"Has the patient been coughing?" Do Ugandan providers ask patients tested for malaria about cough history? Secondary analysis of 2011 data from the Integrated Infectious Disease Capacity Building Evaluation (IDCAP)

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Abstract

"Has the patient been coughing?" Do Ugandan providers ask patients tested for malaria about cough history? Secondary analysis of 2011 data from the Integrated Infectious Disease Capacity Building Evaluation (IDCAP)

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Introduction: In 2013, malaria caused an estimated 584,000 deaths worldwide, with 90% of those deaths occurring in Africa. The Integrated Management of Childhood Illness (IMCI) strategies have been effective at improving the health outcomes of malaria patients (Schellenberg et al., 2004). Recent case management algorithms guide health care providers to ask about cough history and perform laboratory testing for evidence of infection with malaria by either microscopy or a malaria rapid diagnostic test (RDT) in all patients suspected of having malaria. Many health workers do not adhere to these guidelines uniformly. Little is known about the influence of performing a parasitological diagnosis on the clinical practice of taking a history of cough in low- and middle-income countries.

Method: We performed a secondary analysis using data from a cluster randomized trial to conduct a cross-sectional study using 36 Ugandan level IV health facilities to test the hypothesis that practitioners would be more likely to record cough history in patients with a negative malaria test result compared to patients with a positive malaria test result. We used a generalized linear model to perform a multivariate regression clustered by health facility and adjusted for patient age, gender, emergency triage status, facility, intervention arm, and month of visit.

Result: A total of 138,285 patients were tested for malaria. Cough history was performed for 80,266 (58%) patients. In the univariate analysis, cough history was assessed in a similar percentage of patients with a negative malaria test 53,017/92,683 (57%) versus a positive malaria test 27,249/45,602 (60%), and this difference was not statistically significant (relative risk [RR] 0.96, 95% CI 0.88-1.04, P=0.313). After adjusting for confounding factors, the percentage of patients with a documented cough history was the same across malaria test results (adjusted RR 0.99, 95% CI 0.91-1.08, P=0.833).

Conclusion: This analysis revealed no difference in the relative risk that a provider would perform a cough history in patients with a negative malaria test result versus positive malaria test result. The frequency of patients asked about history of cough by a health provider was a little over half, despite the IMCI and other WHO guidelines suggestion that cough history precede other examinations and should be asked in all patients. This information has important implications for infectious disease training programs as well as clinical guidelines.

Introduction

In 1992 the World Health Organization (WHO) began developing integrated strategies for health care workers to reduce the number of deaths and the frequency and severity of infectious diseases in low- and middle-income countries. One strategy, entitled the Integrated Management of Childhood Illness (IMCI) (Benguigui et al., 2006), focused on improving case management for children with infectious diseases such as malaria. In 2013, malaria caused an estimated 584,000 deaths worldwide, with 90% of those deaths occurring in Africa (WHO, 2014). The IMCI strategies have been effective at improving patient health outcomes (Schellenberg et al., 2004).

Case management guidelines must be continuously revisited and revised to promote the best clinical practices and quality of care for patients (Baiden et al., 2011). In the *2006 World Malaria Report* (WHO, 2006), the WHO recommended that health care providers take a history, carry out an examination, and undertake the appropriate investigations for each patient (Enarson et al., 2005). For patients suspected of having malaria, case management algorithms advise health care providers to assess for cough. There are two parts to the assessment: 1) asking about history of cough, and 2) follow-up questions and physical examination among patients with a cough. We will refer the former as the cough history and the latter as the cough assessment. The physician must question the patient about cough history or may observe the patient coughing. The cough history helps health care providers to decide whether or not to perform additional cough assessments to classify patients into specific categories that will help exclude other potential illnesses (Benguigui et al., 2006). A cough assessment is defined by physically examining patients for cough and specific clinical features (i.e. respiratory rate, lower chest wall in-drawing, abnormal chest sounds such as stridor, and difficulty breathing). According to

clinical guidelines, during a routine examination, asking a patient about his or her cough history must precede an assessment for cough.

