa)	Other Relevant Specifications
Deltamethrin w/o PBO* w/ PBO	120	1.8	≥ 400	**Wash Resistance Index:** 95-101% **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 18 holes/cm² (116 holes/in²)
	100	4.0 PBO: 25 g/kg ± 25%	≥ 400	**Wash Resistance Index:** 88-100% (PBO: 81-100%) **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 20 holes/cm² (129 holes/in²)
Permethrin** w/o PBO w/ PBO	150	20	≥ 350	**Wash Resistance Index:** 97-101% **Wash Dimensional Stability:** ≤ 10% shrinkage/expansion **Netting Mesh Size:** ≥ 5 holes/cm² (32 holes/in²)
	150	20 PBO: 10 g/kg ± 25%	≥ 250	**Wash Resistance Index:** 96-101% (PBO: 84-96%) **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 6 holes/cm² (39 holes/in²)
Alpha-cypermethrin w/o PBO w/ PBO	150	5.8	≥ 450	**Wash Resistance Index:** 95-101% **Wash Dimensional Stability:** ≤ 10% shrinkage/expansion **Netting Mesh Size:** ≥ 20 holes/cm² (129 holes/in²)
	130	6.0 PBO: 2.2 g/kg ± 25%	≥ 350	**Wash Resistance Index:** 95-100% (PBO: 92-100%) **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 12.5 holes/cm² (80.6 holes/in²)

*PBO = piperonyl butoxide, added as synergist (an agent that increases the effectiveness of the insecticide)
**Permethrin is 40:60 (cis:trans) isomer ratio and should stay within range of 50:50 to 30:70.

Netting Material: Polyethylene, 4-locks knitting pattern*** (monofilament, high-density, insecticide-incorporated)

	Denier	Insecticide Concentration (g/kg ± 25%)	Minimum Bursting Strength (kPa)	Other Relevant Specifications
Alpha-cypermethrin	130	4.5	≥ 470	**Wash Resistance Index:** 95-101% **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 18 holes/cm² (116 holes/in²)

***The knitting pattern of this netting material is characterized by having a lock in each of the 4 corners of a hole – see Figure 1 hereafter.

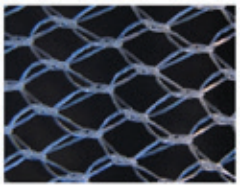


Figure 1: Knitting pattern of MiraNet LN.

Netting Material: Polypropylene (multifilament, insecticide-incorporated)

	Denier	Insecticide Concentration (g/kg ± 25%)	Minimum Bursting Strength (kPa)	Other Relevant Specifications
Deltamethrin	100	8.5	≥ 450	**Wash Resistance Index:** 74-99% **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 21 holes/cm² (135 holes/in²), with average mesh size between 21-29 holes/cm² (135-187 holes/in²)

Combined Netting Materials:
Roof of net made of polyethylene (monofilament, deltamethrin-incorporated w/ PBO),
Sides of net made of polyester (multifilament, deltamethrin-coated)

	Denier	Insecticide Concentration (g/kg ± 25%)	Minimum Bursting Strength (kPa)	Other Relevant Specifications
Deltamethrin w/ PBO (on polyethylene roof)	100	4.0 PBO: 25 g/kg ± 25%	≥ 400	**Wash Resistance Index:** 88-100% (PBO: 81-100%) **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 20 holes/cm² (129 holes/in²)
Deltamethrin w/o PBO (on polyester sides)	75	1.85	≥ 250	**Wash Resistance Index:** 85-99% **Wash Dimensional Stability:** ≤ 5% shrinkage/expansion **Netting Mesh Size:** ≥ 24 holes/cm² (155 holes/in²)
	100	1.4	≥ 350	

Source of Guidelines: WHO Specifications for Pesticides Used in Public Health http://www.who.int/whopes/quality/newspecif/en/

ANNEX 5: QUALITY CONTROL CHECKLIST AT COMMUNITY LEVEL:

Quality management activity (Directly observe the CHW performing RDT):	**Write Comments Below:**
Quality of the Test:	
Check the expiry dates of RDTs	
Storage conditions (in the appropriate box).	
Check if the RDT tool kit is complete (the test, gloves, buffer solution, blood lancet,)	
Problems in performance of RDTs by health workers, check if:	
Insufficient blood in hole because transfer device is defective or too large for the hole or because blood cannot exit transfer device	
Too much blood put in hole and remaining in test window wrongly interpreted as a positive test line	
Faint lines wrongly interpreted as negative	
Thinking there is a test line when there is none from fear of missing a faint line	
Insufficient buffer placed in hole	
Blood or buffer placed in wrong hole (for RDTs with different holes for blood and buffer)	
Poor visual acuity of health worker	

ANNEX 6: MALARIA COMMODITY SPECIFICATIONS

Product Denomination	Artemether Lumefantrine 6x1 & Artemether Lumefantrine 6x2 tablets
Dosage	The combined therapy must be Artemether 20mg and Lumefantrine 120mg(AL) per tablet
Presentation	Two age groups 6x1 and 6x2 weighing respectively 5kg-15kg and 15-25kg. The tablets are dispersible.

