



Karolinska Institutet

Department of Medicine Solna, Infectious Diseases Unit
Karolinska University Hospital, Karolinska Institutet, Stockholm, Sweden

Impact of laboratory diagnosis for improving the management of uncomplicated malaria at peripheral health care settings in Coast region, Tanzania

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Marycelina Mubi

Principal Supervisor:

Professor Anders Björkman
Karolinska Institutet
Department of Medicine
Division of Infectious diseases

Opponent:

Professor Ib C. Bygbjerg
University of Copenhagen, Denmark
Department of International Health,
Immunology and Microbiology

Co-supervisor(s):

Professor Zul Premji
Muhimbili University of Health & Allied
Sciences, Tanzania
Department of Parasitology & Entomology

Examination Board:

Docent Johan von Schreeb
Karolinska Institutet
Department of Public Health Sciences

Dr Mariane Warsame
Karolinska Institutet
Department of Public Health Sciences

Docent Urban Hellgren
Karolinska Institutet
Department of Medicine, Huddinge

Dr. Noushin Emami
Stockholm University
Department of Molecular Biosciences

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ABSTRACT

Malaria is a disease caused by parasites of the genus *Plasmodium*. Five species cause human disease, but the most common in tropical areas, and the cause of severe disease is *Plasmodium falciparum*. Control of morbidity and mortality is mainly achieved through appropriate malaria case management, which includes prompt diagnosis and treatment with effective antimalarial drugs. While definitive diagnosis of malaria is made by demonstration of parasites in the patient blood through microscopic examination of giemsa stained blood smears, in most clinical settings in Africa, diagnosis is limited by lack of facilities and personnel. The availability of malaria rapid diagnostic tests (RDTs) offers an opportunity to extend diagnostic services to areas previously not covered by conventional microscopy services.

Two intervention trials were conducted, one at primary health care (PHC) facilities using microscopy, and the other at community level, through community health workers (CHWs), using rapid diagnostic tests (RDTs) for malaria diagnosis, and the impact of the interventions on antimalarial drugs prescription practices, antibiotic prescriptions and health outcome was investigated (Study I and II). A descriptive, cross sectional study was conducted to assess health workers diagnostic and prescription practices following introduction of RDTs for universal testing of malaria at PHC level in Tanzania (Study III). An exploratory study was also carried out to assess the usefulness of Histidine rich protein 2 (HRP2) and lactate dehydrogenase (LDH) based RDTs for treatment monitoring and detection of recurrent infection following artemisinin-based combination therapy (ACT) during a 42 day follow up period (Study IV).

The use of parasite-based diagnostics significantly reduced antimalarial prescriptions at health facility and community level without affecting the health outcome of patients not treated with antimalarials (study I and II). The prescriptions of antimalarial drugs were 61% at intervention health facilities, whereas in the clinical and control arms the prescription rates remained high, 95% and 99%, respectively (study I). Similarly, 53% of patients tested with RDT at community level were provided antimalarial drugs compared to 96% among patients treated based on clinical diagnosis only (Study II). The availability of parasite-based diagnostics and antimalarial drugs within the community allowed early access to treatment as 67% of patients consulted CHWs within 24 hours of onset of fever (Study II). The rate of non adherence to test results was low in both study I and II.

Study III observed low use of parasite-based diagnostics among fever patients (63%), low non adherence to test results (14%), substantial prescription of antimalarial drugs to non-tested patients (28%) and high prescriptions of antibiotics among patients with negative RDT results (81%), as well as frequent stock outs of both RDTs and ACTs.

HRP2 based tests performed poorly when compared to LDH based tests for treatment monitoring, with median clearance times of 28 (7-42) and 7 (2-14) days respectively (Study IV). HRP2 based tests were unable to detect 8/10 recurrent infections during follow up compared to only two recurrent infections missed by LDH based tests.

These studies lead to a conclusion that the availability of parasite-based diagnostics helps to restrict treatment with antimalarial drugs to patients with malaria. However, non adherence to malaria test results could undermine the potential of RDTs, and in-depth studies should be conducted to identify its causes. As the relative contribution of malaria as a cause of fever is declining in Tanzania, there is need to improve the overall management of non-malarial fevers. The longer persistence of HRP2 antigen in blood makes HRP2 based tests not suitable for treatment monitoring and detection of recurrent infection calling for alternative diagnostic strategies for this purpose.