In 2010, WHO recommended that all patients suspected of malaria be examined for evidence of infection with malaria parasites by either microscopy or a malaria rapid diagnostic test (RDT) (WHO, 2010). In addition, based on IMCI guidelines, taking a cough history and assessing for cough remains best clinical practice. Several publications have reported that many health workers do not adhere to IMCI guidelines uniformly (Horwood et al., 2009; Rowe et al., 2001; Walter et al., 2009). Little is known about the influence of performing a parasitological diagnosis on the clinical practice of taking a history of cough in low- and middle-income countries.

In a setting where malaria is endemic and a busy clinician does not perform a thorough history and examination of every patient, there is a perception that a clinician might begin by ordering a malaria test. If s/he rules out a malaria diagnosis, then s/he would devote time to a more thorough history and examination to make an alternative diagnosis. Using data from the Ugandan Integrated Infectious Disease Capacity Building Evaluation (IDCAP) cluster randomized trial, we conducted a cross-sectional analysis to test the hypothesis that practitioners would be more likely to ask about cough history in patients with a negative malaria test result compared to patients with a positive malaria test result.

Methods

Setting: The IDCAP cluster randomized trial was conducted in 36 Ugandan level IV health facilities (or comparable facilities). The facilities in this study were located in all Ugandan administrative regions (central, east, north and west).

Intervention data:

One goal of the interventions was to support practitioners to develop routine and complex clinical reasoning skills (Miceli et al., 2012). The first intervention was the Integrated Management of Infectious Disease (IMID) training program that included a core course for three weeks, followed by two 1-week sessions and distance learning courses. In 2010, the IMID training program was given simultaneously to two mid-level practitioners at all 36 health facilities. The curriculum content was based on Integrated Management of Childhood Illness (IMCI) and the Integrated Management of Adult Illnesses (IMAI), updated WHO malaria guidelines, Joint Uganda Malaria Program (JUMP), the Infectious Diseases Institute (IDI) HIV training program, and Ugandan national and international guidelines.

The second intervention was nine monthly on-site support (OSS) visits with four activities for two days per month. It was implemented sequentially in the intervention arms, occurring in arm A first, and later in arm B. The health facilities were randomized in clusters in a 1:1 ratio, including 18 sites where OSS was implemented from April 2010 to December 2010 (Arm A), and 18 sites that served as controls during this period (Arm B). Arm B received OSS monthly from March to September 2011. Bimonthly OSS continued in Arm A in March to August 2011.

Data collection:

A standardized outpatient form was used to collect individual patient data during outpatient visits for the evaluation from November 2009 to December 2011. The details of the data collection are described in Weaver et al., (2014) and Mbonye et al., (2014).

Subjects & Study design:

We performed a secondary analysis of IDCAP data to conduct a cross-sectional study using individual patients as the unit of measurement. Patients in this analysis accessed care at any of the participating healthcare facilities between January and September 2011, when all facilities had received OSS or were in the process of receiving it. Patients were included in this analysis if they had malaria test results by blood smear microscopy or RDT. The presence of a result in the outpatient form, either positive or negative, was used as an indicator that a malaria test result was received. Patients with missing malaria test results were excluded. Our primary outcome of interest was the recording of a patient's cough history. A record of a patient's response to at least one of two questions about presense of cough and duration was used as an indicator that the practitioner performed a cough history: 1) cough < 2 weeks (yes/no), and 2) cough ≥ 2 weeks (yes/no).

Statistical Analysis:

First, we conducted a univariate analysis using malaria test result as our independent variable and cough history assessment as our dependent variable. Then to determine the association between a malaria test result (negative versus positive) and performing an assessment for cough history, we used a generalized linear model to perform a binomial regression clustered by health facility identification number. We adjusted for potential confounders by performing a multivariate binomial regression clustered by health facility identification number. Potential confounders were selected *a priori* and included patient age, gender, emergency triage status, facility (hospital vs. level IV health clinics), intervention arm, and month of visit. The threshold for statistical significance was set at $\alpha \leq 0.05$ and 95% confidence intervals (CI) were calculated.

We tested the statistical significance of an interaction term between the presence of a malaria test result and the following factors: intervention arm, emergency triage status, and month of visit. These factors were determined not to be effect modifiers in our study, so no stratified analyses are presented.

