ASSESSMENT OF KNOWLEDGE ON USE OF ARTEMETHER LUMEFANTRINE IN MANAGEMENT OF UNCOMPLICATED MALARIA AMONG OUTPATIENTS AT KIU-TH

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DECLARATION

I, KUSIIMA JIM declare that this research report is my original work and has not been presented in whole or part to any institution of learning for any academic award. Where other is referred to, acknowledgement by citation has been made.

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APPROVAL

I, Mr. Kabanza Robert, the supervisor of KUSIIMA JIM do hereby certify that this research report has been developed under my supervision and has been approved for submission.

Signature

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Date 15/12/2018
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LIST OF ABBREVIATIONS:

1. WHO-World Health Organization
2. CQ-Chloroquine
3. SP-Sulfadoxine/Pyrimethamine
4. AQ- Amodiaquine
5. Qn- quinine
6. QC-chloroquine
7. AL- Artimether-Lumefantrine
8. ACTs- Artesinin combination therapies.
9. KIUTH- Kampala International University Teaching Hospital.
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ABSTRACT

This study sought to assess the knowledge on the use of Artemether/Lumefantrine therapy in the management of uncomplicated malaria among outpatients treated at KIU-TH.

A cross-sectional study design was employed in this study. Data was collected from August to October 2018 using a questionnaire by simple random sampling and was entered and analyzed using Microsoft Excel spreadsheet and Statistical Package of Social Sciences (SPSS) version 20 respectively. The results were presented in form of tables, charts, graphs and Pearson Chi Square test were generated. The minimum and maximum age of the respondents was 0.5 and 55 respectively given that Skewness was greater than 1. (1.043).

The findings of the study have demonstrated that the patients' knowledge on use of Artemether-Lumefantrine for management of uncomplicated malaria is inadequate following key parameters of dosing time, duration of treatment, dietary recommendations and response to side effects. Certain aspects which could affect proper use of the drug like knowledge on the possible side effects and what to do when they experience them, the AL dietary requirements and why they should not stop taking their drug even when they feel better before the treatment is over, what to do if they vomited any dose were not clearly understood by the patients.

It was found out that patients' level of Education had no significant effect on their knowledge on use of AL. Other patient factors like Marital status, Patient occupation and the frequency of obtaining AL as OTC were not significantly associated with the knowledge expressed by the patients on AL.

The major challenges to poor use in this setting were related to difficulties in following expected dosing schedule and most especially the time for the second dose, time for completion of the dose, dietary recommendations and what is done when the drug is vomited which could be sorted out through improved counseling and patient Education on taking the medication by the dispenser or pharmacist.

CONCLUSION: Patients did not have adequate knowledge on the dispensed drug and particularly on the dosing schedule and dietary recommendations associated with the use of AL. The patients’ level of Education did not have a significant effect on the knowledge on use of AL expressed by the patients. This could imply that the quality of patient-service provider interaction and particularly counseling and emphasis on all issues pertaining the use of the dispensed drugs is weak.

RECOMMENDATIONS: Re-train health workers particularly dispensers/pharmacists on the purpose of effective counseling on disease and treatment issues of the patients. Ensure that all first doses of AL be administered before the patient leaves the health facility. Set a follow up strategy of the patient to assess response to therapy at least after two days and solve any problems that may have resulted from treatment.
CHAPTER ONE

INTRODUCTION

BACKGROUND

Patient's knowledge of medication use is not only of vital importance in the prevention of drug related problems, but also a major factor that influences treatment success and hence if provided, it offers an opportunity for one to attain a full health potential.

Equitable provision of health care not only portrays the fair and just allocation of resources in the health care sector, but also embraces the provision of information required by patients relating to their condition and the physician's diagnosis, and the medication they are to use. Clarity of diagnostic and treatment advice correlates with adherence, which in turn leads to achievement of health. Otherwise, health will not be achieved if such information is not given in a simple clear format that can be understood by the patient. However, provision of information to patients is not only a necessary factor in treatment success but also a right.

Patients' choice is an intrinsic aspect of equity in health care. People who are ill have to believe that their health status has actually deviated from what they consider to be normal and that there's something wrong with them. This perception is dependent on a number of factors, the major ones being; previous experience, from for example, a similar illness, family members or the community. In case of children, the knowledge and experience of the mother are critical determinants.

Therefore, to achieve the goals sought by a health service provider, an informed decision taken by patients is desirable. (EQUINET, February 2006)

Every year, malaria affects millions of people globally with the bulk majority occurring in Sub-Sahara Africa of which Uganda is part. To reduce the number of malaria cases and deaths, Uganda adopted and is currently implementing the use of ACTs as a national policy for the treatment of uncomplicated malaria. Due to the emerging widespread resistance of Plasmodium falciparum to commonly used antimalarial monotherapies, particularly Chloroquine and Sulfadoxine-Pyrimethamine (SP), many countries have recently adopted artemisinin-based combination therapy (ACT) as the first-line regimen for the treatment of uncomplicated malaria (Worrall, et al., 2007).
Despite the promising clinical results, Lumefantrine suffers from biocompatibility issues, principally poor bioavailability and low solubility in aqueous media. In addition, patients need to eat high-fat foods to realize higher rates of drug absorption and higher blood concentrations to kill malaria when receiving Lumefantrine.

Appropriate use of these agents and attitude of the community to pattern of drug use is important to enhance the goal of treatment and prevent emergence of resistance to therapy. From surveys carried out, evidence shows that 80% of malaria cases are inadequately managed at community level by the home-based caregivers and 96% of caregivers initiated actions within 24 hours but only 15% of their actions are appropriate due to inadequate dosages (W.H.O, 2005).

There can be problems with anti-malarial drug use, particularly where there is inadequate training of people in the use of particular drugs resulting in emergence of resistance to these drugs. Even if drugs are obtained after consultation, the ways in which they are used depend on the understanding and health seeking behavior of individual consumer. This means that understanding of the people, their attitudes and knowledge to drug, that is, drug-taking behaviors are fundamental to attempts to improve drug usage.

