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A retrospective evaluation of the quality of malaria case management at twelve health facilities in four districts in Zambia

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PEER REVIEW

Peer reviewer

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Comments

This is a relatively small, retrospective study of malaria case management practices in Zambia. It highlights several aspects that require attention including the use of diagnostics for all patients, decreasing the use of SP for malaria test confirmed cases, eliminating the use of anti-malarial drugs for patients WHO test negative for malaria, and assuring that all patients with confirmed malaria receive treatment.

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ABSTRACT

Objective: To establish the appropriateness of malaria case management at health facility level in four districts in Zambia.

Methods: This study was a retrospective evaluation of the quality of malaria case management at health facilities in four districts conveniently sampled to represent both urban and rural settings in different epidemiological zones and health facility coverage. The review period was from January to December 2008. The sample included twelve lower level health facilities from four districts. The Pearson *Chi*-square test was used to identify characteristics which affected the quality of case management.

Results: Out of 4891 suspected malaria cases recorded at the 12 health facilities, more than 80% of the patients had a temperature taken to establish their fever status. About 67% (CI_{95} 66.1–68.7) were tested for parasitemia by either rapid diagnostic test or microscopy, whereas the remaining 22.5% (CI_{95} 21.3.1–23.7) were not subjected to any malaria test. Of the 2247 malaria cases reported (complicated and uncomplicated), 71% were parasitologically confirmed while 29% were clinically diagnosed (unconfirmed). About 56% (CI_{95} 53.9–58.1) of the malaria cases reported were treated with artemether–lumefantrine (AL), 35% (CI_{95} 33.1–37.0) with sulphadoxine–pyrimethamine, 8% (CI_{95} 6.9–9.2) with quinine and 1% did not receive any anti-malarial. Approximately 30% of patients WHO were found negative for malaria parasites were still prescribed an anti-malarial, contrary to the guidelines. There were marked inter-district variations in the proportion of patients in WHO a diagnostic tool was used, and in the choice of anti-malarials for the treatment of malaria confirmed cases. Association between health worker characteristics and quality of case malaria management showed that nurses performed better than environmental health technicians and clinical officers on the decision whether to use the rapid diagnostic test or not. Gender, in service training on malaria, years of residence in the district and length of service of the health worker at the facility were not associated with diagnostic and treatment choices.

Conclusions: Malaria case management was characterised by poor adherence to treatment guidelines. The non-adherence was mainly in terms of: inconsistent use of confirmatory tests (rapid diagnostic test or microscopy) for malaria; prescribing anti-malarials which are not recommended (*e.g.* sulphadoxine–pyrimethamine) and prescribing anti-malarials to cases testing negative. Innovative approaches are required to improve health worker adherence to diagnosis and treatment guidelines.

KEYWORDS

Malaria, Quality, Diagnosis, Treatment, Antimalarials, Microscopy, Rapid diagnostic tests, Zambia

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1. Introduction

Prompt and effective case management is part of an essential package of integrated malaria control^[1]. Malaria case management strategy involves two main components: accurate case identification with parasitological diagnosis and appropriate treatment with the recommended drugs. This is promoted through the provision of guidelines to inform WHO member states on their national malaria diagnosis and treatment guidelines^[1,2].

In Zambia, malaria services are provided free of charge in line with the health reforms of 1993^[3] as part of the Basic Health Care Package (BHCP) and the user fee removal policy of 2006^[4]. The malaria prevention and control services are provided within this financing policy framework. The current malaria diagnosis and treatment guidelines in Zambia demand that: All patients with suspected malaria should undergo a routine confirmatory diagnostic test regardless of age, using microscopy or rapid diagnostic tests (RDTs); all uncomplicated malaria cases should be treated with the six-dose regimen of artemether–lumefantrine (AL); severe malaria cases should be treated with quinine and all these malaria services should be provided at no cost to the user^[5,6].

The efficacy and cost effectiveness of the AL and sulphadoxine–pyrimethamine (SP) have been well documented by studies conducted in the country and AL has been found to be more efficacious and cost-effective than SP^[7,8]. Studies on the effectiveness of the available strategies for malaria diagnosis at the point of care in Zambia have shown that RDTs are more cost-effective than microscopy and clinical diagnosis of malaria^[9,10]. The availability and use of malaria interventions are monitored through the routine health management system and specialised population surveys such as the Zambia Demographic and Health Survey^[11] and the Malaria Indicator Surveys^[10,12,13]. All these sources of information have demonstrated that progress has been made in improving access to preventive and curative tools and corroborate findings in the World Malaria Report of 2010^[2]. The impact of the malaria control interventions has been demonstrated by reductions in both parasite and anaemia prevalence^[12–14] and is thought to have contributed to reductions in child mortality in Zambia^[11].

