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Rapid malaria diagnostic tests *vs.* clinical management of malaria in rural Burkina Faso: safety and effect on clinical decisions. A randomized trial

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Summary

OBJECTIVES To assess if the clinical outcome of patients treated after performing a Rapid Diagnostic Test for malaria (RDT) is at least equivalent to that of controls (treated presumptively without test) and to determine the impact of the introduction of a malaria RDT on clinical decisions.

METHODS Randomized, multi-centre, open clinical trial in two arms in 2006 at the end of the dry and of the rainy season in 10 peripheral health centres in Burkina Faso: one arm with use of RDT before treatment decision, one arm managed clinically. Primary endpoint: persistence of fever at day 4. Secondary endpoints: frequency of malaria treatment and of antibiotic treatment.

RESULTS A total of 852 febrile patients were recruited in the dry season and 1317 febrile patients in the rainy season, and randomized either to be submitted to RDT (P_RTD) or to be managed presumptively (P_CLIN). In both seasons, no significant difference was found between the two randomized groups in the frequency of antimalarial treatment, nor of antibiotic prescription. In the dry season, 80.8% and 79.8% of patients with a negative RDT were nevertheless diagnosed and treated for malaria, and so were 85.0% and 82.6% negative patients in the rainy season. In the rainy season only, both diagnosis and treatment of other conditions were significantly less frequent in RDT positive *vs.* negative patients (48.3% *vs.* 61.4% and 46.2% *vs.* 59.9%, $P = 0.00$ and 0.00, respectively).

CONCLUSION Our study was inconclusive on RDT safety (clinical outcome in the two randomized groups), because of an exceedingly and unexpectedly low compliance with the negative test result. Further research is needed on best strategies to promote adherence and on the safety of a test based strategy compared with the current, presumptive treatment strategy.

keywords malaria management, malaria diagnosis, fever management, rapid diagnostic test, RDT safety, clinical decision

Introduction

In recent years, following WHO recommendations, most African countries have adopted treatment protocols for malaria based on artemisinin combination treatments (ACT) (Ogbonna & Uneke 2008). The new protocols have proven to be very effective, but they are also much more expensive than previous regimens. The presumptive treatment of all fevers for malaria, previously a current practice, has therefore being questioned on economical grounds (Pfeiffer *et al.* 2008). Moreover, presumptive treatment is considered potentially dangerous as it might contribute to selecting for resistant *Plasmodium falciparum* strains. New guidelines for malaria management recommend a mandatory laboratory test before malaria treatment (WHO 2006). In many African areas without laboratory facilities, the only possibility is the use of a rapid diagnostic test (RDT).

Paracheck® (Orchid Biomedical Systems, Goa, India) is the most widely used RDT. It is based on the detection of the *P. falciparum* specific HRP-2 protein and diagnoses malaria infection rapidly and with reasonable accuracy according to most studies, with 90.1–100% sensitivity and 52–99.5% specificity (Guthmann *et al.* 2002; Singh &

Kabaghe *et al. Malar J (2016) 15:163*
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Malaria Journal

RESEARCH

Open Access

Health workers' compliance to rapid diagnostic tests (RDTs) to guide malaria treatment: a systematic review and meta-analysis

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Abstract

Background: The World Health Organization recommends malaria to be confirmed by either microscopy or a rapid diagnostic test (RDT) before treatment. The correct use of RDTs in resource-limited settings facilitates basing treatment onto a confirmed diagnosis; contributes to speeding up considering a correct alternative diagnosis, and prevents overprescription of anti-malarial drugs, reduces costs and avoids unnecessary exposure to adverse drug effects. This review aims to evaluate health workers' compliance to RDT results and factors contributing to compliance.

Methods: A PROSPERO-registered systematic review was conducted to evaluate health workers' compliance to RDTs in sub-Saharan Africa, following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Studies published up to November 2015 were searched without language restrictions in Medline/Ovid, Embase, Cochrane Central Register of Controlled Trials, Web of Science, LILACS, Biosis Previews and the African Index Medicus. The primary outcome was health workers treating patients according to the RDT results obtained.

Results: The literature search identified 474 reports; 14 studies were eligible and included in the quantitative analysis. From the meta-analysis, health workers' overall compliance in terms of initiating treatment or not in accordance with the respective RDT results was 83 % (95 % CI 80–86 %). Compliance to positive and negative results was 97 % (95 % CI 94–99 %) and 78 % (95 % CI 66–89 %), respectively. Community health workers had higher compliance rates to negative test results than clinicians. Patient expectations, work experience, scepticism of results, health workers' cadres and perceived effectiveness of the test, influenced compliance.

Conclusions: With regard to published data, compliance to RDT appears to be generally fair in sub-Saharan Africa; compliance to negative results will need to improve to prevent mismanagement of patients and overprescribing of anti-malarial drugs. Improving diagnostic capacity for other febrile illnesses and developing local evidence-based guidelines may help improve compliance and management of negative RDT results.