Artemether and Lumefantrine differ markedly in terms of rate of absorption and elimination. Artemether is absorbed rapidly, reaching a peak concentration at approximately two to three hours after dosing (White et al., 1999).

Patients’ insufficient or wrong knowledge regarding the medication they use may vary and probably lead to incorrect use of their medicines, thus causing a decrease in their efficacy. Thus ascertaining Patients’ knowledge on the use of Artemisinin-based Combination Therapies (ACTs) for malaria is important for effective treatment.

A study was conducted among out patients obtaining AL from KIUTH. Knowledge was assessed by tracking patients’ knowledge on drug use that was measured as willingness to complete all doses (“completed treatment”), taking of each dose at the correct time (“timely completion”), what foods and drinks were to be used to take the medication, and knowledge about the challenges associated with the medication as was expected to be explained by the
dispenser to the patient and the patient factors contributing to the non-adherence to the medication.

STATEMENT OF PROBLEM
The formulation, dose, frequency and duration of anti-malarial drugs must be appropriate and if not so, the efficacy of the drug could be ruined. Even if drugs are obtained after consultation, the ways in which they are used depend on the understanding and health seeking behavior of individual consumer. This means that understanding of the people, their attitudes and knowledge to drug, that is, drug-taking behaviors are fundamental to attempts to improve drug usage. Patient adherence level to ACTs is moderate and counseling during dispensing should focus more on consequences of not completing the dosage (Alexandria, et al 2015). A recent study by Afaya et al reported an adherence level to ACT by patients in Ghana to be 36.6%. In their study, adherence level was measured by patients reporting of not completing the treatment course of ACT by themselves (Afaya et al, 2017).

There is no substantial quantitative data is available on adherence to the malarial treatment in the study area (Uganda). For this reason therefore, there is an information gap on how AL is being used and there is no certainty if patients use the medication appropriately.

MAIN OBJECTIVE
The main objective was to assess knowledge on use of Artemether-Lumefantrine in the management of uncomplicated malaria among out patients at KiUTH

SPECIFIC OBJECTIVES
1. To determine patients’ knowledge on the dispensing instructions of the correct dosing rate and duration of AL therapy.
2. To assess the patients’ knowledge on the dietary requirements while using AL.
3. To assess the effect of patients’ level of Education on the knowledge on use of AL for management of uncomplicated malaria.

RESEARCH QUESTIONS
1. When do patients take their dispensed medication?
2. What drinks or foods do patients use while administering or taking their medication?
3. What effect does the level of Education of patients have on the knowledge on use of AL?
RESEARCH HYPOTHESIS
The out patients treated for malaria at KIUTH with AL had inadequate knowledge on use of their drug”.

1.8 JUSTIFICATION OF THE STUDY
This study assessed patients’ knowledge on the use of the newly introduced anti-malarial treatment with Artemether-Lumefantrine in the study area.
There has not been reports of adherence studies in the study area on malaria treatment, this study thus aimed to generate important information that will help in safeguarding the new drug against inappropriate use and the rising drug resistance. The findings and recommendations of this study are to help health officers at KIUTH to make appropriate decisions on the implementation of rational use of AL combined therapy and help put in place appropriate measures to curb non adherence.
2.1 PATIENTS’ KNOWLEDGE ON THEIR MEDICATION

Knowledge refers to facts, information, and skills acquired through experience or education. It can also be defined as awareness or familiarity gained by experience of a fact or situation. Medication can be defined as a drug or other form of medicine that is used to treat or prevent disease.

Patients’ insufficient or wrong knowledge regarding the medication they use may vary and probably lead to the incorrect use of the latter, thus causing a decrease in its efficacy, or the appearance of other health problems. The prevalence of negative results associated to medication is so high that it is deemed an important public health problem (Nosten and White, 2007).

A basic pillar to facilitate obtaining excellent results in pharmacotherapy lies in adequate knowledge of patients regarding their own pharmacological treatment. Because of this, patients’ knowledge on their medication, is a key part to minimize the appearance of negative results associated to medication.

Medication adherence is defined by the World Health Organization as “the degree to which the person’s behavior corresponds with the agreed recommendations from a health care provider” (Dobbels, vanhaecke, et al., 2005). Poor adherence to prescribed regimens can result in serious health consequences. It seeks to define medication taking behaviour as it is clear that full benefits of the many effective medications that are available will be achieved only if patients follow prescribed treatment regimens reasonably closely. Adherence can further be defined to include data on dose taking (taking the prescribed number of pills each day) and the timing of doses (Osterberget al., 2005). To achieve adequate adherence, patients need to have adequate knowledge and understand the treatment regimen well. Knowledge is crucial for the patient to be able to give or take the treatment as required and deal with the tendency to stop treatment when symptoms dissipate (McCombie, 1996). Furthermore, good communication with the patients not only ensures that the client has adequate knowledge on the treatment but also provides a chance for clarifications on other aspects of care that are crucial for adequate adherence to be achieved (Homedes, et al. 1993). Adherence patterns are also dictated by the complexity of the dosing schedules. Simple schedules (One pill a day) help maximize adherence. Studies have shown that adherence is inversely proportional to the frequency of treatment schedules with patients on a
four times daily schedule achieving the lowest average adherence (Peas et al., 1997; Claxton et al., 2001; Abuaku et al., 2004; Depoortere et al., 2004b; Osterberg et al., 2005).

