Good Practices for Selecting and Procuring Rapid Diagnostic Tests for Malaria

The target audience for this manual includes procurement officers, malaria programme managers, health officers and supply chain managers responsible for selecting, procuring or assisting in the procurement of RDTs for malaria in the public and private sectors. The manual summarizes information from publications on the quality of malaria RDTs that is readily accessible only by specialized procurement agencies. Its aim is to improve understanding of the following aspects of procurement:

- performance components and selection criteria;
- estimating quantity requirements and budgeting;
- defining technical specifications;
- managing tenders, adjudications and contracts;
- quality control through lot testing;
- supply management and product recalls; and
- monitoring supplier performance and managing product variations.
Vulnerabilities...

... of specific RDT components

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Step 1
Selection of an appropriate RDT

1.2 WHO/FIND Malaria RDT Performance Testing Programme

Programme operational since 2008. Offers an established mechanism that allows laboratory-based evaluation of RDT performance in a standardized way => Distinguish between well and poorly performing tests in order to guide procurement and prioritization for entry into WHO Prequalification

Evaluation criteria:
- Panel Detection Score (PDS) at 2000 and 200 parasites/μL
- False Positive Rate
- Invalid Rate
- Heat stability
- Ease of use
1.3 WHO recommended selection criteria for procurement of RDTs

1. Plasmodium species and transmission intensity

   1.1 For detecting *P. falciparum*
      
      1.1.1 In areas of low and moderate transmission: It is highly advisable to select RDTs with a *P. falciparum* panel detection score well above 35% at 200 parasites/μl (e.g. > 75%).
      
      1.1.2 In areas of high transmission: The *P. falciparum* panel detection score should be at least 50% at 200 parasites per microlitre. As the extent of high-transmission areas is likely to decrease with effective malaria control, a panel detection score well above this level should become the basis for product selection in the future.

   1.2 For detecting *P. vivax*: The panel detection score for *P. vivax* should be equivalent to that for *P. falciparum*: well above 50% at 200 parasites per microlitre (e.g. > 75%).

2. False positive rate less than 10%
3. Invalid rate less than 5%

Further considerations:
- Stability
- Ease of use and training requirements
- Price
- Lot testing (Step 9)
Limitations of using sensitivity from RDT field trials (I)

Definitions

• **Sensitivity:** Percent of patients with the infection who will have a positive result in the test under evaluation, determined from the result of the reference or ‘gold standard’ test.

• **Panel detection score:** A score between 0 and 100, calculated as the proportion of times a malaria RDT gives a positive result on all tests from both lots tested against samples of parasite panels at a specific parasite density (i.e. four tests at 200 parasites/μL, two at 2000 parasites/μL). Invalid tests are excluded from the analysis.

![Diagram: Determination of panel detection score at low parasite density](image1)

Reading against:

- 100 panels of Pf at 200 parasites/μL
- 40 panels of Pv at 200 parasites/μL

Limitations of using sensitivity from RDT field trials (II)

Published results of RDT field trials might vary in sensitivity and specificity because of:

• parasite density in the study population (RDT sensitivity depends on the antigen concentration and decreases at low parasitaemia),

• heterogeneous diagnostic performance of the comparison method (usually microscopy),

• inconsistent manufacturing standards for the RDT used in the study,

• exposure of the RDT to high temperatures during distribution and storage before the study, and

• problems with RDT preparation or interpretation of results.
Step 2
Estimating needs

2.1 Quantification
- Areas with no malaria surveillance data
- Areas with unreliable malaria surveillance data
- Areas with reliable malaria surveillance but no reliable data on RDT consumption
- Areas with reliable malaria surveillance and RDT consumption data

2.2 Transforming estimated needs into orders

Areas with reliable malaria surveillance but no reliable data on RDT consumption

Recorded data:
- total number of reported malaria cases,
- number of malaria cases confirmed by microscopy,
- total number of slides examined by microscopy for malaria,
- number of malaria cases confirmed by RDT,
- total number of malaria RDTs performed.

Step 1:
Not tested (probable or unconfirmed) = reported malaria cases – positive (confirmed malaria)
Positive (confirmed malaria) = cases confirmed by microscopy + cases confirmed by RDTs

Step 2:
RDT requirements = \( \frac{\text{not tested + tested (by RDT)}}{\text{adjusted for completeness of reporting}} \) + SS
Step 4
Defining technical specifications

Cassettes

Dipstick

Hybrid

Step 9
Quality control by lot testing

Lot testing – Why?
- Rounds 1 + 2 results confirmed: inter-lot and inter-test performance variability
- Provide convincing evidence to clinicians / users / regulatory authorities that RDTs are reliably working

Lot testing – When?
- pre-shipment (!)
- post-shipment
- post distribution

Lot testing – Where?
- Malaria RDT Quality Assurance Laboratory, Research Institute for Tropical Medicine (RITM), Muntinlupa City, Philippines
- Laboratory of Molecular Epidemiology, Pasteur Institute of Cambodia, Phnom Penh, Cambodia
Step 9
Quality control by lot testing

**How?**

1. At least 2 weeks before the RDTs are to be dispatched for testing, send request for lot testing to mal-rdt@wpro.who.int or info@finddiagnostics.org.
2. Request form with instructions on sample size and shipping will be sent to you.
3. Return completed submission form to lot testing coordinator.
4. Send RDT samples to the designated laboratory (approx. 125 P. falciparum-only RDTs or 175 combined P. falciparum and pan-specific (or P. vivax–specific) RDTs).
5. Initial results will be returned to you within 5 working days of receipt of the test.
6. Remaining RDTs are stored and tested every six months throughout the shelf-life. A report of these results is sent every six months.

Costs: Sending institution covers transport costs, the quality control testing is done free of charge.

The manual is available at the following link:


Thank you