Original Research Article

Clinicians' knowledge and practices in the diagnoses and management of non-malarial fever illnesses among under 5 children in Kisii County, Kenya

Samwel Amka Onywoki1*, Samuel Mong’are2, Obwocha Evans Obare2, John Gachohi1,3

1School of Public Health, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya
2School of Health Sciences, Kisii University, Kisii, Kenya
3Washington State University, Global Health Kenya, Kenya

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*Correspondence:
Dr. Samwel Amka Onywoki,
E-mail: samwelamka@gmail.com

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ABSTRACT

Background: Indiscriminate fever management using antimalarial drugs escalates patients' health risk, especially those <5 years old, with the likelihood of accelerating the emergence and spread of drug-resistant malaria parasites. We assessed clinicians' knowledge and practices in diagnosing and managing non-malarial fever illnesses among children <5 years in Kisii County, Kenya.

Methods: 193 nurses and clinical officers working in selected public health facilities in Kisii County were recruited into the study. Semi-structured questionnaires and individual interviews were used in collecting data. Chi-square was used in testing associations between categorical variables.

Results: 94% (n=181) of the respondents were aware of other infectious illnesses other than malaria, 71% (n=137) were aware of fever as the primary clinical sign of malaria while 61% (n=118) of the respondents were aware of non-infectious sources where fever is the leading symptom. The frequently prescribed antipyretic drugs were paracetamol and Ibuprofen. Under the hematinic and vitamins category, clinicians commonly prescribed multivitamin syrups and iron blood tonics. 91% (n=176) of the study respondents reported that they occasionally-preserved anti-malaria drugs for malaria negative diagnostic results. Knowledge and practices in diagnosis management of non-malaria illnesses, varied significantly among clinician’s who were in the rural and urban facilities (p=0.025, OR: 1.16, 95% CI: 0.02-0.28). However, there was no association between level of knowledge of the enrolled nurses, registered nurse and clinical officer [(p=0.21, OR: 0.88, 95% CI: -0.32-0.07), (p=0.89, OR: 0.98, 95% CI: -0.26-0.23)]

Conclusions: Clinicians in Kisii County reported prescribing anti-malarial drugs for malaria negative diagnostic results, highlighting the need for continuous field training in differentiating malarial and non-malarial fevers.

Keywords: Non-malaria, Fever, Clinician, Knowledge, Practices, Diagnosis

INTRODUCTION

In developing countries, where diagnostic facilities are limited, acute febrile illness aetiologies remain mostly unidentified, yet case fatality rates remain high. In settings with limited diagnostic capacities, infection with bacteria, viruses, or protozoa that cause respiratory and gastro-intestinal illnesses could present febrility similar to that encountered in malaria among children. There is evidence of morbidity and mortality burden accrued from non-malarial febrile illnesses in malaria-endemic areas. Since fevers commonly attributed to malaria could have disparate causes, experts recommend that a formal diagnosis precedes antimalarial treatment. Nevertheless,
burden, however, other causes of febrile illnesses have remained prevalent. Inappropriate use of ACTs can have serious implications for the spread of drug resistance and leads to poor outcomes for non-malaria patients treated with incorrect drugs. Providing health care in sub-Saharan Africa is a complex problem. Clinicians, and the public frequently fail to understand that diagnosis is essential to the prevention and treatment of disease. Access to reliable diagnostic testing is severely limited in this region, and misdiagnosis commonly occurs. Understandably, allocation of resources to diagnostic laboratory testing has not been a priority for resource-limited health care systems, but unreliable and inaccurate laboratory diagnostic testing leads to unnecessary expenditures in a region already plagued by resource shortages, promotes the perception that laboratory testing is unhelpful, and compromises patient care. While the Ministry of Health in Kenya has adopted mandatory testing for malaria for all children presenting with fever, there are no studies assessing clinicians' knowledge and practices in diagnosing and managing non-malarial fever illnesses among children under 5 in malaria-endemic regions such as Kisii County, Kenya. This study was conceptualized and implemented in this region to fill this gap.