2.3 STUDIES ON ARTEMETHER-LUMEFANTRINE ANTIMALARIAL THERAPY

Although ACTs are recommended to confront the notorious drug resisting Plasmodium falciparum malaria, it is true that their dosing schedule especially for AL is complex; consisting of six doses to be taken over three days. This raises critical questions as to whether this complex multidose treatment will be practical and to what extent patients will complete the recommended doses (Kremsner, 2005). Studies across the world demonstrate low adherence rates for both acute and chronic illnesses with most studies recording a median rate of 58% and a range of 40 to 93%. In a study carried out in Uganda to determine adherence in children dispensed with the right dosage of chloroquine, only 38% were found to be completely adherent (Nshakira, 2002).

In another study carried out in rural Tanzania to determine adherence to antimalarial treatment with ACTs; Sulfadoxine-Pyrimethamine and Artesunate, adherence was reported at 75% (Kachure et al., 2004). Similarly, Depoortere et al., 2004, reported an adherence of 39.4% in a Zambian refugee settlement.

A study carried out to determine adherence to AL among children in Sudan showed that 18.3% of the children were considered certainly non-adherent, 22.6% were probably non-adherent and 59.1% were probably adherent (Depoortere et al., 2004). Fogg et al (2004) reported high adherence to a combination of Artemether and Lumefantrine in Uganda in which 90% of the children were documented as being probably adherent, 7.1% being definitely non-adherent and 2.9% probably non-adherent. Though there is no definite standard as to what constitutes adequate adherence, rates greater than 95% are mandatory particularly for serious diseases (Spiilker, 1991).

In 2005, an effectiveness trial using Artemether/Lumefantrine (AL) was conducted in Mbarara courtesy of the MoH of Uganda and showed no clinical failure after 28 days of follow up. In light of the above, a decision was taken to change the policy on malaria treatment from Chloroquine + Sulfadoxine/Pyrimethamine combination to Artemisinin-based Combination Therapies (ACTs).

Malaria Treatment Policy was outlined as follows, treatment of uncomplicated malaria:
The recommended first line medicine is Artemether/Lumefantrine. This medicine (Artemether/Lumefantrine) is not recommended for children below 4 months of age or 5 kg body weight and pregnant women in the first trimester. Artesunate+ Amodiaquineis the alternative when Artemether/ Lumefantrineis not available. The recommended second line medicine is oral quinine for all.

Non adherence can lead to preventable morbidity and mortality as it leads to therapy failure, drug resistance and misuse of left over medicine (Homedes et al., 2001). In 2001, poor adherence to medication accounted for sustained worsening of disease, death and increased health care costs in the United States of America (Senst et al, 2001; McDonnel et al., 2002). In addition, these authors documented that of all medication related admissions in the USA, 33-69% were as a result of non-adherence. Similarly a study in Nigeria found out that 84% of children diagnosed with malaria who did not get better when treated with chloroquine were actually non-adherers (Okonkwo et al., 2001).

A study to determine adherence to AL by caregivers in Kenya (Elijah, 2009 October) showed that Out of the 355 caregivers interviewed, 85.4% adhered to timing of giving the 2nd dose, 68.7% adhered to timing for the 3rd dose, 67.9% to the fourth and 65% to the 5th dose. Missed doses were only 0.6% for the 2nd dose but increased to 2.0% by the 5th dose. Adherence reduced as the days of treatment progressed with the 5th dose recording the lowest adherence.

Caregivers’ knowledge on how to give the drug was positively linked to the rate of adherence. Caregivers who had poor knowledge recorded the lowest rates and adherence increased as the knowledge scores increased (r = 0.3; P = 0.001). These findings supported the view by Okonkwo et al (2001) and Nosten and Brasseur (2002) who reported that clear instructions and laying emphasis on appropriate health education greatly improved adherence. This study showed that improving on the knowledge on dispensing instructions is an important factor to target to improve on adherence.

In the cases where composite adherence was not achieved, 31.4% cited difficulties in following the required dose schedule, 25.6% repeated the AL dose hence the pills got finished before the expected time while 6.9% avoided a dose in fear of vomiting. Some caregivers (13.8%) cited their work schedules which conflicted with AL administration schedule while in 5.9%, the dosage schedule was not followed because the child was away at school. In 9.0% of the cases, caregivers forgot to give some doses and the tablets got spoilt in 7.4% of the cases.
The findings of the study demonstrated that adherence to Artemether – Lumefantrine (AL) in the treatment of malaria is low among the children under the age of five years in Embu district (46.8% as compared to the ideal of 95% for acute illnesses).

Factors positively associated with adherence were the age of caregiver, the occupation, knowledge on malaria, knowledge on AL dispensing instructions, time first dose is given, vomiting of doses and the complexity of the dosing schedule.

In view of the challenges demonstrated in this study, it is suggested that AL administration be monitored hence a definite follow up would be useful in the management of malaria with AL.

From this study, it was concluded that though caregivers in this area had average knowledge on malaria, there are gaps on some key areas like malaria prevention measures and appropriate health seeking behavior. Caregivers did not always have adequate knowledge on the dispensed drugs and particularly how to administer them. This could imply that the quality of caregiver - service provider interaction and particularly counseling on how to administer the dispensed drugs was weak. Adherence to ArtemetherLumefantrine in the children below five years in Embu district was low which would compromise the efficacy of the drug.

Artemether and Lumefantrine differ markedly in terms of rate of absorption and elimination. Artemether is absorbed rapidly, reaching a peak concentration at approximately two to three hours after dosing (White et al., 1999). In contrast, Lumefantrine is absorbed and cleared more slowly, acting to eliminate the residual parasites (van Vugt et al., 2000). The absorption of Lumefantrine is influenced by lipids and food intake. This is because Lumefantrine is a lipophilic compound and fatty food enhances solubilisation and penetration of the drug through the membranes (Kokwaro et al., 2007). Therefore drug dispensers should be aware of this and counsel patients to take the medication with fatty meals.
CHAPTER THREE: METHODOLOGY

3.0 STUDY AREA AND STUDY POPULATION
The study was carried out in the outpatient department of KIUTH and population of interest was patients who receive Artemether- Lumefantrine at OPD of KIUTH through the general pharmacy. All patients diagnosed with malaria and treated with Artemether Lumefantrine and gave consent to participate in the study were interviewed while excluding the other patients diagnosed to have severe malaria and were treated with quinine.

