

# The MalariaCare Toolkit

## Tools for maintaining high-quality malaria case management services

### Pre-external competency assessment of malaria microscopy (pre-ECAMM) course

Download all the MalariaCare tools from: [www.malariacare.org/resources/toolkit](http://www.malariacare.org/resources/toolkit).



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U.S. President's Malaria Initiative

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## Abbreviations

ECAMM External competency assessment of malaria microscopy

P *Plasmodium*

WHO World Health Organization

# Background

## Course objectives

The objective of the course is to prepare malaria microscopists for the World Health Organization (WHO) External Competency Assessment of Malaria Microscopy (ECAMM). On completion of the course, the participants should be able to:

- Familiarize with the format and content of the WHO ECAMM course.
- Practice examining slides and reporting answers within the ten-minute time allocation.
- Identify all malaria species (*Plasmodium falciparum*, *P. vivax*, *P. ovale*, *P. malariae*, *P. knowlesi*) microscopically.
- Identify all malaria parasite stages microscopically.
- Differentiate artifacts and pseudoparasites from true malaria parasites and identify other nonmalarial blood parasites.
- Quantify malaria parasites accurately using a quantitative method.

## Number and selection of participants

### Selection of participants

Laboratory technologists/technicians who have demonstrated good competency in malaria microscopy during a malaria microscopy competency assessment will be called to attend this workshop. The identified staff should be working mainly in the malaria/parasitology section of the laboratory and will be expected to take a lead in establishing the relevant laboratory procedures, sharing their updated knowledge with the other staff in their health facilities, and supervising staff in their own health facilities and facilities under their supervision.

## Venue selection and length of course

An appropriate venue should be identified with the following specifications:

- A venue with a large enough room to support teaching and examination conditions that can accommodate up to 12 microscopes.
- One functioning electric binocular microscope per participant.
- Electricity and/or access to a power generator.
- A facility to provide morning and afternoon tea and lunch to the participants.
- Transport to collect additional supplies, and secretarial assistance. Access to printing and photocopying is an added advantage.
- Facilities for accommodation of facilitators and participants nearby.

## Duration of training

The duration of training is five days.

## Course evaluation

Evaluation of course participants is carried out in the following ways:

- Pre-tests and post-tests (theory & practical)
- Observation by facilitators during the course
- Competency assessment of malaria microscopy

### **Grading course participants**

#### *Malaria microscopy*

Pass marks in malaria microscopy performance are based on the WHO minimum scores for reference-level microscopists scoring at the equivalent of WHO level 2 for parasite detection species identification and parasite quantitation:

- >80 percent parasite detection.
- >80 percent species identification.
- >40 percent density.

MalariaCare recommends that only those participants that achieve this level of competency should move on to participate in the WHO ECAMM course.

### **Participants' evaluation of the course**

At the end of the course, the participants will be asked to fill out a standard evaluation form. The evaluation will be conducted anonymously and will address both technical and logistical issues.

## Required supplies, equipment, and materials

Supplies and equipment should be organized well in advance of the actual training date. Electric microscope quality needs to be inspected by trainers to ensure that the necessary components are available (i.e., 100X immersion oil objective, lead, etc.). Extra bulbs should be on hand in order to respond to issues on the spot. A list of equipment, supplies, and reagents required for this training can be found in Annex 2.

# DAY ONE

## Introduction to the course (1 hour)

The learning objectives of this unit are to introduce the course content, set the ground rules for the course, and perform the pre-tests.

### Introduction objectives (1 hour)

- Request the participants to introduce one another.
- Explain the objectives of the course.
- Establish the expectations of the participants.
- Review the timetable for the course.
- Stipulate the ground rules for the course and review administrative issues.
- Establish the governance for the course duration.

## Content

- **Introduction:** Name, length of time in service, place of work, designation at work.
- **Objectives of the refresher training course:** Appropriately prepare participants for a WHO ECAMM course.
- **Expectations of the course:** Achieve a minimum score equivalent to that of a WHO level 2 microscopist for parasite detection, species identification, and parasite quantitation. Discuss professional advantages of passing a WHO ECAMM course.
- **Timetable for the course:** Comments on timetable, suggested changes.
- **Setting ground rules:** Importance and purpose of ground rules, selecting ground rules, following ground rules throughout the course. Ground rules typically focus on issues such as arriving on time, staying as long as participants can, practice as much as they can, use all hours the laboratory is open, take short breaks, try to complete the quota of slides they are expected to inspect in a day, etc.
- **Establishing the governance of the course:** Administrative structures, team leader, and timekeeper.

## **Pre-assessment—malaria microscopy competency assessment (4 hours)**

The pre-test is used to measure existing knowledge and competencies of laboratory staff with respect to microscopic diagnosis of malaria.

### **Learning objectives: Pre-test (4 hours)**

- Establish baseline competency in malaria microscopy by assessing skill level for parasite detection, species identification, and parasite quantitation.
- Become familiar with the WHO Regional Office for Africa testing format.

### **Content**

- **Pre-tests:** Purpose and format of pre-tests.
- **Determining the competency of individual participants:** Detection of malaria parasites, species identification, and accuracy of parasite quantification.
- **Informing** each participant of his or her respective scores on pre- and post-tests.