**METHODS**

**Study setting, design, sample size, and sampling**

In 2013, Kenya changed its governance system, dividing the country into 47 semi-autonomous units called counties, which are further sub-divided into 290 sub-counties. Each county consists of two to 12 sub-counties. Part of the County government’s role is to manage the county’s health sector with health facilities and services in levels as follows: level 1 composed of community facilities run by trained community health volunteers, level 2 composed of dispensaries run by nurses and clinical officers, level 3 composed of health centers which are small-scale hospitals with minimal facilities and services, level 4 composed of sub-county hospitals, and level 5 composed of county referral hospitals.

We conducted a healthcare worker-focused study in Kisii County. Kisii County borders Nyamira County to the North East, Narok County to the South and Homabay and Migori Counties to the West. In this study, participants were drawn from five sub-counties. We employed a cross-sectional descriptive study design to recruit nurses and clinical officers working in level 2 and level 3 of selected public health facilities in the county.

A sample size of 384 respondents was initially calculated using the Cochran method, (1998) for determining the sample size. Since the county's health care workers' population size was less than ten times the estimated sample size, we used a finite population correction factor (fpc) to compute a sample size that would improve the outcomes' precision. The latter step yielded a sample size
of 175, of which we added 10% to account for non-
response to generate a final sample of 193 health care
workers.

Sampling of study respondents employed a multi-stage
cluster sampling approach where five of the 9 sub-
counties in the county were randomly selected. These five
sub-counties were aligned to either predominantly urban
sub-counties, defined as areas where more than 80% of
the population live in an urban setting or predominantly
rural sub-counties where at least 50% of the population
live. Two rural and three urban sub-counties were
proportionally selected depending on the intensity of
health facilities. Within the selected sub-counties, all
level 2 and level 3 public funded health facilities were
selected while within each facility, all consenting clinical
officers and nurses were recruited to participate in the
study.

Data collection

Data was collected using semi-structured questionnaires
and individual interviews. The collected data covered the
clinician’s socio-demographic and socio-economic
characteristics, training and professional experience,
knowledge about malaria and non-malaria fever and their
perceived capacities in diagnosis and management. Check
lists collected qualitative data from key informants
comprising of medical superintendents, facility in-charge
officers, medical laboratory technologists/technicians.

Data analysis

Likert scale was used to determine distribution of
perceptions on diagnoses of non-malaria fever illnesses.
Likert scale was also used to determine distribution of
perceptions among respondents on non-malaria fever
illnesses. Odds ratio (OR) was used to test the
association between categorical variables i.e. dependent
and independent. Proportion to size method was used to
determine respondents that specified bacterial, viral and
protozoal sources of non-malaria illnesses. Proportion to
size method was used to determine respondents that
specified bacterial, viral and protozoal sources of non-
malaria fevers in Kisii County.

RESULTS

A total of 193 clinical officers and nurses participated in
the study. 39% (n=75) were male while 61% (n=118)
were female. 55% (n=106) of the respondents worked in
health facilities found in urban sub-counties while 45%
(n=87) worked in health care facilities based in rural sub-
counties. 80% (n=155) of the respondents had attained a
diploma whereas 10% (n=19) had attained a medical
degree, while 10% (n=19) had attained a certificate in
different medical courses.

Experience and training

Clinicians had varying levels of experience and training.
49% (n=95) of the clinicians had 6-10 years of
experience, 29% (n=56) had 2-5 years of experience, 11%
(n=21) had over 16 years of experience, 10% (n=19) had
11-15 years and 1% (n=2) had less than one-year level of
experience.