3.1 STUDY DESIGN
The study was a cross sectional study using exit interview consultation of patients dispensed with AL and based on filling of questionnaire by the patients to track their knowledge on their dispensed medicines.

3.2 SAMPLE SIZE DETERMINATION AND SAMPLING METHOD
A more representative study would require that the whole population or as big as possible be studied. However, due to shortage of time and resources, a manageable percentage was considered and sample size was 119 patients and only 96 patients were interviewed.

The Slovins formula (1960) was adopted;
\[ n = \frac{N}{(1+Ne^2)} \]

Where;
\( n \) = the desired sample
\( N \) = population estimated to have a particular characteristic being measured. (estimated 169 patients), confidence interval of 95%.
\( e \) = margin of error (e = 0.05)

By computation,
\( n = 119 \)

Simple random sampling was used amongst patients who received AL from the dispensing counter of general pharmacy of the OPD.
4.1.3 Education level of patients

The bigger proportion of respondents (39.13%) had attended Secondary as their highest level of Education followed by those of Primary (26.09%), Tertiary/Institution (19.57%), university (11.96%) and lastly 3.261% had no any formal Education.

4.1.4 Marital status of the respondents

A large proportion of the respondents (56.5%) were single followed a good proportion (32.6%) who were married, then 4.3% who were widows, 4.3% were in a relationship and lastly an equal proportion of 1.1% were divorced and widowers.
4.1.5 Occupation of the patients under study

Majority (73.91%) of the patients interviewed were students, followed by 16.3% who were peasants, 6.52% were Business men and women and the smallest portion (3.26%) were civil servants.

4.2 Identifying the medicines received

The majority (57.29%) of the patients interviewed had received Lumartem, followed by Coartem (38.54%), then 2.08% received Artefan while 2.08% were not sure of which their medicines were.
Majority of the patients (97.83%) had also received tablets of strength 20 mg/120mg AL and only 2.17% had received oral suspension 180mg/1080mg AL in 60ml.

4.3. Analysis of the frequency of use of medicine by the patients
Figure 8: A Pie chart showing the frequency of use of the drug by the patients this year.

From the study, 51.09% had used the drug 1-2 times, followed by 27.17% who had used it 3-5 times, 5.43% used the drug more than 5 times while 16.30%, it was the first time of use.
Majority of the patients (97.83%) had also received tablets of strength 20 mg/120mg AL and only 2.17% had received oral suspension 180mg/1080mg AL in 60ml.

4.3. Analysis of the frequency of use of medicine by the patients

Figure 7: A pie chart showing the past history of the use of the drug by the patients
4.4 Frequency of obtaining the drug as over-the-counter previously by the patients

Figure 9: A bar graph showing frequency of obtaining the drug as over-the-counter previously by the patients

From the study, 44.75% reported to have bought it from drug shops or pharmacies 1-2 times, followed by 10.42% obtaining it 3-4 times, 2.083% had obtained it more than 4 times while 42.71% had never done so.

4.5 The number of tablets patients that will be taken as per their response.

Figure 10: A pie chart showing the number of tablets to be taken

From the study, majority (86.46%), responded to take 4 tablets, followed by 7.29% who were to take 2 tablets, 5.21% were to take 3 tablets and lastly 1.04% who were to take more than 4 tablets.
A good proportion of 54.17% reported to take the second dose after 8 hours from the time of the first dose, followed by 41.67% who would take it after 12 hours and the smallest portion of 4.17% choosing to take the second dose when they feel their condition is worsening.

50% of patients interviewed suggested to complete their full dose in 3 consecutive dosing days, followed by 38.54% of whom it would take them more than 3 days to have their dose completed, 10.42% saying they never complete their full dose and only 1.04% to finish in less than 3 days.
4.6 Way of taking medicine.

Figure 11: A pie chart showing the way patients take the medicine

From the study, 78.13% were to take it by swallowing, followed by 13.54% who would crush the tablets and dissolve in water and the least 8.33% were to take it by chewing the tablets.

4.7 Predicted adherence to dose timing

Figure 12: A pie chart showing the time when patients start their medicines after Issuance

Out of the 96 patients interviewed, 77.8% reported to take the first dose immediately after the patients have received their medication, followed by 14.58% suggesting to start the dose any time and least percentage 8.33% to start after 2 hours from the hospital.
4.8 Reasons why patients do not complete the whole dose of AL.

Figure 15: A bar graph showing the reasons for not completing the dose

From the results above, majority of patients (56.25%) would stop their medication the moment they feel their condition has improved (feeling better), followed by 16.67% who would stop the medication when they feel no improvement though taking the medication, 11.46% stopping because tablets are many, 8.333% would stop their medication by choosing other alternative drugs and 7.292% due to unpleasant smell of AL tablets.
4.9 Common side effects associated with the use of the drug experienced by the patients

Figure 16: A bar graph showing common side effects experienced by the patients using AL

The side effects reported were as follows; 27.08% experience vomiting, followed by 20.83% who experience dizziness, 18.75% experience disturbed sleep, 11.46% experience loss of appetite, 4.167% experience skin rush/itching while 17.71% reported no known side effects.
4.11 Action taken when they vomit within 2 hours after taking AL

Figure 18: A pie chart showing the action taken when they vomit within 2 hours after taking AL

From the results, 59.38% would wait for the next dose, followed by 28.13% who would take a new dose and a smaller portion (12.5%) would just stop taking the medication.