However, WHO reports have recently indicated that Zambia is among the countries experiencing an increase in malaria transmission after the initial decline in disease morbidity and mortality^[2]. This is supported by up to 15% increase in the in-patient malaria cases between 2008 and 2009^[2,15].

Uncomplicated malaria, if treated early and appropriately does not progress to the severe form of malaria and consequently does not lead to death^[1]. For malaria fatalities to be prevented, the health workers must be able to diagnose the disease definitively using RDTs or microscopy and treat with the appropriate antimalarial in line with the national

diagnosis and treatment guidelines for malaria in the country^[5,6].

However, little attention is paid to how the quality of these services can be enhanced. Quality and not just the availability of health services is important if health outcomes are to be improved significantly^[16]. It is important to invest in quality improvements in public health facilities because more than 80% of the malaria patients in Zambia seek care from these facilities^[17,18]. Thus, this paper endeavours to establish the appropriateness of malaria case management at the health facility level among four districts in Zambia.

2. Materials and methods

2.1. Study design and study sites

A retrospective evaluation of the quality of malaria case management was conducted at 12 health facilities as a part of a larger study on willingness to pay for malaria risk reduction^[19]. The study sites were four districts in four of the nine provinces of Zambia. The districts were Chongwe, Chingola, Kabwe and Monze and were conveniently sampled due to the availability of secondary data which was a basis for the retrospective review. The sites represent both the high and low malaria epidemiological zones and cover both urban and rural settings^[20].

2.2. Sampling

All the patient registers were reviewed for 2008 at each of the 12 level one health facilities (3 facilities per district). The year 2008 was used for the review because this is when the supply of malaria commodities (including RDTs and antimalarials) was optimal and the health facility staff had received the required in-service training on malaria case management as documented in the malaria programme reports^[21,22].

2.3. Data collection

The quality assessment was based on the malaria diagnosis and treatment guidelines for Zambia which were in use in 2008. The quality of management of malaria was established for each facility, health worker characteristics were assessed and all data were entered in the transcribing sheet developed for the survey. Each health worker was identified using their hand writing. The number of health workers at each of the health facilities was limited and it was possible to identify the handwriting according to each health worker, verified by the health centre in-charge and the corresponding days of being on duty for a particular health

worker. After that, the characteristics of the health worker were verified and entered into the questionnaire. These included sex, age, profession, in service training on malaria, IMCI training, residence (rural or urban) and years of service. A total of 39 health workers were considered for analysis out of the expected 36 (3 per district). The parameters considered for quality of malaria case management were:

- Proportion of suspected malaria cases in whom a parasitemia confirmatory test (RDT or microscopy) was performed.
- Proportion of malaria parasite positive cases treated with the recommended antimalarial.
- Proportion of parasite negative cases in whom no antimalarial was prescribed.

The Pearson chi-square test was used to identify characteristics which affected quality of case management based on the differences in proportions; a *P*-value of less than 0.05 was considered significant. The variables used were sex, profession, in service training on malaria, IMCI training, residence (rural or urban), district and years of service at the facility.

The main outcome measure was the proportion of malaria patients managed according to the national guidelines. The explanatory factors were the health worker characteristics, which were found to be associated with the malaria case management quality parameters.

The main limitation of the study is that it was a retrospective review of health facility records, therefore, the investigators could not control the record completeness for each patient's socio-demographic variables. The missing socio-demographic variables in health facility registers was a common practice as the health centre staff focused more on writing down the patient name, the clinical investigations and drugs prescribed rather than the age and gender of the patients. Secondly, in this study, we could not directly measure the availability of RDTs and drugs on each day but

the information used for malaria commodity availability was based on program reports and the population based Malaria Indicator Survey of 2008 for Zambia.

2.4 Ethics clearance

The ethics clearance for this study was provided by the Tropical Diseases Research Centre Research Ethics Committee in Ndola, Zambia.

3. Results

3.1. Patterns of case malaria management

Out of all the 4891 suspected malaria patients WHO visited the 12 health facilities between January and December 2008, more than 80% of the patients had a temperature taken to establish their fever status. About 67% (*CI*₉₅ 66.1–68.7) of the suspected malaria patients had a confirmatory parasitological test, with more tested by RDT than by microscopy (Table 1). A fifth of the suspected malaria cases were subjected to clinical diagnosis only.