Table 1: Clinicians’ knowledge on non-malaria fever
illnesses in selected health facilities in Kisii County.

| Proxy statements assessing knowledge | Agree | Neutral | Disagree |
|--------------------------------------|-------|---------|----------|
| Fever is main sign of malaria        | 71    | 13      | 16       |
| Certain non-malaria infectious illness predominantly present with fever | 94    | 4       | 2        |
| Certain non-infectious illnesses predominantly present with fever | 61    | 16      | 23       |

Table 2: Distribution of likert scale Perceptions on
diagnoses of non-malaria fever illnesses.

| Perception on diagnosis of non-malaria illnesses | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--------------------------------------------------|----------------|-------|---------|----------|------------------|
| Diagnosing fever etiology                        | -              | 80    | 16      | 4        | -                |
| Malaria in children <5 yrs is over-diagnosed     | 8              | 34    | 10      | 47       | 1                |
| Children <5 yrs with non-malaria illnesses       | 3              | 16    | 15      | 65       | 1                |
| Capacity to establish major sources of fever etiology | 6              | 84    | 6       | 4        | -                |

Knowledge in non-malaria fever illnesses diagnosis

94% (n=181) of the respondents were aware of other
fever causing infectious illnesses other than malaria, 71%
(n=137) reported that they were aware of fever as the
main sign of malaria and 61% (n=118) of them reported
that they were aware of non-infectious sources of fever
where fever is the main symptom (Table 1).

64% (n=124) of non-malarial-fever perceived to be of
bacterial origin was attributed to pneumonia, 11% (n=21)
to typhoid fever, 5% (n=10) to URTI and 20% (n=39) to
other infections including brucellosis, cellulitis, gastro-
enteritis, meningitis, otitis media, salmonellosis, TB,
tonsillitis among others (Fig 1). 33% (n=63) of non-malarial-fever perceived to be of viral origin was attributed to influenza, 12% (n=23) to measles, 11% (n=21) to chicken pox and 44% (n=85) to other infections common colds, coryza, mumps, HIV, hepatitis B, rhinitis among others (Figure 1). 39% (n=75) of non-malarial-fever perceived to be of protozoal origin was attributed to malaria, 36% (n=69) to amoebiasis, 13% (n=25) to giardiasis and 12% (n=23) to other infections (Figure 1).

Table 3: Common medication used in treating febrile children under five years.

| Common medication for <5 years | Group          | Freq | % |
|--------------------------------|----------------|------|---|
| **Antipyretic**                |                |      |   |
| Paracetamol                    | Rural          | 184  | 95|
| Ibuprofen                      | Urban          | 9    | 5 |
| **Hematic and Vitamins**       |                |      |   |
| Multivitamins Syrup            | Rural          | 188  | 97|
| Iron Blood Tonic               | Urban          | 5    | 3 |
| **Antibiotics**                |                |      |   |
| Amoxicillin                    | Rural          | 169  | 88|
| Ampicillin                     | Urban          | 2    | 1 |
| Cotrimoxazole                  | Rural          | 22   | 11|
| **Antimalarial**               |                |      |   |
| AL                             | Rural          | 192  | 1 |
| **Other Classes of drugs**     |                |      |   |
| Anticonvulsant                 | Rural          | 5    | 1 |
| Antidepressant                 | Urban          | 1    | 1 |
| Antiemetic                     | Rural          | 1    | 1 |
| Antifungal                     | Urban          | 30   | 59|
| Antihistamine                  | Rural          | 23   | 46|
| Antihypertensive               | Urban          | 1    | 2 |
| Azole                          | Rural          | 1    | 1 |
| De-wormer                      | Urban          | 26   | 51|
| Fluoroquinolone                | Rural          | 2    | 3 |
| Fluids                         | Urban          | 3    | 6 |
| ORS                            | Rural          | 1    | 1 |
| Rehydration Salt               | Urban          | 1    | 1 |
| Sedative                       | Rural          | 1    | 1 |
| Steroid                        | Urban          | 1    | 1 |
| Vaccine                        | Rural          | 3    | 7 |

Knowledge in management of non-malarial fever illnesses

Clinicians had varying methods of managing children presenting with non-malarial fever illnesses. 85% (n=164) prescribed antibiotics, 6% (n=11) prescribed fluid therapy, 4% (n=7) prescribed paracetamol, 2% (n=4) prescribed antimalarial drugs with similar proportion prescribing dewormers. 1% (n=2) prescribed other antipyretics other than paracetamol (Figure 2).