Common presentation of the tablet	• Weight category must be well classified for the 2 groups:
	  ○ 5-15kg
	  ○ 15-25 kg
	• Tablets must be in yellow color;
	• Drug instructions should be written on the front of the package where tablets are visible as per the design attached;
	• Product must have at least 24 months of shelf life;
	• The tablets to be taken in one dose per age group must be enclosed in one square well separated from another in order to orient patients on the way to take the ACT and ensure a good compliance;
	• The blister must show the succession of doses for the total cure from one dose to another and from day 1 to day 3 using arrows as illustrated in the design attached;
	• The blister must specify that the second dose is taken 8 hours after the first dose

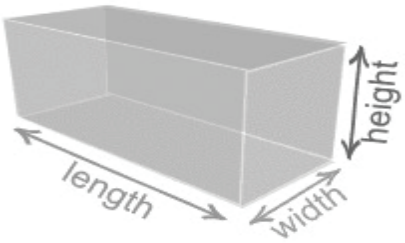
Product denomination	**Artemether Lumefantrine 6x3 and Artemether Lumefantrine 6x4 tablets**
Dosage	The combined therapy must be Artemether 20mg and Lumefantrine 120mg(AL) per tablet
Presentation	Two age groups 6x3 and 6x4 weighing respectively 25kg-35kg and above 35kg; The tablets are non-dispersible

Common presentation of the tablet	• Weight category must be well classified for the 2 groups:
	  ○ 25-35kg
	  ○ And 35kg & above.
	• Tablets must be in yellow color;
	• Drug instructions should be written on the front of the package where tablets are visible as per the design attached;
	• Product must have at least 24 months of shelf life;
	• The tablets to be taken in one dose per age group must be enclosed in one square well separated from another in order to orient patients on the way to take the ACT and ensure a good compliance;
	• The blister must show the succession of doses for the total cure from one dose to another and from day 1 to day 3 using arrows as illustrated in the design attached;
	• The blister must specify that the second dose is taken 8 hours after the first dose

Product denomination	Artesunate injection
Dosage	Artesunate 60mg
Presentation	• Ampoule or vial containing 60mg anhydrous Artesunate • Co-packed 50mg/1ml ampoule of 5% sodium bicarbonate solution • Product must have at least 24 months of shelf life. • The reconstituted, diluted solutions showed acceptable stability, chemically and physically (including particulate matter), for one hour at 25 °C-30°C.
Product denomination	**Quinine tablets**
Dosage	Quinine sulfate tablet should contain: 300mg/ tablet
Presentation	• Quinine tablets of 300mg, • Packaging: • Shelf life 2 years from date of analysis • Temperature storage between 18 - 25°C
Products denomination	**Quinine injection**
Dosage	Quinine sulfate: 300mg/ml or 600mg/2ml
Presentation	• Quinine Dihydrochloride Injection should be available in the following packaging: • 300mg/1ml vial or ampoules; • 600mg/2ml vial or ampoules; • Packaging: 1 pack of 100 vials per box
Products denomination	**Malaria Rapid Diagnostic Tests**

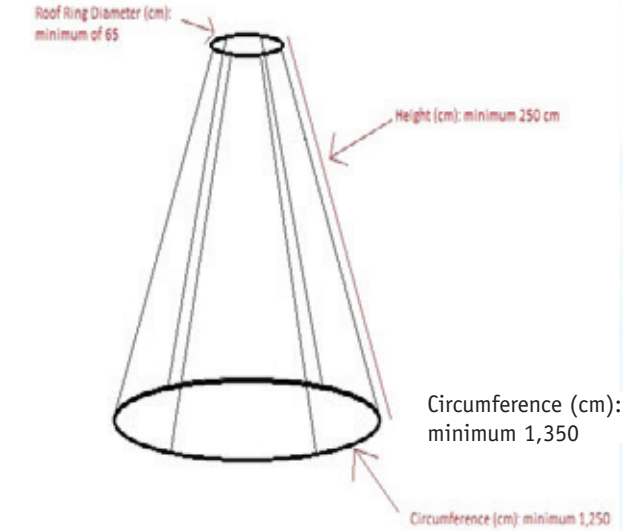
Presentation	• RDTs with antigen detecting pLDH/HRP2
	• Detection rate:>80% of Plasmodium Falciparum at 200 parasites/µl.
	• Detection rate: > 90% of Plasmodium Falciparum at 2000 or 5000 parasites/µl.
	• False positivity rate less than 3%.
	• Invalid rate: less than 3%.
	• Storage temperature: between 4 °C and 30°C.
	• The RDTs to be ISO Certified.
	• RDT format: cassette (easy use for CHWs) with:
	• Capillary blood collected from fingertip
	• Whole blood collected by venipuncture using EDTA sample tubes
	• Appropriate packaging (Combo, kits 30tests).
	• Each sealed pouch contains test device with a pipette.
	• The kit contains:
	  ○ 30 test devices individually foil pouched with a desiccant
	  ○ 30 5µL capillary pipettes, 30 lancets, 30 alcohol swabs, 30 individual buffer ampoules
	  ○ Instructions for use
	  ○ 30 pairs of latex gloves, 30 dried swabs

