

Rapid Malaria Detection: A Race Against Time

In the bustling emergency departments of UK hospitals, time is of the essence and every second counts, especially when dealing with life-threatening diseases like malaria.

But what if a child has just returned from a trip to a malaria-endemic region and has a fever? Is it malaria or just a common cold? The answer to this question could be a matter of life and death.

What is malaria?

Malaria is a life-threatening disease that's usually transmitted through the bite of an infected Anopheles mosquito.



It's caused by Plasmodium parasites, parasites which infect red blood cells. *Plasmodium falciparum* being the most common and dangerous type to humans.



Malaria is common ('endemic') in tropical and subtropical regions, including large areas of Africa and Asia, central and south America.




Symptoms of malaria

- High temperature (fever)
- Lethargy
- Sweats and chills
- Cough
- Tummy and muscle pain

Making the right call

- Such symptoms are very non-specific
- A fever plus returning from an endemic region **urgently needs a test**
- Only around 3 in 100 children in UK emergency depts likely have malaria

Children are the worst affected

Globally there are about 400,000 deaths per year due to malaria. Two thirds of those deaths are children under five.

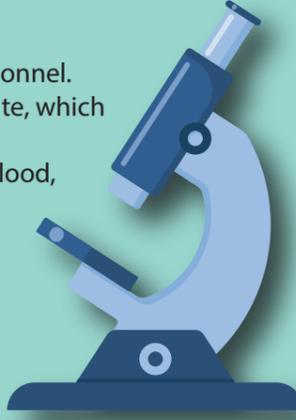


Diagnosing malaria

Microscopy

Current "gold standard" test for malaria. Carried out in a laboratory by examining a drop of the patient's blood under a microscope to look for the presence of the malaria parasites.

- Pros**
- Highly accurate when performed by trained personnel.
 - Can identify the specific species of malaria parasite, which is important for treatment decisions.
 - Allows for the quantification of parasites in the blood, which can help assess disease severity.
- Cons**
- Can be time-consuming, delaying diagnosis and treatment.
 - Can put added costs and pressure on busy frontline settings.



Rapid Diagnostic Test (RDT)

A type of diagnostic tool (similar to at home Covid tests many will be familiar with). For malaria, these tests typically involve a finger-prick blood sample.

- Pros**
- Quick results, often within 15–30 minutes.
 - Simple to use.
 - Does not require specialised training or equipment.
 - Can be used in a wide range of settings, including remote areas with limited laboratory facilities.
- Cons**
- May not be as accurate as microscopy, particularly for detecting non-falciparum species of malaria.
 - Cannot quantify the number of parasites in the blood.
 - Some strains of *Plasmodium falciparum* with certain gene deletions may not be detected by certain types of RDTs.



How effective are Rapid Diagnostic Tests for malaria?

When speed might be of the essence in diagnosing malaria, do we still need to wait for time-consuming microscopy?
 A Diagnostic Accuracy Study to Evaluate Standard Rapid Diagnostic Test (RDT) Alone to Safely Rule Out Imported Malaria in Children Presenting to UK Emergency Departments, *Chris Bird et al*, Journal of the Pediatric Infectious Diseases Society, Volume 12, Issue 5, May 2023, Pages 290–297, <https://doi.org/10.1093/jpids/piad024>



Microscopy
(Current clinical reference standard)

Vs



Rapid Diagnostic Tests (RDTs)

Both in a laboratory setting as part of usual care

15 Hospital sites across England, Scotland, and Wales

1,414 Children who had visited emergency departments after travelling to malaria-endemic regions

47 Cases of malaria detected

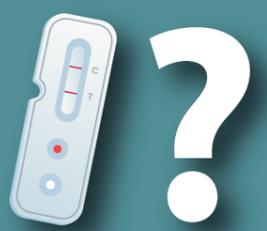
96.3% Success rate
Against non-falciparum types of the malaria parasite.

100% Success rate
RDTs detected every single case of malaria caused by the *Plasmodium falciparum* parasite, the most common form

What might this mean?
 Malaria was accurately diagnosed in all but one case (1 out of 47) with an RDT and one microscopy test alone.

This study provides evidence for recent expert advice that an otherwise well-looking child does not need to come back for repeat microscopy (if the child is unwell with persistent fever, then repeat microscopy should be performed along with tests for other causes of fever).

What next for RDTs?



We plan to trial taking the RDT out of the lab and use it in the children's emergency department with other new technologies, aiming to make an earlier diagnosis and cut the time families spend in hospital.

NIHR | **Community Healthcare MedTech and In Vitro Diagnostics Co-operative**

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