Table 4: Association between clinician’s knowledge and practice in diagnoses.

| Hypothesis | Predictors variables | Group     | OR (95% CI) | P     |
|------------|----------------------|-----------|------------|-------|
| H1         | Category of Sub-County | Rural     | 1.16 (0.02-0.28) | 0.025 |
| H2         | Cadre                | Enrolled Nurse | Ref | Ref | 0.88 (-0.32-0.07) | 0.21 |
|            |                      | Registered Nurse |     |     | 0.98 (-0.26-0.23) | 0.89 |

Knowledge diagnosis of non-malaria fever illnesses

Clinicians had varied methods of diagnosing children presenting with non-malaria fever illnesses; 90% (n=173) made diagnoses through clinical assessment, 5% (n=10) made diagnose by history taking and the other 5% (n=10) made diagnoses after laboratory tests (Figure 3).

Figure 1: Proportion of respondents that specified bacterial, viral and protozoal sources of non-malaria fevers in Kisii County.

Clinicians had varied perceptions on diagnoses of children under the age of 5 presenting with non-malarial fever illnesses. 80% (n=155) perceived that feature of the clinical history and patient physical examination perform well for diagnosing fever aetiology, 42% (n=81) perceived that malaria in children below 5 years of age is over-diagnosis, 66% (n=127) perceived that children under 5 years with non-malaria fever illnesses have poor clinical outcomes after treatment while 90% (n=174) perceived that they had the capacity to establish major sources of fever aetiology (Table 2).
Clinicians had varied options for managing children presenting with non-malaria fever illness. In antipyretic category, 95% (n=184) prescribed paracetamol and while 5% (n=9) prescribed Ibuprofen. Under hematinic and vitamins category, multivitamins syrup and iron blood tonic were the most prescribed drugs. Among antibiotics, 88% (n=169) prescribed amoxicillin, 11% (n=21) prescribed cotrimoxazole and 1% (n=2) prescribed ampicloxacillin (table 3). The interviewed clinicians concurred that in anti-malarial, 100% (n=193) prescribed artemether lumefantrine (AL). Other classes of drugs prescribed include anticonvulsant, antidepressant, antiemetic, antifungal, antihistamine and antihypertensive.

**Practices on diagnosis and management of non-malaria fever illness**

Clinicians had varied options of commonly prescribed medicines to children under the age of 5 years presenting with non-malarial fever illness. In antipyretic category, 95% (n=184) prescribed paracetamol and while 5% (n=9) prescribed Ibuprofen. Under hematinic and vitamins category, multivitamins syrup and iron blood tonic were the most prescribed drugs. Among antibiotics, 88% (n=169) prescribed amoxicillin, 11% (n=21) prescribed cotrimoxazole and 1% (n=2) prescribed ampicloxacillin (table 3). The interviewed clinicians concurred that in anti-malarial, 100% (n=193) prescribed artemether lumefantrine (AL). Other classes of drugs prescribed include anticonvulsant, antidepressant, antiemetic, antifungal, antihistamine and antihypertensive.

**Practices on referrals**

Clinicians had varied criteria of referring children under the age of 5 years presenting with non-malaria fever illness to a higher level of health care facility. Clinicians stated conditions they refer from a lower level: 36% (n=69) referred convulsion cases, 20% (n=39) referred coma cases, 10% (n=19) referred anaemia cases, 9% (n=17) referred dehydration cases, 9% (n=17) referred...
respiratory distress cases, 7% (n=14) referred severe pneumonia cases and others including persistent fever, severe malnutrition, jaundice, septicaemia, meningitis, measles, diarrhoea among others (Figure 5).

**Practice and perception on availability of guidelines and functional laboratories to diagnose non-malaria illnesses**

Clinicians had varied perceptions on availability of syndrome based guidelines as well as functional laboratories aiding in diagnosis and management of non-malaria fever illness among children and under the age of 5 years. 60% (n=116) affirmed availability of local syndrome based guidelines for management of non-malaria fever. 57% (n=110) affirmed availability of functional laboratories to diagnose non-malaria illnesses (Figure 6).