ANNEX 7: RECTANGULAR LLIN SPECIFICATIONS

Type of Specifications	Standard Specifications with proof documents
Product	Polyester, polyethylene, polypropylene (from WHO recommended LLINs list)
Netting material	**Denier:** Not less than 100 **Bursting strength:** Not less than 350 kPa for polyester fiber, 450 kPa for polypropylene fiber and 250 kPa for polyethylene fiber **Mesh size:** should be between 56 to 161 holes per inch^2 **Dimensional stability at washing**: Not more than 10% shrinkage after washing **Wash resistance:** net quality should be maintained after not less than 20 standards washes **N.B.:** Long-Lasting Insecticidal Mosquito Nets will be based on the most recent WHO recommendations.
Shape	**Rectangular** **Definition:** the net will have six faces that are rectangles. The height must be the same at each point of measurement of the net. **Illustration:** 
Color	One of the following colors: **green, white or sky blue**
Dimensions	**Length:** 190 cm minimum (the acceptable deviation is ≤ 5%) **Height:** 180 cm minimum (the acceptable deviation is ≤ 5%) **Width:** 180 cm minimum (the acceptable deviation is ≤ 5%) Net attachment: 8 reinforced fabric loops
Incorporated or coated insecticide	a) Deltamethrin, permethrin or Alpha-cypermethrin: insecticide incorporated into polyethylene fibber or insecticide coated on polyester fiber; b) Additional to insecticides mentioned above, LLINs treated with insecticide synergists (e.g.: PBO) **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.

Insecticide concentration	» **Monotreated nets** a) Delthametrin: 1.05-2.8 g/kg b) Permethrin: 17-23 g/kg c) Alpha-cypermethrin; 3.75- 8.4 g/kg » **Combination nets** **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Effective duration	Not less than 3 years after opening (source)
Special Delivery Instructions	The mosquito nets must be packed with a manufacture brand name and according to design of local brand name (eg: Tuzanet®). The local brand name is given to MPPD by RBC's Malaria and Other Parasitic Diseases Division after final notification to the winner of the tender. Note that each mosquito net must have individual packaging and each bale must contain 50 pieces compressed by the accurate machine at the factory. On the bale and the individual package of each LLINs, mark name of manufacturer, quantity of mosquito nets per bale, dimension, shape, tender number, and insecticide used, concentration, date of production, shelf life of LLIN and batch number. Label on the mosquito net with product trade name, manufacturer, insecticide used, insecticide concentration and date of production, shelf life of LLIN, batch number, 5 ISO3758 pictograms. **N.B. Local branding name and design on CD to be obtained from the Medical Procurement and Production Division.**
Acceptance conditions	This is subject to in country physical and chemical inspections according to international and national guidelines

ANNEX 8: CONICAL LLIN SPECIFICATIONS

Type of Specifications	Standard Specifications with proof documents
Product	Polyester, polyethylene, polypropylene (from WHO recommended LLINs list)
Netting material	**Denier:** Not less than 100 **Bursting strength:** Not less than 350 kPa for polyester fiber, 450 kPa for polypropylene fiber and 250 kPa for polyethylene fiber **Mesh size:** should be between 56 to 161 holes per inch^2 **Dimensional stability at washing**: Not more than 10% shrinkage after washing **Wash resistance:** net quality should be maintained after not less than 20 standards washes **N.B.:** Long-Lasting Insecticidal mosquito Nets will be based on the most recent WHO recommendations.
Shape	**Conical** **Definition:** the net will have a circular base and one seam. The net will be made of one or multiple vertical panels of cloths. The distance between the seam and the base must be the same at point of measurement of the net. **Illustration:** Roof Ring Diameter (cm): minimum of 75 
Color	One of the following colors: **green, white, or sky blue**
Dimensions	**Circumference:** 1250 cm minimum (the acceptable deviation is ≤ 5%) **Height:** 250 cm minimum (the acceptable deviation is ≤ 5%) **Ring diameter:** 65 cm minimum (the acceptable deviation is ≤ 5%) **Net attachment:** 1 reinforced fabric loop