### **Review previously examined slides (2 hours)**

Provides participants with an opportunity to review misdiagnosed slides, ask the facilitators specific questions, and use the time for general study.

**END OF DAY ONE**

## **DAY TWO**

### **Microscopy assessment (4 hours)**

Participants will read a set of 15 slides and report on parasite detection, species identification, and parasite density.

### **Review previously examined slides (2 hours)**

Provides participants with an opportunity to review misdiagnosed slides, ask the facilitators specific questions, and use the time for general study.

**END OF DAY TWO**

## **DAY THREE**

### **Microscopy assessment (4 hours)**

Participants will read a set of 15 slides and report on parasite detection, species identification, and parasite density.

### **Review previously examined slides (2 hours)**

Provides participants with an opportunity to review misdiagnosed slides, ask the facilitators specific questions, and use the time for general study.

**END OF DAY THREE**

## **DAY FOUR**

### **Microscopy assessment (4 hours)**

Participants will read a set of 15 slides and report on parasite detection, species identification, and parasite density.

### **Review previously examined slides (2 hours)**

Provides participants with an opportunity to review misdiagnosed slides, ask the facilitators specific questions, and use the time for general study.

**END OF DAY FOUR**

## **DAY FIVE**

### **Microscopy assessment (4 hours)**

Participants will read a set of 15 slides and report on parasite detection, species identification, and parasite density.

### **Review previously examined slides (2 hours)**

Provides participants with an opportunity to review misdiagnosed slides, ask the facilitators specific questions, and use the time for general study.

**END OF DAY FIVE**

# ANNEXES

## Annex 1. Timetable.

<b>Time</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
<b>8:00–9:00</b>	Introduction	Assessment	Assessment	Assessment	Assessment
<b>9:00–10:00</b>	Pre-assessment				
<b>10:00–10:30</b>	Break	Break	Break	Break	Break
<b>10:30–12:30</b>	Pre-assessment	Assessment	Assessment	Assessment	Assessment
<b>12:30–1:30</b>	Lunch	Lunch	Lunch	Lunch	Lunch
<b>1:30–2:30</b>	Pre-assessment	Assessment	Assessment	Assessment	Assessment
<b>2:30–3:00</b>	Break	Break	Break	Break	Break
<b>3:00–5:00</b>	Slide review	Slide review	Slide review	Slide review	Slide review

## Annex 2. List of necessary supplies and reagents.

Description	Unit	Status/Notes
<b>Lab equipment and supplies</b>		
Electric binocular microscope	1 per participant	✓
Storage box or microscope cover	1 per microscope	
Blue filters	1 per participant	
Lint-free tissue	5 boxes	
100X immersion oil objective	1 per microscope	
Extra bulbs (for microscope)	3–5	
Power cords (for plugging multiple microscopes)	3–5	
Tally counter	2 per participant	
Plastic bins for washing hands (if no sink)	3	
Timing clock with alarm	1 for group	
Pencils	1 box for group	
Laboratory coats	1 per participant	
Gloves	2–5 boxes	
<b>High-quality and validated reference slides</b>		
<i>Plasmodium falciparum</i>	High, moderate, low densities	
<i>Plasmodium ovale</i>		
<i>Plasmodium vivax</i>		
<i>Plasmodium malariae</i>		
<i>Plasmodium knowlesi</i>		
Malaria-negative samples		
Mixed species		
<b>Course equipment and supplies</b>		
LCD projector	1	
Laptop computer	1	
Pens/pencils	1 per participant	
Notebooks/writing tablets	1 per participant	
Name tags	1 per participant	
World Health Organization malaria microscopy training CD-ROM	1 per participant	
Printed course curriculum	1 per participant	
Printed timetables	1 per participant	
Certificate paper	1 per participant	
Daily attendance sheet	1 per each day of training	
Receipts (for tracking per diem)	1 book of receipts	

## Annex 3. Determination of parasitemia.

Laboratory diagnosis of malaria

*Plasmodium* spp.

**DPD<sub>x</sub>**  
Laboratory Identification of Parasites  
of Public Health Concern

### Determination of Parasitemia

Determination of parasitemia can be done using both thick and thin smears.

#### Thick smears:

The number of parasites/ $\mu$ l of blood is determined by enumerating the number of parasites in relation to the standard number of WBCs/ $\mu$ l (8000).

$$\text{No. Parasites} \times (8000 \div \text{No. WBCs counted}) \\ = \text{No. parasites per } \mu\text{L of blood}$$

#### Thin smears:

The percent of infected RBCs is determined by enumerating the number of infected RBCs in relation to the number of uninfected RBCs. A minimum of 500 RBCs total should be counted.

$$(\text{No. infected RBCs} \div \text{Total No. RBCs counted}) \times 100 \\ = \text{Percent Infected RBCs}$$

#### Notes:

- Multiply-infected RBCs are counted as one.
- Gametocytes are not figured in calculations.

Note: No., number; RBC, red blood cell; WBC, white blood cell.



## U.S. PRESIDENT'S MALARIA INITIATIVE