Of the 2247 malaria cases reported by health workers (complicated and uncomplicated), 56% (*CI*₉₅ 53.9–58.1) were treated with AL, 35% (*CI*₉₅ 33.1–37.0) treated with SP, 8% (*CI*₉₅ 6.9–9.2) were given quinine and 1% were not given any anti-malarial (Table 1). Of the reported malaria cases 29% were clinically diagnosed, 71% were parasitologically confirmed (59% by RDT and 12% by microscopy). Approximately 30% of the patients WHO were reported not to have malaria were still prescribed with an anti-malarial, contrary to the guidelines.

3.2 District variations

There were variations among districts in the proportion of

Table 1
Summary of malaria case management.

Variable	<i>n</i>	%	95% <i>CI</i>
Number of patients suspected to have malaria	4891		
Suspected malaria patients in whom any test (clinical algorithms or parasitological test) was performed	4395	89.9	89.0–90.7
Suspected malaria patients assessed clinically only	1099	22.5	21.3–23.7
Suspected malaria patients tested by microscopy	791	16.2	15.2–17.2
Suspected malaria patients tested by RDT	2505	51.2	49.8–52.6
Cases appropriately tested (RDT+microscopy)	3296	67.4	66.1–68.7
Suspected malaria patients found to be negative	2644	60.2	58.7–61.6
Confirmed negative cases treated with any anti-malarial	793	30.0	28.2–31.8
Negative cases appropriately treated (not given anti-malarial)	1851	70.0	68.2–71.8
Cases found to be malaria positive	2247	51.1	49.6–52.6
Cases found to be positive appropriately treated (given ACT)	1258	56.0	53.9–58.1
Cases found to be parasite positive treated with SP	787	35.0	33.1–37.0
Cases found to be positive treated with quinine	180	8.0	6.9–9.2
Positive cases not treated with anti-malarial	22	1.0	0.6–1.5

patients in whom a diagnostic tool was used. In Monze and Kabwe districts, more than half of the patients were only clinically diagnosed to have malaria, whereas in Chongwe and Chingola, more than three quarters of the patients had a confirmatory test performed (Figure 1). According to NMCP programme reports, all the districts received adequate supplies of RDTs and antimalarials in 2008. Similarly, the choice of antimalarials for the treatment of cases classified to have malaria differed by district (Figure 2). Chingola and Chongwe districts showed higher prescriptions of AL, while Monze district showed the least.

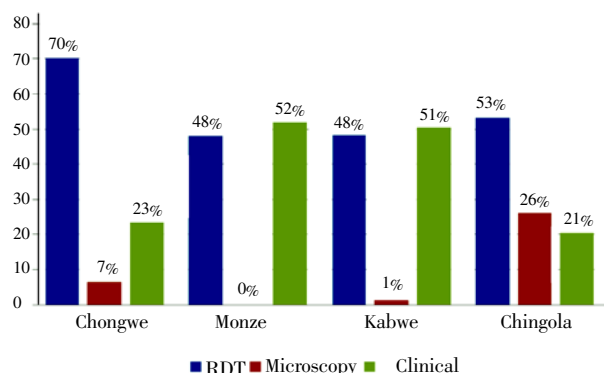


Figure 1. Proportion of patients per district in whom a diagnostic tool was used or clinical diagnosis was applied only.

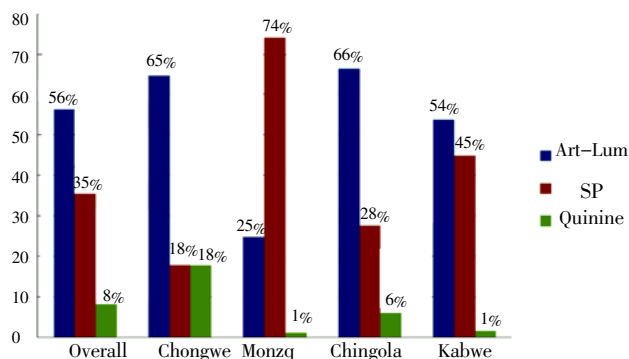


Figure 2. Choice of the anti-malarials to treat malaria cases according to district.

3.3 Association between health worker characteristics and quality of case malaria management

The decision whether to use the RDT test or not varied with the health worker category ($P=0.001$) as shown in Table 2. Nurses used RDTs two times more frequently than clinical officers and environmental health technicians. The district of residence was found to be associated with a decision to prescribe SP ($P=0.001$) or AL ($P=0.041$) respectively. Health workers from Chingola and Chongwe prescribed AL to 65% and 66% of the malaria positive cases, respectively (Figure 2) while Kabwe and Monze health workers prescribed AL to 54% and 25% malaria positive cases respectively. Health workers from Monze district prescribed SP more than AL to the malaria positive cases (74% versus 25%). Gender, in

service training on malaria, years of residence in the district and length of service at the facility were not associated with diagnostic and treatment choices.