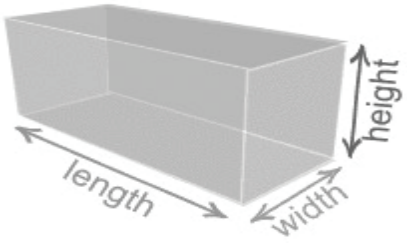
Incorporated or coated insecticide	a) Deltamethrin, permethrin or Alpha-cypermethrin: insecticide incorporated into polyethylene fibber or insecticide coated on polyester fiber; b) Additional to insecticides mentioned above, LLINs treated with insecticide synergists (e.g.: PBO) **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Insecticide concentration	» **Monotreated nets** a) Delthametrin: 1.05-2.8 g/kg b) Permethrin: 17-23 g/kg c) Alpha-cypermethrin; 3.75- 8.4 g/kg » **Combination nets** **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Effective duration	Not less than 3 years after opening
Special Delivery Instructions	The mosquito nets must be packed with a manufacture brand name and according to design of local brand name (eg: Tuzanet®). The local brand name is given to MPPD by RBC's Malaria and Other Parasitic Diseases Division after final notification to the winner of the tender. Note that each mosquito net must have individual packaging and each bale must contain 50 pieces compressed by the accurate machine at the factory. The spring ring is included in the individual packaging of each mosquito net. Note that the spring ring must be flexible, made in plastic material. On the bale and the individual package of each LLINs, mark name of manufacturer, quantity of mosquito nets per bale, dimension, shape, tender number, and insecticide used, concentration, date of production, shelf life of LLIN and batch number. Label on the mosquito net with product trade name, manufacturer, insecticide used, insecticide concentration and date of production, shelf life of LLIN, batch number, 5 ISO3758 pictograms. **N.B. Local branding name and design on CD to be obtained from the Medical Procurement and Production Division.**
Acceptance conditions	This is subject to in country physical and chemical inspections according to international and national guidelines

ANNEX 9: EXTRA-LARGE CONICAL LLIN SPECIFICATIONS

Type of Specifications	Standard Specifications with proof documents
Product	Polyester, polyethylene, polypropylene (from WHO recommended LLINs list)
Netting material	**Denier:** Not less than 100 **Bursting strength:** Not less than 350 kPa for polyester fiber, 450 kPa for polypropylene fiber and 250 kPa for polyethylene fiber **Mesh size:** should be between 56 to 161 holes per inch^2 **Dimensional stability at washing:** Not more than 10% shrinkage after washing **Wash resistance:** net quality should be maintained after not less than 20 standards washes **N.B.:** Long-Lasting Insecticidal mosquito Nets will be based on the most recent WHO recommendations.
Shape	**Conical** **Definition**: the net will have a circular base and one seam. The net will be made of one or multiple vertical panels of cloths. The distance between the seam and the base must be the same at point of measurement of the net. **Illustration**: 
Color	One of the following colors: **green, white, or sky blue**
Dimensions	**Circumference:** 1,350cm minimum (the acceptable deviation is ≤ 5%) **Height:** 250cm minimum (the acceptable deviation is ≤ 5%) **Ring diameter:** 75cm minimum (the acceptable deviation is ≤ 5%) Net attachment: 1 reinforced fabric loop

Incorporated or coated insecticide	a) Deltamethrin, permethrin or Alpha-cypermethrin: insecticide incorporated into polyethylene fibber or insecticide coated on polyester fiber; b) Additional to insecticides mentioned above, LLINs treated with insecticide synergists (e.g.: PBO) would be the preferred option **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Insecticide concentration	» **Monotreated nets** a) Delthametrin: 1.05-2.8 g/kg b) Permethrin: 17-23 g/kg c) Alpha-cypermethrin; 3.75- 8.4 g/kg » **Combination nets** **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Effective duration	Not less than 3 years after opening
Special Delivery Instructions	The mosquito nets must be packed with a manufacture brand name and according to design of local brand name (eg: Tuzanet®). The local brand name is given to MPPD by RBC's Malaria and Other Parasitic Diseases Division after final notification to the winner of the tender. Note that each mosquito net must have individual packaging and each bale must contain 50 pieces compressed by the accurate machine at the factory. The spring ring is included in the individual packaging of each mosquito net. Note that the spring ring must be flexible, made in plastic material. On the bale and the individual package of each LLINs, mark name of manufacturer, quantity of mosquito nets per bale, dimension, shape, tender number, and insecticide used, concentration, date of production, shelf life of LLIN and batch number. Label on the mosquito net with product trade name, manufacturer, insecticide used, insecticide concentration and date of production, shelf life of LLIN, batch number, 5 ISO3758 pictograms. **N.B. Local branding name and design on CD to be obtained from the Medical Procurement and Production Division.**
Acceptance conditions	This is subject to in country physical and chemical inspections according to international and national guidelines