**Practice on diagnosis and management of non-malaria fever illness**

The interviewed clinicians had varied perceptions on diagnosis and management of non-malaria fever illness as follows; 54% (n=104) had opinion that diagnoses were done through microscopy while 46% (n=89) had opinion that diagnoses were done through rapid diagnostic test (Figure 7). From laboratory results, 97% (n=187) of the clinicians treated patients based on symptoms they presented with in case the diagnoses turn out negative. The same proportion refers the patient to other facilities when the diagnoses tests are unavailable. 91% (n=176) of the clinicians sometimes prescribed anti-malaria drugs for malaria negative diagnostic results.

There was varied association between clinician’s knowledge and practice in diagnosis and management of non-malaria fever illnesses. The knowledge and practices in diagnosis management of non-malaria illnesses, varied significantly among clinician’s who were in the rural and urban facilities (p=0.025, OR: 1.16, 95% CI: 0.02-0.28). However, the study did not find any association between level of knowledge of the enrolled nurses, registered nurse and clinical officer {(p=0.21, OR: 0.88, 95% CI: 0.32-0.07), (p=0.89, OR: 0.98, 95% CI: 0.26-0.23)} (table 4)

**DISCUSSION**

The findings of this study show that study respondents were aware of the existence of non-malaria fever illnesses. Awareness of the existence of non-malaria fever illnesses might have been associated with study respondents’ known encounter in the management of such cases including; pneumonia, oral thrust, typhoid fever, tonsillitis and chicken pox. Our key study finding agrees with earlier studies which reported that fever is one of the commonest symptoms of illness in children and has numerous causes.

Fever is one of the most common presenting symptoms of pediatric illnesses. Fever in children under age five years signifies systemic inflammation, typically in response to a viral, bacterial, parasitic, or less commonly, non-infectious aetiology. Infection with bacteria, viruses, protozoa or fungi can manifest as febrile illnesses. Since these febrile illnesses have some common overlapping manifestations, clinical diagnosis can be difficult. With the numerous differential diagnoses of fever in children, diagnostic delays could ensue.

Malaria-endemic neighbouring counties might have influenced study respondents to prescribe anti-malaria drugs. Because of the perceived increased risk of malaria mortality, if treatment is missed, some study respondents considered it safe to treat non-malarial febrile illnesses.
with antimalarial drugs than to miss a true case. Health care workers often lack the epidemiological information or laboratory services necessary to support rational diagnostic and management decisions while managing patients with negative malaria diagnostic tests.\(^1\)

In Kenya, the Ministry of Health guideline states, 'in certain cases a slide may be negative even when the patient has malaria...'.\(^2\) Such statements could encourage clinicians to prescribe anti-malaria drugs unnecessarily.\(^11\)

This study concurs with previous studies that found out that more than half of febrile children without malaria received antimalarial drugs, but only because clinicians did not trust the accuracy of the negative test results of malaria rapid diagnostic tests.\(^12\) This is in agreement with other studies that revealed that, because of the perceived increased risk of malaria mortality if treatment is missed, some clinicians consider it safe to treat several cases of non-malarial febrile illnesses with antimalarial drugs than to miss a true case.\(^13\)

Earlier studies reported that in the tropics and malaria-endemic regions, most fevers are presumed to be due to malaria and are treated empirically as such.\(^13\) Earlier studies reported that in Nigeria for instance, 83% of children under 5 years old received ACT even after testing negative for malaria via microscopy.\(^8\) This concurs with the present study which revealed that the majority (91%) of the study respondents reported that they sometimes prescribe anti-malaria drugs for malaria negative diagnostic results. This was attributed to the fact that the study area is in close to malaria-endemic counties like Homabay. The other motivating factor was, because of the perceived increased risk of malaria mortality if treatment is missed, some clinicians consider it safe to treat several cases of non-malarial febrile illnesses with anti-malarials than to miss a true case.