Trial registration: CRD42015016151 (PROSPERO)

Keywords: Malaria, Rapid diagnostic test (RDT), Health workers, Sub-Saharan Africa, *Plasmodium falciparum*, Clinical decision making, Adherence, Compliance

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MALARIA JOURNAL

RESEARCH Open Access

How can malaria rapid diagnostic tests achieve their potential? A qualitative study of a trial at health facilities in Ghana

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Abstract

Background: Rapid diagnostic tests (RDTs) for malaria are at the early stages of introduction across malaria endemic countries. This is central to efforts to decrease malaria overdiagnosis and the consequent overuse of valuable anti-malarials and underdiagnosis of alternative causes of fever. Evidence of the effect of introducing RDTs on the overprescription of anti-malarials is mixed. A recent trial in rural health facilities in Ghana reduced overprescription of anti-malarials, but found that 45.5% patients who tested negative with RDTs were still prescribed an anti-malarial.

Methods: A qualitative study of this trial was conducted, using in-depth interviews with a purposive sample of health workers involved in the trial, ranging from those who continued to prescribe anti-malarials to most patients with negative RDT results to those who largely restricted anti-malarials to patients with positive RDT results. Interviews explored the experiences of using RDTs and their results amongst trial participants.

Results: Meanings of RDTs were constructed by health workers through participation with the tests themselves as well as through interactions with colleagues, patients and the research team. These different modes of participation with the tests and their results led to a change in practice for some health workers, and reinforced existing practice for others. Many of the characteristics of RDTs were found to be inherently conducive to change, but the limited support from purveyors, lack of system antecedents for change and limited system readiness for change were apparent in the analysis.

Conclusions: When introduced with a limited supporting package, RDTs were variously interpreted and used, reflecting how health workers had learnt how to use RDT results through participation. To build confidence of health workers in the face of negative RDT results, a supporting package should include local preparation for the innovation; unambiguous guidelines; training in alternative causes of disease; regular support for health workers to meet as communities of practice; interventions that address negotiation of health worker-patient relationships and encourage self-reflection of practice; feedback systems for results of quality control of RDTs; feedback systems of the results of their practice with RDTs; and RDT augmentation such as a technical and/or clinical troubleshooting resource.

Background

Rapid diagnostic tests for malaria are being put forward as a potential solution for targeting valuable anti-malarial drugs to those who need them [1]. Malaria overdiagnosis, and misdiagnosis, is now recognized across malaria endemic countries in Africa and Asia [2]. The consequences of overdiagnosis include poor health outcomes due to missed diagnoses of alternative causes of symptoms [3] and exposure to unnecessary medication, wastage of valuable drugs and unnecessary expenditure at the household, country health system and donor levels [4,5]. The consequences of missed cases of malaria are avoidable morbidity and mortality, and it is important than measures to reduce overdiagnosis do not lead to an increase in the number of missed malaria cases. Malaria overdiagnosis has been reported at primary

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From the University of Manchester academic phrasebook
http://www.phrasebank.manchester.ac.uk/introducing-work/ (downloaded 2.18)

Describing the research design and the methods used - close

Data for this study were collected using …
Five works will be examined, all of which …
This investigation takes the form of a case-study of the …
This study was exploratory and interpretative in nature.
This study uses a qualitative case study approach to investigate …
The research data in this thesis is drawn from four main sources: …
The approach to empirical research adopted for this study was one of …
This dissertation follows a case-study design, with in-depth analysis of …
By employing qualitative modes of enquiry, I attempt to illuminate the …
Qualitative and quantitative research designs were adopted to provide …
Both qualitative and quantitative methods were used in this investigation.
A holistic approach is utilised, integrating X, Y and Z material to establish …
The study was conducted in the form of a survey, with data being gathered via …
The methodological approach taken in this study is a mixed methodology based on …
A combination of quantitative and qualitative approaches was used in the data analysis.

Explaining the significance of the current study - close

This research sheds new light on …
This study provides new insights into …
The study offers some important insights into …
The present study fills a gap in the literature by …
Understanding the link between X and Y will help …
This investigation will enhance our understanding of …
This is the first study to undertake a longitudinal analysis of …
The present research explores, for the first time, the effects of …
The findings should make an important contribution to the field of ….
This study provides an exciting opportunity to advance our knowledge of …
This study aims to contribute to this growing area of research by exploring …
This project provided an important opportunity to advance the understanding of …
Therefore, this study makes a major contribution to research on X by demonstrating …
There are several important areas where this study makes an original contribution to …

This paper …..

argues that …	explores the ways in which …
gives an account of …	assesses the significance of …
discusses the case of …	highlights the importance of …
analyses the impact of …	considers the implications of …
attempts to show that …	critically examines the view that …
contests the claim that …	proposes a new methodology for …
provides an overview of …	examines the relationship between …
reviews the evidence for …	compares the different ways in which …
reports on a study which …	investigates the factors that determine …
traces the development of …	describes the design and implementation of …