ANNEX 10: G2 RECTANGULAR LLINS SPECIFICATIONS

Type of Specifications	Standard Specifications with proof documents
Product	Polyester(from WHO recommended LLINs list)
Netting material	**Denier:** 75 or 100 **Bursting strength:** 75 denier: ≥ 250 kPa, 100 denier: ≥ 405 kPa **Mesh size:** ≥ 156 holes/inch^2 or ≥ 24 holes/cm^2 **Dimensional stability at washing:** < 5% shrinkage after washing **Wash resistance:** net quality should be maintained after not less than 20 standards washes **N.B.:** Long-Lasting Insecticidal mosquito Nets will be based on the most recent WHO recommendations.
Shape	**Rectangular** **Definition:** the net will have six faces that are rectangles. The height must be the same at each point of measurement of the net. **Illustration:** 
Color	One of the following colors: **green, white or sky blue**
Dimensions	**Length:** 190 cm minimum (the acceptable deviation is ≤ 5%) **Height:** 180 cm minimum (the acceptable deviation is ≤ 5%) **Width:** 180 cm minimum (the acceptable deviation is ≤ 5%) Net attachment: 8 reinforced fabric loops
Coated insecticide	» Alpha-cypermethrin: insecticide coated on polyester fiber; » Chlorfenapyr: insecticide coated on polyester fiber **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Insecticide concentration	» Alpha-cypermethrin:100 mg/m^2 ± 25% » Cholrfenapyr: 200 mg/m^2 ± 25% **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Effective duration	Not less than 3 years after opening

Special Delivery Instructions	The mosquito nets must be packed with a manufacture brand name and according to design of local brand name (eg: Tuzanet®). The local brand name is given to MPPD by RBC's Malaria and Other Parasitic Diseases Division after final notification to the winner of the tender. Note that each mosquito net must have individual packaging and each bale must contain 50 pieces compressed by the accurate machine at the factory. On the bale and the individual package of each LLINs, mark name of manufacturer, quantity of mosquito nets per bale, dimension, shape, tender number, and insecticide used, concentration, date of production, shelf life of LLIN and batch number. Label on the mosquito net with product trade name, manufacturer, insecticide used, insecticide concentration and date of production, shelf life of LLIN, batch number, 5 ISO3758 pictograms. **N.B. Local branding name and design on CD to be obtained from the Medical Procurement and Production Division.**
Acceptance conditions	This is subject to in country physical and chemical inspections according to international and national guidelines

ANNEX 11: G2 CONICAL LLIN SPECIFICATIONS

Type of Specifications	Standard Specifications with proof documents
Product	Polyester (from WHO recommended LLINs list)
Netting material	**Denier:** 75 or 100 **Bursting strength:** 75 denier: ≥ 250 kPa, 100 denier: ≥ 405 kPa **Mesh size:** ≥ 156 holes/inch² or ≥ 24 holes/cm² **Dimensional stability at washing:** < 5% shrinkage after washing **Wash resistance:** net quality should be maintained after not less than 20 standards washes **N.B.:** Long-Lasting Insecticidal mosquito Nets will be based on the most recent WHO recommendations.
Shape	**Conical** **Definition:** the net will have a circular base and one seam. The net will be made of one or multiple vertical panels of cloths. The distance between the seam and the base must be the same at point of measurement of the net. **Illustration:** 

Type of Specifications	Standard Specifications with proof documents
Color	One of the following colors: **green, white, or sky blue**
Dimensions	**Circumference:** 1250 cm minimum (the acceptable deviation is ≤ 5%) **Height:** 250 cm minimum (the acceptable deviation is ≤ 5%) **Ring diameter:** 65 cm minimum (the acceptable deviation is ≤ 5%) **Net attachment:** 1 reinforced fabric loop
Coated insecticide	» Alpha-cypermethrin: insecticide coated on polyester fiber; » Chlorfenapyr: insecticide coated on polyester fiber **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control.
Insecticide concentration	» Alpha-cypermethrin:100 mg/m^2 ± 25% » Cholrfenapyr: 200 mg/m^2 ± 25% **N.B.:** Insecticide products and concentration will be based on the most recent WHO recommendations for treatment of mosquito nets for malaria vector control
Effective duration	Not less than 3 years after opening
Special Delivery Instructions	The mosquito nets must be packed with a manufacture brand name and according to design of local brand name (eg: Tuzanet®). The local brand name is given to MPPD by RBC's Malaria and Other Parasitic Diseases Division after final notification to the winner of the tender. Note that each mosquito net must have individual packaging and each bale must contain 50 pieces compressed by the accurate machine at the factory. The spring ring is included in the individual packaging of each mosquito net. Note that the spring ring must be flexible, made in plastic material. On the bale and the individual package of each LLINs, mark name of manufacturer, quantity of mosquito nets per bale, dimension, shape, tender number, and insecticide used, concentration, date of production, shelf life of LLIN and batch number. Label on the mosquito net with product trade name, manufacturer, insecticide used, insecticide concentration and date of production, shelf life of LLIN, batch number, 5 ISO3758 pictograms. **N.B. Local branding name and design on CD to be obtained from the Medical Procurement and Production Division.**
Acceptance conditions	This is subject to in country physical and chemical inspections according to international and national guidelines