4.12 Foods and drinks used while taking AL reported by the patients

Figure 19: A bar graph showing the foods and drinks used while taking AL

43.75% were to use boiled water, followed by 29.69% who were to use milk, 12.5% were to use fatty food, 4.688% to use juice, 1.563% to use unboiled water and other foods each while 6.25% did not choose what they were to use.
4.10 What is done when patients experience side effects

Figure 17: A pie chart showing patients' response to side effects

It is ideal that whenever a patient experiences any side effects associated with the use of a particular drug, he reports to the prescriber or pharmacist for specialized care and handling. However, it is a common tendency that most patients ignore such and decide to do otherwise and this can result in disastrous outcomes to the patient.

When interviewed what they would do if they experienced side effects, they responded as follows; majority of the respondents (61.46%) responded that they would not bother and do nothing hoping for the effects to disappear shortly, followed by 20.83% who said they would seek for further treatment for the effects, 9.37% would report to the prescriber and 8.33% would choose to stop taking the drug. This showed an information gap of patients on safety precautions while using the drug.
4.13 Other medicines patients were/had used

Figure 20: A bar graph showing other medicines patients had/ were taking

From the study, 46.88% of the patients had used other medicines to treat malaria (including Fansidar and Paracetamol), followed by 9.375% who had used drugs for fungal infections, 3.563% used drugs for allergies, an equal proportion (1.56%) had used medicines for the heart, anti-retroviral drugs and birth control pills whereas 35.94% had not used any medicine.

4.14 Awareness of use of AL in pregnancy

Figure 21: A pie chart showing responses on the time of use during pregnancy.

6.25% responded to use the drug when the pregnancy is more than 3 months old, 2.08% to use it any time they get malaria while 91.67% it was not applicable to them.
4.14 Way of keeping the drug at home.

Figure 22: A bar graph showing the way patients keep their medicine at home.

From the study, 45.83% were to keep the drug in its pack in the cupboard, followed by 28.13% who were to keep the drug in their handbag, 22.92% in open space and 3.125% on TV or refrigerator top.
4.15 DISCUSSION

4.15.1 Patient demographic data

4.15.1.1 Sex of respondents

A total of 96 respondents participated in this study of which 37.50% were males and 62.50% were females. This implies that females seek for treatment for malaria more than males at Kampala international university teaching hospital. This contradicted with findings of the study in Arusha by (Rugemalila, J, March 2006) on Gender and Malaria that women’s understanding of malaria prevention and treatment is significantly weaker than that of men, due to women’s comparatively lower literacy levels and will rarely seek for treatment. The results could also mean that females are more vulnerable to malaria than males particularly in the study area.

4.15.1.2 Age of respondents

The minimum and maximum age of the respondents was 0.7 and 55 respectively given that skewness was greater than 1. (1.043).

4.15.1.3 Level of Education

The bigger proportion of respondents (39.13%) had attended Secondary as their highest level of Education followed by those of Primary (26.09%), Tertiary/ Institution (19.57%), university (11.96%) and lastly 3.261% had no any formal Education. This could be expected in this area as there are many learning institutions both primary and secondary schools who majorly get treatment from KIUTH. The other percentages could be related to the business environment of the area that largely depends on the former factor.

4.15.1.4 Marital status

Out of the total sample of 96 respondents, 56.52% were single followed a good proportion (32.61%) who were married, then 4.348% who were widows, 4.348% were in a relationship and lastly an equal proportion of 1.087% were divorced and widowers.

4.15.1.5 Occupation of the patients

Majority (73.91%) of the patients interviewed were students, followed by 16.3% who were peasants, 6.52% were business men and women and the smallest portion (3.26%) were civil servants. This could be expected in this area as there are many learning institutions both primary
and secondary schools who majorly get treatment from KIUTH and the study area itself being a university Teaching hospital with a number of students among them could be possible malaria patients.

4.15.2 Knowledge about the drug

4.15.2.1 Identify the brand, strength and dosage form of the drug

The majority (57.29%) of the patients interviewed had received Lumartem, followed by Coartem (38.54%), then 2.08% received Artefan while 2.08% were not sure of which their medicines were. Majority of the patients (97.83%) had also received tablets of strength 20mg/120mg AL and only 2.17% had received oral suspension 180mg/1080mg AL in 60ml.

The results showed that Lumartem is most commonly acceptable by the patients which could be related to the different costs of the same drug as per brand. Lumartem is locally manufactured in Uganda and is relatively cheaper compared to the other imported products.

4.15.2.2 Frequency of use of AL by the patients this year

Table 2: Showing the frequency of use if AL this year by the patients

<table>
<thead>
<tr>
<th>NUMBER OF TIMES OF USE OF AL</th>
<th>NUMBER OF RESPONDENTS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 times</td>
<td>51</td>
<td>51.1</td>
</tr>
<tr>
<td>3-5 times</td>
<td>25</td>
<td>27.2</td>
</tr>
<tr>
<td>Above 5 times</td>
<td>5</td>
<td>5.4</td>
</tr>
<tr>
<td>Never used this year</td>
<td>15</td>
<td>16.3</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The frequency of use of the drug was assessed by questioning how many times they had used the same drug during this year (2018, year of study) and they responded as follows; 51.1% had used the drug 1-2 times, followed by 27.2% who had used it 3-5 times, 5.4% used the drug more than 5 times while 16.3%, it was the first time of use.

The extent of obtaining AL from pharmacies and drug shops without a prescription and testing positive for malaria previously by the patients was assessed and 44.75% reported to have bought
it from drug shops or pharmacies 1-2 times, followed by 10.42% obtaining it 3-4 times, 2.083%
had obtained it more than 4 times while 42.71% had never done so.
The current malaria policy in Uganda requires one to be tested positive and then treated for
malaria and AL is used as a prescription drug. Greater access to prescription drugs without a
prescription also increases the chances of misuse.
The patients' knowledge on how to use the drug could be influenced by how he or she has been
using it before regardless of the information on use received thereafter.
This provides a comprehensive view that this combination therapy could be subject to resistance
given the possible malaria reoccurrences depicted by the past history of use by majority of
patients(82.29%).