Table 2

Association between health worker characteristics and quality of case management.

Variables	P value
Health worker sex and RDT testing	0.521
Health worker sex and microscopy testing	0.429
Health worker sex clinical diagnosis	0.603
Health worker in-service training on malaria and rdt testing	0.759
Health worker in-service training on malaria and microscopy testing	0.493
Health worker in-service training on malaria and clinical diagnosis	0.583
Health worker category and RDT testing	0.001
Health worker category and microscopy testing	0.371
Health worker category and clinical diagnosis	0.466
Health worker IMCI training and rdt testing	0.364
Health worker IMCI training and microscopy testing	0.298
Health worker IMCI training and clinical diagnosis	0.211
Health worker residence and rdt testing	0.385
Health worker residence and microscopy testing	0.497
Health worker residence and clinical diagnosis	0.085
Health worker years served at a facility and rdt testing	0.998
Health worker years served at a facility and microscopy testing	0.305
Health worker years served at a facility and clinical diagnosis	0.306
Health worker sex and treating positive cases with AL	0.491
Health worker sex and treating positive cases with SP	0.286
Health worker sex and treating positive cases with quinine	0.455
Health worker category and treating positive cases with AL	0.852
Health worker category and treating positive cases with SP	0.087
Health worker category and treating positive cases with quinine	0.920
Health worker in-service training and treating positive cases with AL	0.658
Health worker in-service training and treating positive cases with SP	0.417
Health worker in-service training and treating positive cases with quinine	0.389
Health worker IMCI training and treating positive cases with AL	0.515
Health worker IMCI training and treating positive cases with SP	0.548
Health worker IMCI training and treating positive cases with quinine	0.479
Health worker residence and treating positive cases with AL	0.135
Health worker residence and treating positive cases with SP	0.106
Health worker residence and treating positive cases with quinine	0.573
Health worker years at a facility and treating positive cases with AL	0.624
Health worker years at a facility and treating positive cases with SP	0.982
Health worker years at a facility and treating positive cases with quinine	0.638
District and treating positive cases with AL	0.041
District and treating positive cases with SP	0.013
District and treating positive cases with quinine	0.470

4. Discussion

Malaria case management in the surveyed districts was characterised by poor adherence to diagnostic and treatment guidelines. The non-adherence was mainly in terms of: inconsistent use of confirmatory tests (RDT or microscopy) for malaria cases; prescribing anti-malarials which are not recommended (SP) in the national guidelines and prescribing anti-malarials to cases testing negative. The indicators for assessment of quality used in this study are consistent with what is internationally accepted as quality of care indicators based on a Delphi survey of national and international experts[23].

In this study, the majority of the confirmed malaria cases were confirmed by the RDT strategy and less by microscopy. These findings are consistent with earlier reports on the same in the country^[22]. This is partly because the RDTs are more available in Zambia than functional microscopes^[24,25]. Furthermore, RDTs are easier to scale up while microscopy scale up is a challenge due to the capital investments required^[26]. It can therefore be said that the use of RDTs has played a major role in increasing the malaria case confirmation capacity in Zambia. When RDTs were absent, malaria confirmation was less than 20%^[21]. Based on the findings of this study and also in line with the WHO recommendations, countries wishing to improve malaria confirmation capacity should consider investing in RDTs at all levels of care where microscopy services are not available. This has the potential to improve patient management outcomes and reduce inappropriate prescription of anti-malarials^[8,27,28]. A decrease in inappropriate prescription of antimalarials contributes to reducing drug pressure and consequently may help delay the emergence of parasite resistance to ACTs which are being used as first line treatment for uncomplicated malaria^[29,30].

Apart from improving health outcomes, parasitological malaria confirmation has an important role in disease epidemiology because it improves the estimation of the malaria burden and better planning of the control interventions. Given that 29% of the reported malaria cases were diagnosed clinically only, it is not possible to estimate the true prevalence of malaria using the reported figures.

The diagnosis result is supposed to inform clinicians on the decision of whether to prescribe an anti-malarial or not. However, this was frequently not the case as seen by prescriptions of other anti-malarials than AL. The 35% persons prescribed SP should be considered inappropriate because this is not in line with the national diagnosis and treatment guidelines. Only children less than 1 year are supposed to be prescribed SP for uncomplicated malaria. It is highly unlikely that these accounted for the 35% of the anti-malarial prescriptions because the children under 1 year account for approximately 4% of the general population^[31] and malaria is less frequent in children under one year.