ANNEX 12: WORKMANSHIP AND APPEARANCE MAJOR AND MINOR DEFECTS OF LLINS

No	Description of Defects	Classifications		Observation
		Major	Minor	
1	**Product**	X		This will be a subject for physical, chemical and laboratory testing
2	**Netting material**	X		This will be a subject for physical, chemical and laboratory testing
3	**Shape (**different from the one specified in the contract)	X		
4	**Color** (different color from the one specified in the contract)		X	
5	**Dimensions** different from the one provided in the technical specifications (the acceptable deviation is ≤ 5%))	X		
6	**Incorporated or coated insecticide**	X		This will be a subject for chemical testing
8	**Spring ring** (missing or it cannot feet in the net)	X		
9	**Drawings** as per the artwork provided and approved		X	
10	**Holes** in the netting material	X		**Major Defect**: A hole in the netting fabric with size bigger than 2x2 mesh or 0.5x0.5 cm
			X	**Minor Defect:** A hole in the netting fabric with size equal or less than 2x2 mesh or 0.5x0.5 cm

No	Description of Defects	Classifications		Observation
		Major	Minor	
11	**Open seam** (Hole is observed in the seam with size bigger than 5 mesh or longer than 1 cm whichever is bigger)	X	X	**Major Defect:** When hole is observed in the seam with size bigger than 5 mesh or longer than 1 cm **Minor Defect:** Hole is observed in the seam with size less than 5 mesh or less than 1 cm
12	**Joint defect.** More than 3 vertical seams in the side panel or more than 1 connecting seam in the roof of rectangular net, and Roof: width of connecting panel is not to be less than 30 cm. Panel: width of connecting panel is not to be less than 50 cm	X		
13	**Loop defect.** Missing loop, ring (only with conical net) or loop can be easily removed by hand pulling	X		
14	**Label defect.** Missing label(s) & difference from those provided from the technical specifications and approved in the Rwanda Ministry of Health Artwork	X		
15	**Repaired hole** at the site before initial shipment with proper repair. No more than 3 patches allowed		X	Hole or run, with proper repair (repaired with patch). No more than 3 patches allowed.
16	**Small knitting defect** (Hole with less than or equal to 2 x 2 mesh or 0.5 x 0.5 cm. A net with 3 or more holes of this type is to be classified as a major defect)		X	
17	**Imperfect seam.** Breaking 1 thread in double-thread seam without hole Too loose or too tight, uneven seam or lower than 3 stitches/cm seam Seam split bigger than 3 mesh or 0.5 cm and less than or equal to 5 mesh or 1 cm.		X	

No	Description of Defects	Classifications		Observation
		Major	Minor	
18	**Trimming defect** - Raw or uncovered seams with height of 1cm or above - Untrimmed thread ends of longer than 5 cm		X	
19	**Stain.** Oil, dirt spot with reasonably significant size (≥ 5 x 5 mesh or 1cm x 1cm) or multiple (≥ 6) small spots		X	

ANNEX 13: PHYSICAL INSPECTION OBSERVATIONS OF LLINS

20	Chalk mark, spotty oil spot with size less than 5x5 mesh	**Observation**
21	Blurred stamp ink	**Observation**
22	Fold at the corner	**Observation**
23	Seam split less than 3 mesh or 0.5 cm	**Observation**
24	Trimming defect. - Raw or uncovered seams with height less than or equal to 1cm - Untrimmed thread ends of less than 5cm	**Observation**

Measurement methodology

The dimensional measurements were taken as follows:
Circumference – fold net twice along seams and measure along bottom edge and then multiply measurement by 4 to get approx. circumference.
Height – measure along the vertical seam from top to bottom edge and measure between 2 seams. The distance between the roof and the base must be the same at any point of measurement of the net. During measuring the nets should be free of creases or wrinkles and should not be stretched.
PS: If the LLIN have been packed tightly in bales, they may have to be stretched to get the original shapes with gentle force (maximum 1kg or 10 newton)

ANNEX 14: SAMPLE SIZE CODES FOR GENERAL INSPECTION LEVEL II

General Inspection Level II	Normal inspection Level II-A	
Total Number of bed nets	**Sample code**	**# of samples**
1201 to 3200	K	125
3201 to 10000	L	200
10001 to 35000	M	315
35001 to 150000	N	500
150001 to 500000	P	800
500000 and over	Q	1250

Acceptance Quality Limit (AQL)

The procuring entity will use ISO 2859-1 (1999) as a sampling guidance for inspection and acceptance limit.
LOT is definite amount of some product, material or service collected together
Batch is a definite quantity of a commodity produced essentially under the same conditions and note that an inspection LOT may consist of several batches or parts of batches.
The procuring entity will use the General inspection level I and normal inspection level II under the Table 2- A in the ISO 2859-1 (1999).

The Acceptance quality limit (AQL) levels is 2.5 for major defects.
The Acceptance quality limit (AQL) levels is 4 for minor defects.