4.15.2.3 The number of tablets taken and way of taking the drug
From the study, majority of patients (who were adults) were sure of how many tablets to take per
given time that is to say, 86.46% knew they were to take 4 tablets, followed by 7.29% who were
to take 2 tablets, 5.21% were to take 3 tablets and lastly 1.04% who were to take more than 4
tablets.
For patients who are unable to swallow the tablets such as infants and children, tablets may be
crushed and mixed with small amounts of water (one to two teaspoons) in a clean container for
administration immediately prior to use. The patients interviewed knew how to take the drug
with majority (78.13%) to take it by swallowing, followed by 13.54% who would crush the
tablets and dissolve in water and the least 8.33% were to take it by chewing the tablets.
This depicted good knowledge on how to take the drug.

4.15.2.4 Adherence to dosing time
Four tablets as a single initial dose, 4 tablets again after 8 hours and then 4 tablets twice daily
(morning and evening) for the following two days (total course of 24 tablets) is recommended
for patients weighing more than 35 kg (Adults) as per the Uganda Clinical Guidelines 2016.
Out of the 96 patients interviewed, 77.8% would adhere to timing of giving the first dose which
is immediately after the patients have received their medication, with 14.58% suggesting to start
the dose any time and least percentage 8.33% to start after 2 hours from the hospital.
For the second dose, a bigger proportion of 54.17% would adhere to the right timing which is after 8 hours from the time of the first dose, followed by 41.67% who would take it after 12 hours and the smallest portion of 4.17% choosing to take the second dose when they feel their condition is worsening irrespective of after how long from the previous dose.

Prediction on adherence to dose completion was minimal with only 50% of patients interviewed suggesting to complete their full dose in 3 consecutive dosing days, followed by 38.54% of whom it would take them more than 3 days to have their dose completed, 10.42% saying they never complete their full dose and only 1.04% to finish in less than 3 days. Such results are related to a study by (Elijah, 2009) on adherence to timing of dose of AL among caregivers of children suffering from malaria that reported reduced adherence.

4.15.2.5 Relationship between level of Education of patients and the time taken to complete the dose.

In an attempt to find out whether the level of Education of the research participants had an effect on the time taken to complete the dose, cross tabulation was done and used a Chi Square test to test the level of significance between the two. It was done at 1% level of significance.
Table 3 showing level of Education of patients and the time taken to complete the dose

<table>
<thead>
<tr>
<th>LEVEL OF EDUCATION</th>
<th>TIME TAKEN FOR COMPLETION OF DOSE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 days</td>
<td>less than 3</td>
</tr>
<tr>
<td>Primary</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>Secondary</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>University</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Tertiary/institution</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>No formal Education</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Authors survey (2018)

Pearson $(2) = 14.827, Pr = 0.251$

From the results, there was no significant relationship between the level of Education of the research participants and the time taken to complete the dose. Therefore the level of Education was not a factor to poor adherence to dose completion that was seen from the study from the time patients suggested to complete their full dose.

The findings contradict with results from a related study by (Hill et al 2001) who reported a significant relationship between patients' level of education and increased adherence to drug treatment.
4.15.2.6 Relationship between level of Education of patients and what is done when they experience side effects.

Table 4: Showing the relationship between level of Education of patients and what is done when they experience side effects.

<table>
<thead>
<tr>
<th>LEVEL OF EDUCATION</th>
<th>RESPONSE TO EXPERIENCING SIDE EFFECTS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Don't bother</td>
<td>Seek further treatment</td>
</tr>
<tr>
<td>Primary</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Secondary</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>University</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Tertiary/institution</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>No formal Education</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>20</td>
</tr>
</tbody>
</table>

Pearson Chi-Square (2) = 10.347  P= 0.586 , At 1% level of significance

There was no significant relationship between level of Education of patients and what is done when they experience side effects. This implies that the decision of what to do when they experience side effects did not depend on the patients' level of Education.

4.15.2.7 Reasons for not completing the dose

From the results above, it is clear that majority of patients (56.25%) would stop their medication the moment they feel their condition has improved (feeling better), followed by 16.67% who would stop the medication when they feel no improvement though taking the medication, 11.46% stopping because of pill burden as suggested that tablets are many, 8.333% would stop their medication by choosing other alternative drugs and 7.292% due to unpleasant smell of AL tablets.

It is a common practice to stop treatment when a patient improves before the treatment is over which hinders completion of the treatment. In this study, this is evident as the results showed that
adherence to dose timing and completion was low as compared to the standard dosing schedules of AL.

Though there has not been studies to report treatment failures and drug resistance with AL in the study area, this kind of behavior with the use of AL would result into drug resistance and possible treatment failures as a case may be since most of patients interviewed had a significant history of use of AL for treatment of uncomplicated malaria.

The findings of this study are similar to those by (McDonnel et al 2002), that little attention is paid to the appropriate dosage and completion of the prescribed doses.

4.15.2.8 Relationship/effect of marital status on the time taken to complete dose of AL

Cross tabulation together with Chi Square test were used to test if marital status could influence the time patients take to complete their full dose of AL, this was done at 1% level of significance.

Table 5: Cross tabulation of marital status versus time taken for completion of full dose of AL

<table>
<thead>
<tr>
<th>MARITAL STATUS</th>
<th>TIME TAKEN FOR COMPLETION OF AL DOSE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 days</td>
<td>Less than 3 days</td>
</tr>
<tr>
<td>Single</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Married</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Divorced</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Widow</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>1</td>
</tr>
</tbody>
</table>

Pearson Chi-Square(2) = 5.163 Pr = 0.952; P > 0.01

The results indicated that there is no significant relationship between marital status of drug users and the time they take to complete their dose of AL at 1% level of significance.

This implies that patients' marital status did not influence their knowledge on how to use the drug.
### 4.15.2.9 Relationship between patients' occupation and time taken to complete the dose.