Most health facilities in the study area diagnose malaria through malaria rapid diagnostic kits instead of using gold standard (microscopy testing). This is due to the fact that most health facilities lack laboratory infrastructure, equipment and are experiencing acute shortage of laboratory personnel. These challenges that health facilities are facing in Kenya could be similar problems Ugandan clinicians are experiencing and hence similar study findings.\(^14\)

Poor infrastructure coupled with inadequate laboratory personnel could be the driving force towards clinical diagnoses instead of conventional diagnoses by use of laboratory. The use of malaria rapid diagnostic kits (MRDTs) in poor resource settings encouraged clinicians to perform empirical therapy. These findings concur with other studies that revealed that empirical treatment of fevers continues in resource-poor settings.\(^13\) The two studies; in Kenya and in sub-Sahara Africa are similar because studies were conducted in an area where P. falciparum is the dominant species. And therefore, the use of MRDT is most prevalent in resource-poor settings.

Poor laboratory infrastructure coupled with inadequate laboratory personnel leaves clinicians with no option of diagnosis apart from making clinical diagnosis. These findings disagree with earlier studies that reported that: it is often difficult to establish a diagnosis from the clinical history and physical examination alone because a range of diseases share similar clinical features.\(^15\) The diagnostic problem may be compounded by limited laboratory capacity for diagnostic testing. Majority of study respondent in Kisii County could have assumed that many years of work experience in handling similar cases could have given them an added advantage. These findings concur with earlier studies\(^1\) that reported that patients with negative malaria diagnostic tests, health care workers often lack the epidemiological information or laboratory services necessary to support rational diagnostic and management decisions.

This observation that children in resource-poor settings in Kenya are treated despite negative results concurs with early ones which reported that, in Nigeria, in a study of 1027 children under the age of five years who were treated for malaria, 853 (83.1%) with slide-negative microscopy results were treated with artemether-lumefantrine.\(^16\) The observation that malaria over-diagnosis and over treatment being attributed to the implementation of WHO integrated management of childhood illness also agrees with previous ones which reported that in Nigeria. In Nigeria, malaria over-diagnosis and overtreatment among children was attributed to the wholesome implementation of WHO's Integrated Management of Childhood Illness (IMCI) guidelines. The IMCI promotes presumptive treatment of fever as malaria for children living in malaria endemic setting.\(^8\)

Kenya and Nigeria fall under malaria-endemic zones. The two countries are categorized under developing countries and they experience economic challenges which impact negatively on the health of the people. The health sector is faced with challenges such as infrastructure and personnel. And therefore, clinicians are faced with challenges of making correct diagnoses on non-malaria fever illness hence, resulting in prescription of antimalarial drugs to children under the age of 5 years presenting with non-malaria fever illnesses.

The findings of this study show that the commonly prescribed antipyretic was paracetamol. Prescribing paracetamol suggests high frequency of fever and /or pain. The prescription of paracetamol and other antipyretics is associated with absence of guidance and medicines for the management of non-malaria febrile illnesses.\(^14\) The commonly prescribed antibiotic was amoxicillin. Amoxicillin is prescribed because it is the general antibiotic prescribed in African countries. In places where clinicians have been convinced not to prescribe anti malaria drugs in rapid diagnostic test (RDT) negative patients, limited guidance has resulted in over-prescription of antibiotics, another poor practice
which will promote the emergence of antibiotic resistance, replacing one problem with another.14. On hematocrit and vitamins, multivitamin syrups were commonly prescribed. Multivitamin syrups are supportive therapies indicative of severity of infections.

CONCLUSION

Majority of clinician in Kisii County were aware of other infectious illnesses other than malaria. A high percentage of clinicians in the health facilities in Kisii County diagnose children under the age of 5 years presenting with fevers by taking clinical history and physical examination for fever aetiology. And most common drugs prescribed for children under five years of age in health facilities in Kisii County were paracetamol, multivitamins syrup, amoxicillin and artemether lumefantrine (AL).

Recommendations

Regular training on proper diagnosis and management of non-malaria illnesses by ministry of health may significantly improve prescription practices among clinicians attending under-fives. Local syndrome-based guidelines for malaria should be made available at the health care facilities in Kisii County as this facilitates the improved health system strengthening component of IMCI strategy. Ministry of Health should strengthen the health facilities infrastructure especially the laboratory to accurately diagnose of common illnesses e.g. pneumonia, URTI and typhoid fever that affect patients across the health facilities in Kisii County.

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