ANNEX 15: WHO RECOMMENDED INSECTICIDES FOR INDOOR RESIDUAL SPRAYING AGAINST MALARIA VECTORS

Insecticide compounds and formulations		Class	Dosage (g a.i/m2)	Duration of effective action (months)
DDT	WP	OC	1-2	> 6
Malathion	WP	OP	2	2-3
Fenitrothion	WP	OP	2	3-6
Pirimiphos methyl	WP, EC	OP	1-2	2-3
Pirimiphos-methyl	CS	OP	1	4-6
Bendiocarb	WP, WP-SB	C	0.1-0.4	2-6
Propoxur	WP	C	1-2	3-6
Alpha-cypermethrin Alpha-cypermethrin	WP, SC WG-SB	PY PY	0.02-0.03 0.02–0.03	4-6 up to 4
Bifenthrin	WP	PY	0.025-0.050	3-6
Cyfluthrin	WP	PY	0.02-0.05	3-6
Deltamethrin	WP, WG	PY	0.01-0.025	2-3
Etofenprox	WP	PY	0.1-0.3	3-6
Lambda-cyhalothrin	WP, CS	PY	0.02-0.03	3-6
Clothianidin WG	WG	NN	0.03	3–8

CS = capsule suspension; EC = emulsifiable concentrate; SC = suspension concentrate; SC-PE = polymer enhanced suspension concentrate; WG = water dispersible granules; WG-SB = water dispersible granules in sealed water soluble bags; WP = wettable powder; WP-SB = wettable powder in sealed water soluble bags.
OC = organochlorines; OP = organophosphates; C = carbamates; PY = pyrethroids; NN = neonicotinoids.

ANNEX 16: WHOPES-RECOMMENDED COMPOUNDS AND FORMULATIONS FOR CONTROL OF MOSQUITO LARVAE, 28 JULY 2017

Insecticide compounds and formulation(s)	Class group	Dosage (active ingredient)		
		General (open water bodies)		Container breeding
		(g-l/ha)	(mg/m2)	(mg/L)
Bacillus thuringiensis israelensis , strain AM65-52, WG (3000 ITU/mg)	BL	125–750	12.5–75	1–5
Bacillus thuringiensis israelensis, strain AM65-52, GR (200 ITU/mg)	BL	5,000–20,000	500–2000	-
Bacillus thuringiensis israelensis (strain AM65-52 + B. sphaericus strain ABTS-1743; 50 Bsph ITU/mg), GR	BL	5,000–20,000	500–2000	60–80
Bacillus thuringiensis israelensis, strain 266/2 (_ 1200 ITU/mg), SC	BL	30–50 L/ha	3–5 mL/m2	0.01–0.04 mL/L
Chlorpyrifos EC	OP	11–25	1.1–2.5	-
Diflubenzuron DT, GR, WP	BU	25–100	2.5–10	0.02–0.25
Novaluron EC	BU	10–100	1–10	0.01–0.05
Pyriproxyfen GR	JH	10–50	1–5	0.01
Fenthion EC	OP	22–112	2.2–11.2	
Pirimiphos-methyl EC	OP	50–500	5–50	1
Temephos EC, GR	OP	56–112	5.6–11.2	1
Spinosad DT, EC, GR, SC	SP	20–500	2–50	0.1–0.5
Spinosad 83.3 monolayer DT	SP	250–500	25–50	
Spinosad 25 extended release GR (Open bodies of water Control of Culex quinquefasciatus in open bodies of water with high organic matter)	SP	250–400	25–40	-
	SP	1000–1500	100–150	-

DT = tablet for direct application; EC = emulsifiable concentrate; GR = granule; MR = matrix release Formulation; SC = suspension concentrate; WG = water-dispersible granule; WP = wettable powder. 2 BL = Bacterial larvicide; BU = Benzoylureas; JH = Juvenile hormone mimics; OP = Organophosphates; SP = Spinosyns.

ANNEX 17: IMPLEMENTATION PLAN OF VECTOR CONTROL

No	Interven-tions	Beneficiaries	Partners involved	
			Names	Roles and Responsibilities
1	IRS	General population in targeted districts	MoH/RBC	IRS Policy development, Macroplanning of IRS including selection of IRS target districts, selection of insecticide, operational research, Planning and Supervision of IRS campaigns, capacity building, Funds mobilization, coordination of partners
			Local government (District and sector authorities)	Community mobilization, IRS microplanning including IRS seasonal workers recruitment, supervision of the IRS campaign,
			Health facilities (District hospitals and health centers)	IRS seasonal workers' recruitment, IRS microplanning, supervision and implementation of the IRS campaign, management of adverse effects linked to the insecticide.
			Other GoR partners	In collaboration with MoH/RBC conduct macroplanning of IRS, management of IRS funds, implementation of IRS campaigns, IRS quality control, capacity building
		Private sector	Hotels, lodges, boarding schools, military and Police camps, prisons, Refugee camps	Spraying in accordance to the national policy and guidelines
2	LSM	General population countrywide	Population	Larval habitat modification and manipulation through community work (umuganda), and other interventions at household level (Water drainage, flushing etc…)
			MINAGRI/RAB, PSF, REMA, RDB, MININFRA	Advocacy and policy development in the management of water bodies (water dams, irrigation schemes, etc.) i.e: Introduction of larval natural predators into water bodies/Larvivorous fish plantation, Ensure the mitigation plan for malaria control is part of all development projects
			Agriculture cooperatives	Implementation of the LSM policy includ-ing mitigation plans of larval proliferation