Table 6: Cross tabulation of patients' occupation and time taken to complete the dose

<table>
<thead>
<tr>
<th>OCCUPATION OF THE PATIENT</th>
<th>TIME TAKEN FOR COMPLETION OF DOSE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Peasant</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Businessman/woman</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Student</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>Civil servant</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Authors study (2018)

Pearson Chi Square = 3.873  P = 0.920

There was significant relationship between the patients' occupation and the time taken to complete the dose. Done at 1% level of significance.
4.15.2.10 Action taken when they vomit within 2 hours after taking AL

Table 7: Showing the action taken when dose of AL is vomited.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>NUMBER OF PATIENTS</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop taking the drug</td>
<td>14</td>
<td>12.5</td>
</tr>
<tr>
<td>Take a new dose</td>
<td>26</td>
<td>28.13</td>
</tr>
<tr>
<td>Wait for the next dose</td>
<td>56</td>
<td>59.38</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The results of this study showed that only 28.13% of the patients knew that they needed to repeat a dose if vomited within 2 hours of oral administration while larger proportion 59.38% would wait for the next dose while 12.5% would just stop taking the medication. This means that these patients did not have satisfactory information on what to be done in case they vomited their drug.

Both Artemether and Lumefantrine are well absorbed after oral administration. Peak plasma artemether concentrations typically occur within 2 hours after administration and peak Lumefantrine concentrations occur in 6-8 hours. In case of vomiting following administration of AL within 2 hours after administration would mean that a significant concentration of the drug is not yet absorbed and that it is vomited out reducing below the minimum effective concentration and thus no therapeutic outcome is achieved. It would therefore require repeat of dose to sustain peak plasma levels and the effective concentration of AL in plasma.

4.15.2.11 Knowledge on food recommendations of AL

Administration with fat-containing foods, including milk, improves bioavailability by more than two-fold for Artemether and up to 16-fold for Lumefantrine in adults. One of the components of AL, Lumefantrine requires fatty food or milk for its absorption into the body. This component is responsible for effective prolonged action of AL and is the basis of the advice that AL be taken with fatty foods.
In this study, 57.82% of the patients would not adhere to this requirement as they were neither going to use fatty food or milk while taking AL. Among these 43.75% were to use boiled water, 6.25% would not consider any of the options provided as they suggested they would just chew the drug and no specified food recommendation they would take, 4.688% were to use juice, and 1.563% to use unboiled water and any other items available.

Only 42.19% of patients would use milk and fatty food (29.69% and 12.5% respectively) a proportion which is sub-optimal. Patient education on this aspect of treatment was weak as shown by the number of patients (57.82%) who did not know about this dietary requirement.

Since this study was a pre-use interview of patients on the medication they had received, it is most likely that even among the 42.19% who complied with this requirement, a good number may not practice what they suggested and or done so by fact that they had heard about it before.

From this study, it can be seen that adherence to food recommendations with AL is an important factor to consider in the treatment of patients with uncomplicated malaria. The absorption of Lumefantrine is influenced by lipids and food intake. This is because Lumefantrine is a lipophilic compound and fatty food enhances solubilisation and penetration of the drug through the membranes (Kokwaro et al., 2007). Therefore drug dispensers should be aware of this and counsel patients to take the medication with fatty meals.

4.15.2.13 Relationship/effect of obtaining Artemether- Lumefantrine as over-the-counter by the patients previously from drug shops and pharmacies on what kinds of foods and drinks they use while taking their medicines.

To find out if the choice of foods and drinks patients choose to use while taking their medication is influenced by previous directions to patients about use of the same drug from drug shop and community pharmacy attendants, cross tabulation was done and Chi Square test at 1% level of significance was performed to measure if there was significant relationship.
Table 8: Cross tabulation of obtaining Artemether- Lumefantrine as over-the-counter by the patients previously from drug shops and pharmacies on what kinds of foods and drinks they use while taking their medicines.

<table>
<thead>
<tr>
<th>FREQUENCY OF OBTAINING AL AS OTC</th>
<th>Boiled water</th>
<th>Unboiled water</th>
<th>Fatty food</th>
<th>Milk</th>
<th>Juice</th>
<th>Others</th>
<th>None</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 times</td>
<td>15</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>3-4 times</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Above 4 times</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>12</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>1</td>
<td>8</td>
<td>19</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>64</td>
</tr>
</tbody>
</table>

Source: Authors study (2018)

Pearson chi square (2) = 12.116  Pr = 0.841

From the above analysis, there was no significant relationship between obtaining AL as over-the-counter from drug shops and pharmacies and the kind of foods and drinks patients use while they take their medication at 1% level of significance that is to say \( P > 0.01 \). This implies that obtaining the drug as OTC before did not influence the choice of foods and drinks to use.

4.15.2.14 Knowledge of use during pregnancy

Due to embryo-foetal toxicity associated with AL, safety of use of AL during the first trimester of pregnancy is not guaranteed and so usually avoided.

A few pregnant patients of malaria interviewed responded as follows; 6.25% were sure that they needed their pregnancy to be more than 3 months old to be prescribed with AL while 2.08% were not aware of this requirement and suggested they would use AL anytime they get pregnant.

In general, some patients were able to access AL as OTC of whom may be deficient in this kind of knowledge and thus this suggested a gap in knowledge among pregnant women who use or intend to use AL.
4.15.2.15 Knowledge on keeping the drug at home

Artemether is photosensitive and exposure to light would lead to product degradation. AL combination drug is recommended to be stored /kept between 59°F to 86°F (15°C to 30°C). This lies between the room temperature and any storage that prevents exposure to excessive heat and light would preserve the safety of AL. another perquisite to storage is keep the drug out of reach of children who can consume it any time they access it and present potential toxicity effects. These storage conditions should be clearly explained to the patient on receiving this medication.