Among the patients with a negative parasitological test result, appropriate management implies not prescribing any anti-malarial. It was found that some patients with a negative test were still prescribed anti-malarials. This finding is similar to previous ones reported in Zambia by Hamer *et al* in 2007^[24] and elsewhere in Africa^[27,32–34]. When the health workers don't have the capacity to identify the other causes of fever they are likely to give an anti-malarial. Therefore, it is important to work with other programs for joint capacity building including supervision in order to improve the integrated management of illnesses.

This study has demonstrated that malaria in-service trainings were not associated with better malaria case management practices. This finding is similar to what has been reported in Kenya where it was found that in service training and possession of guidelines did not have an effect on

the quality of malaria case management^[35]. Also, in a health facility survey involving children in Malawi, it was found that in service training on malaria management was not associated with treatment quality^[36]. In light of this, it is cardinal that joint program supervision should be promoted for continuous assessment of health workers' performance.

It is important to note here that in this study, the approach was to analyse the health worker practices as opposed to asking health workers directly why they don't prescribe AL^[37] so as to avoid the 'blame game'. In studies where health workers have been asked to account for their lack of adherence to malaria diagnosis and treatment guidelines, they have cited requiring more training or fear of stock-outs of commodities and the associated cost of ACTs^[37,38]. However the latter two arguments may not always hold because the non-prescription of AL occurs even when the drug is available and in countries such as Zambia, patients are not required to pay for anti-malarial drugs. Therefore, the cost to the patient cannot be an impediment to AL being prescribed to the patients. In Malawi where the policy change was made to adopt SP and not ACT, only 37.4% of children received appropriate treatment^[39] whereas in Uganda before the policy change to ACTs was implemented, only 40% were prescribed the recommended anti-malarials^[40]. Therefore it seems that health workers blame the 'system' in which they work instead of seeing themselves as part of the solution, when in fact, as health workers they are part of the health system and their actions do impact on malaria case management [27,37,41,42]. The under utilisation of diagnostic results and inappropriate prescription of anti-malarials reported in this study and other studies has also been reported among private clinics in Kenya [43] and pharmacies in Ivory Coast^[44]. Therefore, this illustrates how widespread this problem is and how it may be a contributor to slowing progress in reducing malaria related mortality.

Innovative approaches on how to improve health worker adherence to treatment guidelines are required in order to contribute to better malaria case management at lower level health facilities. It is important to develop mentoring programmes for health workers where they begin to see themselves as part of the solution of delivering effective case management, otherwise the full benefits and health outcomes of implementing effective malaria case management may not be realised^[37].

Conflict of interest statement

We declare that we have no conflict of interest.

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also like to thank the District Health Offices for consistently providing data. Thank you to the programme officers at National Malaria Control Centre and the district staff for their support.

Comments

Background

This article describes a retrospective review of malaria case management in four districts in Zambia. Past evaluations have demonstrated deficiencies in the use of diagnostics for malaria and the proper prescription of artemisinin-based combination therapy.

Research frontiers

Zambia rapidly scaled up the availability and use of RDTs for malaria between 2004 and 2006. This paper describes how well these tests were being used a few years later in 2008 and the effect of specific factors (such as type of health care provider and malaria in-service training) on the proper use of diagnostics and prescription of AL.

Related reports

The findings described in this research are moderately different from those of a previous evaluation of malaria case management practices in Zambia (Hamer DH *et al.* (2006). In the current study, 715 of patients were parasitologically confirmed whereas in the earlier one, only 27% had a diagnostic test done. This suggest that the use of malaria diagnostics, either RDT or microscopy, has improved between 2006 and 2008 in Zambia.

Innovations and breakthroughs

This is far from the innovative research. It is a practical retrospective review of clinic records in a small number of health centers ($n=12$). However, the selection of health centers in four different areas of the country with different levels of malaria transmission helps to make the results more generalizable.

Applications

The findings reported by Chanda-Kapata *et al.* demonstrate continued problems with malaria case management in Zambia. In addition to demonstrating a need for further strengthening of the use of malaria diagnostics, there is also a need to improve the use of AL instead of SP. Innovative interventions to improve malaria case management are urgently needed.

Peer review

This is a relatively small, retrospective study of malaria case management practices in Zambia. It highlights several aspects that require attention including the use of diagnostics for all patients, decreasing the use of SP for malaria test confirmed cases, eliminating the use of anti-malarial drugs for patients WHO test negative for malaria, and assuring that all patients with confirmed malaria receive treatment.

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