Results

A total of 138,285 patients were tested for malaria by RDT or blood smear between January and September 2011 at 36 Ugandan health facilities. Table 1 displays patient characteristics. During the selected time period, cough history was recorded for a total of 80,266 (58%) patients. Cough history was asked in a similar percentage of patients with a negative malaria test 53,017/92,683 (57%) versus a positive malaria test 27,249/45,602 (60%), and this difference was not statistically significant (relative risk [RR] 0.96, 95% CI 0.88-1.04, P=0.313). After adjusting for confounding factors, the percentage of patients with a documented cough history was the same across malaria test results (adjusted RR 0.99, 95% CI 0.91-1.08, P=0.833).

Discussion

In this study, we sought to understand the relationship between malaria test result and health care providers documenting cough history. We found that health providers asked 58% of patients about history of cough among all patients tested for malaria. There was no difference in the relative risk that a provider would perform a cough history in patients with negative malaria test versus positive malaria test.

The lack of significant results for our analysis suggests malaria test result and documenting history of cough are not related. These results do not diminish the importance of health care providers asking all patients about history of cough.

In our study, the frequency of patients asked for history of cough by a health provider was a little over half, despite the IMCI and other WHO guidelines suggestion that all patients receive a cough history. Few studies have explored the relationship between malaria test results and health care providers asking for cough history. There are, however, some studies that have evaluated the frequency of documenting cough history for malaria cases. Erikson et al. (2007) assessed the quality of malaria case management at health facilities in a rural district of Tanzania. The authors found that health workers asked about the presence of cough, diarrhea, and fever in 30% of all consultations. The study did not differentiate between these three indicators. In an observational study examining the effects of microscopy on outpatient malaria case management in Kenya, health care providers asked about cough history in 36.8% (95% CI: 30.7–42.9) of patients (Zurovac et al. 2006). The frequency seen in our study is higher than those seen in other studies, perhaps due to the effects of the IDCAP interventions. Nonetheless, based on the guidelines recommending that all malaria suspects have an evaluation for cough, our frequency of 58% would suggest that assessing for cough history continues to need improvement.

Strengths & limitations:

A strength of this study was that there were sufficient number of patients to test the hypothesis. An additional strength of this study is that there were an adequate number of level IV health facilities or comparable facilities that participated in this study.

There are several limitations of this study. It is difficult to determine whether a history of cough was not asked by a health care provider or whether the health care provider asked and then neglected to record it. If providers consistently forgot to record the history, this might explain the low frequency seen for recorded cough history in this study. Furthermore, the variable 'history of

cough' cannot provide information on other cough assessments, i.e. respiratory rate, lower chest wall in-drawing, abnormal chest sounds such as stridor, and difficulty breathing. This information is available in the IDCAP data, and could be analyzed in the future to provide additional insight into cough assessment and the quality of care provided to patients with suspected malaria.

Conclusion:

In conclusion, the results of this study showed that health care providers were not more likely to ask about cough history for patients with a negative malaria test result versus patients with a positive malaria test result. The frequency of taking a cough history performed by health care providers in this study was moderately low, given the guideline recommendation that cough history should precede other examinations. This information has important implications for infectious disease training programs as well as clinical guidelines. Clinical guidelines promote assessing for cough history for all patients, and this information could be especially helpful when creating training sessions for these case management algorithms.

Tables

Table 1. Baseline characteristics of IDCAP visits in 2011 among patients that had a malaria test performed

Characteristics	Total	%
N	138,285	100
Age		
Under 5 years	49,102	36
5-13 years	20,142	15
14+ years	67,720	49
Female sex	82,557	60
Malaria test positive	45,602	33
Cough assessments performed	80,266	58
History of fever	101,603	73
Emergency triage status*		
Emergency	1,845	1
Priority	9,977	7
Queue	106,353	77

 *Percent does not add to 100 percent due to missing data

Table 2. Relative Risk and frequency of history of cough recorded by malaria test result

	Malaria test negative n (%) N=92,683	Malaria test positive n (%) N=45,602	RR (95% CI)	P value
History of cough (univariate)	53,017 (58%)	27,249 (60%)	0.96 95% CI (0.88 - 1.04)	0.313
History of cough (adjusted)*	53,017 (58%)	27,249 (60%)	0.99 95% CI (0.91 - 1.08)	0.833

*Adjusted for Patient age, Gender, Emergency triage status,
Facility (hospital vs. level IV health clinics), Intervention arm and Month of visit

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