From this study, 45.83% of the interviewed patients were to keep their medication in its pack in the cupboard which is safe, followed by 28.13% who would keep it in their handbags, 22.92% would keep it in open space and 3.125% were to keep in on TV or refrigerator top.

This was not a good representation of knowledge on how best this medication should be stored or kept while being used by patients. In appropriate storage could relate to drug resistance and treatment failures reported in some places with AL.
CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

1. Patients did not have adequate knowledge on the dispensed drug and particularly on the dosing schedule and dietary recommendations associated with the use of AL.

2. The patients' level of Education did not have a significant effect on the knowledge on use of AL expressed by the patients. This could imply that the quality of patient-service provider interaction and particularly counseling and emphasis on all issues pertaining the use of the dispensed drugs is weak.

3. The findings of this study provided enough evidence to reject the research hypothesis that out patients treated for uncomplicated malaria with AL at KIUTH have adequate knowledge on use of their drug.

5.2 RECOMMENDATIONS

Basing on the findings of this study, the discussion and conclusions, the following recommendations are made.

1. Re-train health workers particularly dispensers/pharmacists on the purpose of effective counseling on disease and treatment issues of the patients.

2. Ensure that all first doses of AL be administered before the patient leaves the health facility which can easily guide appropriate timing of the second dose since patients are not always prepared to take the drug there and then.

3. Set a follow up strategy of the patient to assess response to therapy at least after two days and solve any problems that may have resulted from treatment. This also will help measure the patient compliance to taking the drug.

4. A more water soluble formulation of AL should be identified as the dietary requirements associated with the available oral dosage forms are not usually met by most patients due affordability and availability.
5.3 SUGGESTIONS FOR FURTHER RESEARCH

The following studies are recommended to fill the gaps revealed by the study:

1. Assessment of adherence to Artemether – Lumefantrine use by malaria patients (a more detailed patient follow up study) in the study area.

2. Assessment of health workers for quality of communication and dispensing instructions given to patients.
REFERENCES


doi:10.1097/01.TP.0000158430.06507.87


APPENDIX 1: QUESTIONNAIRE TO THE RESPONDENTS

Dear sir/madam,

You are being requested to take part in this research study and before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. You are free to ask the researcher if there is anything that is not clear or if you need more information.

The purpose of this study is: To assess the knowledge on the use of Artemether/Lumefantrine combined therapy in the management of uncomplicated malaria among patients treated at KIU-TH.

Please complete these questions by ticking as appropriate.

Section A: DEMOGRAPHIC INFORMATION:

QN 1. PATIENT INITIALS: ......................................................................................................................

QN 2. SEX:
   1. Male  
   2. Female

QN 3. AGE: 

QN 4. TRIBE ..............................................................

QN 5. MARITAL STATUS:
   6. Others , specify.................................

QN 6. LEVEL OF EDUCATION:
5. No formal Education

**SECTION A: OCCUPATION**

1. Peasant
2. Business man / woman
3. Student
4. Civil servant
5. Others, specify

**SECTION B: IDENTIFYING THE MEDICINES RECEIVED**

QN 1. What is the brand name of the drug.

1. Coartem
2. Lumartem
3. Artef
4. Others, specify

QN 2. Number of pills/ tablets/ volume of syrup

1. 24
2. 12
3. 60mls of syrup
4. Others, specify

QN 3. Dosage form and strength:

1. Tablet 20/120mg
2. Oral suspension 180/1080mg/60ml
3. Others

**SECTION C: QUESTIONS ON USE OF MEDICINES RECEIVED (AL):**

QN1. Have you used these medicines before to treat malaria? 1. Yes 2. NO

QN2. How often have you used these drugs during this year? Number of times

QN3. How many times have you bought this medicine from the drug shop or pharmacy without testing for malaria and or without a prescription?

QN4. How many tablets do you take per given time?

QN 5. When do you start taking your medicine after the doctor gives it to you?
1. Immediately □  2. After 2 hours □  3. Any time □

QN6. When do you take your second dose after leaving the hospital?

1. After 8 hours □  2. After 12 hours □  3. When I feel getting worse □

QN7. How long do you take to complete taking all the medicines given to you?

1. It takes me 3 days □  2. Less than 3 days □  3. More than 3 days □  4. I never complete this medicine □

QN8. How do you take this medicine?

1. I just swallow □  2. I chew the tablets □  3. I crush and dissolve in water □

QN9. What do you take with this medicine?


QN10. How do you feel after taking these drugs?


5. I have no problem with this drug □  6. Others, specify..................................................
QN 11. What do you do when you experience any of the above while taking this drug?

1. I don’t worry as they disappear shortly  
2. I seek further treatment
3. Report to the prescriber
4. Others, specify

QN 12. What do you do when you vomit immediately (within 2 hours) after taking this medicine?

1. I stop taking the medicine
2. I take a new dose
3. I wait for the next dose

QN 13. Why would you consider not completing the dose of your medicine given?

1. When I feel okay
2. Not improving
3. Taking other medicines
4. Tablets are many
5. Unpleasant smell
6. Others, specify

QN 14. Which of the following drugs are you taking or you have taken in the recent past?

1. Any other medicine to treat malaria
2. Medicines for your heart
3. Any drugs for treatment of abnormal condition of the mind
4. Medicine to alleviate mood disorders
5. Medicines for treatment of allergies
6. Medicines to treat HIV infection
7. Medicines against fungal infection
8. Birth control pills

QN 15. When do you take your medicines with respect to the fact that you are pregnant?

(if applicable, i.e., pregnant)

1. Any time I get malaria
2. Not sure
3. My pregnancy is more than 3 months old
QN 16. How do you keep your medicines while at home?

1. In my hand bag  
2. Open space  
3. In its pack inside the cupboard  
4. TV or Refrigerator top  

THANK YOU FOR YOUR PARTICIPATION