3	IRM	General population	MoH/RBC, MINAGRI/ RAB, PSF, REMA, RDB, MININFRA	Policy development and implementation, inter-sectoral collaboration with other government Ministries and agencies such as the MINAGRI/RAB, REMA, RSB, Routine insecticide susceptibility monitoring, Ensure quality control of all imported VC tools, policy development in alignment with the IRM strategy
4	OTHER PROTECTIVE MEASURES	General population	MoH/RBC, MINAGRI/ RAB, PSF, REMA, RDB, MININFRA, MINALOC	Ensure quality of imported tools, policy development and implementation, PSF to ensure availability of products on the market, social mobilization, regulations

(1) Vector Control Technical Expert Group Report to MPAC September 2013, (2) Phase III evaluation of the insecticidal efficacy and durability of a deltamethrin treated polypropylene long-lasting net LifeNet®, in comparison with long-lasting nets made from polyester and polyethylene: study protocol, (3) Effects of environmental factors and storage conditions on the performance of *Olyset Plus against sand flies in WHO cone bioassays*

ANNEX 18: TECHNICAL SPECIFICATIONS OF MALARIA COMMODITIES

1. ARTEMETHER LUMEFANTRINE TABLETS

Types of specification	Standard Specifications
Product	- The combined therapy must be Artemether 20mg and Lumefantrine 120mg(AL) per tablet
Presentation	- Two age groups 6x1, 6x2 ,6x3,6x4 weighing respectively 5kg-15kg and 15-25kg - The tablets for AL 6x1, 6x2 must be dispersibles; and AL 6x3 and AL 6x4 are not dispersibles.
Common presentation	- Tablets must be in yellow color; - Drug instructions should be written on the front of the package where tablets are visible as per the design attached; - Product must have at least 24 months of shelf life; - The tablets to be taken in one dose per age group must be enclosed in one square well separated from another in order to orient patients on the way to take the ACT and ensure a good compliance; - The blister must show the succession of doses for the total cure from one dose to another and from day 1 to day 3 using arrows as illustrated in the design attached; - The blister must specify that the second dose is taken 8 hours after the first dose.

2. QUININE

Types of specification	Standard Specifications
Product 1	**QUININE tablets**
Product	Quinine Molecular Formula: C20H24N2O2; Purity (HPLC) NLT 95.0%
Presentation of the tablet	Quinine sulfate tablet should contain: 300mg/ tablet;
Product 2	**QUININE injection**
Presentation of injectable	Quinine Dihydrochloride Injection should be available in the following packaging: 300mg/1ml vial or ampoules; 600mg/2ml vial or ampoules;
Packaging	- Quinine Sulfate Injection should be available in the following packaging: 300mg/ tablet of 100/box; - Quinine Dihydrochloride Injection should be available in the following packaging: - 300mg/1ml vial or ampoules of 10 /box; 600mg/2ml vial or ampoules of 100 /box; - Shelf life 2 years from date of analysis - Temperature storage between 18 à 25°C

3. ARTESUNATE INJECTION

Types of specification	Standard Specifications
Product 1	**Artesunate Injectable**
Presentation for health facility	- Ampoule or vial containing 60mg anhydrous Artesunate - Co-packed 50mg/1ml ampoule of 5% sodium bicarbonate solution - Product must have at least 24 months of shelf life. - The reconstituted, diluted solutions showed acceptable stability, chemically and physically (including particulate matter), for one hour at 25 °C-30°C.
Product	**Artesunate suppositories**
Presentation for community	- Rectal capsules containing 100mg sodium Artesunate, - Rectal Artesunate dose 10 mg/kg body weight, given as a single dose followed by referral of the patient to a facility where appropriate continued treatment can be instituted. - Product must have at least 24 months of shelf life.

4. MALARIA RAPID DIAGNOSTIC TESTS

1. RDTs be evaluated and showing performance in the WHO-FIND Malaria RDT Evaluation Program (Round 1-7) and/or WHO prequalified.
2. The manufacturer should be ISO 13485:2003, USFDA21 CRF 820 or WHO certified.
3. RDTs with antigen detecting pLDH (Pan) and HRP2 (Pf) on separate lines
4. Panel detection score: at least 90% of Plasmodium Falciparum at 200parasites/µl
5. Panel detection score: at least 95% of Plasmodium Falciparum at 2000 or 5000 parasites / µl.
6. Total False positivity rate less than 3%.
7. Invalid rate: less than 1%.
8. Recommended storage temperature: 4°C to 35°C or larger range.
9. RDT format: cassette:
10. RDTs ancillary items per test:
    - 1 single use bottle of developer buffer per test
    - 1 Inverted cup or pipette for capillary blood collection
    - 1 Lancet
    - 1 alcohol swabs and dried swab
    - 1 schematic test procedure.
    - 1 pair of disposables gloves (Non steriles) in biodegradable plastic, size 7,5.
11. Packaging according to manufacturer standards.
12. Shelf life: at least 24 months.

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