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Malaria prevention recommendations for risk groups visiting sub-Saharan Africa: A survey of European expert opinion and international recommendations

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ABSTRACT

Introduction: Malaria prevention can be complex due to the individual characteristics of the traveller, travel destination, duration of stay and type of travel. Our aim in this study was to document malaria chemoprophylaxis recommendations provided by travel-medicine experts in Europe for specific risk groups of travellers visiting malaria-endemic areas of sub-Saharan Africa.

Methods: Travel medicine experts in Europe were asked to complete an online questionnaire, a 28-item Survey Monkey survey, on 11 malaria prevention scenarios. We also reviewed the recommendations of the UK, U.S. CDC, Germany, Switzerland, WHO and the electronic Medicines Compendium (eMC) for malaria prevention in risk groups.

Results: The questionnaire was sent to 110 travel medicine experts in 19 countries. The response rate was 44.55%. The experts would recommend, as first choice, malaria chemoprophylaxis atovaquone/proguanil for an adult traveller with no co-morbidities travelling for 2 weeks (91.67% of experts) and for 2 months (51.06%), for a healthy tourist child travelling for two weeks (68.09%) and for an adult traveller with liver cirrhosis (57.78%). Mefloquine was the first choice for a healthy tourist child travelling for 2 months (59.57%), for a tourist infant (8 kg) travelling for 2 weeks (59.57%) and for 2 months (68.09%), for a pregnant VFR (74.47%), for a breast-feeding mother with her 5 kg infant (72.34%) and for a VFR family with limited budget (63.83%). For an adult traveller with renal impairment the experts recommended mefloquine (42.22%) or doxycycline (37.78%). All experts (100%) recommended mosquito repellents. Mosquito nets were recommended routinely by 95.35% of the experts, air-conditioning by 83.72% and impregnated clothing by 81.40%.

Conclusion: The European experts differ in pre-travel anti-malarial recommendations for risk groups visiting malaria endemic areas of sub-Saharan Africa. Contraindications are not always observed and there are no uniform recommendations for high-risk groups. 9 experts would recommend atovaquone/proguanil to a traveller with severe renal impairment although most reviewed national recommendations consider this a contraindication. Discordance in recommendations, a lack of key data and few chemoprophylaxis options limit choices for pre-travel health advisors.

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1. Background

In 2014, the world tourism organization (WTO) reported 1138 millions arrivals worldwide and the forecast for 2030 is 1.8 billion international tourists. Travel to Africa grew by 2% in 2014 and to

sub-Saharan Africa by 3% [1].

An earlier study noted a statistically significant increase in travel-related diseases acquired in sub-Saharan Africa by ill travellers presenting in Europe. Malaria was one of the top diagnoses, mainly acquired in sub-Saharan Africa by men (68%) and by those whose purpose of travel was “visiting friends and relatives” (VFR) (52%) [2].

The findings of the study showed that, for all traveller groups (including the risk groups and VFRs), pre-travel consultation

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significantly lowers the proportionate morbidity ratios for *Plasmodium falciparum* malaria [2]. These results demonstrate the importance and effectiveness of pre-travel prevention strategies [2]. Travellers to high risk malaria-endemic areas should receive anti-malarial advice: a combination of mosquito avoidance measures and chemoprophylaxis [3]. Since 1980, the spread of chloroquine resistant *Plasmodium falciparum* malaria has extended through sub-Saharan Africa [4,5]. Currently recognized priority chemoprophylaxis recommendations for travellers to sub-Saharan Africa are atovaquone/proguanil, doxycycline and, as second choice in some countries, mefloquine [6–8].

Malaria prevention can be complex due to the individual characteristics of the traveller, travel destination, duration of the stay and type of travel [9]. The complexity of providing advice is increased in groups such as immunosuppressed travellers, young children, pregnant women and long-term travellers [9,10]. The risk is also higher in previously semi-immune people who have moved to countries without highly endemic malaria as the immunity wanes. Those visiting friends and relatives in their home countries (VFR) are less likely to receive pre-travel advice [11]. Because drug safety studies and efficiency strategies are lacking for all risk groups, recommendations can be complex [11].

European experts generally follow the national and/or international recommendations for malaria chemoprophylaxis. A previously published Delphi method study regarding malaria chemoprophylaxis recommendations showed that the experts varied widely among the preferred chemoprophylaxis recommendations. The choices were affected by „a high degree of subjectivity and national policy differences“ [12,13].

2. Objective

Our aim in this study was to document malaria chemoprophylaxis recommendations provided by travel-medicine experts in Europe for specific risk groups of travellers visiting malaria-endemic areas of sub-Saharan Africa and to document whether routine protective measures are recommended. We also aimed to review national and international recommendations with regard to malaria prevention recommendations for certain risk groups.

3. Methods

This study was done between October and December 2014. Leading travel medicine experts in Europe were asked to complete an online questionnaire on malaria prevention. These European experts were identified using the International Society of Travel Medicine (ISTM-) Clinic directory and also by asking colleagues from EuroTravNet (<http://www.istm.org/eurotravnet>) and TropNet (<http://www.tropnet.net>) to participate.

A 28-item questionnaire in English by Survey Monkey with 27 multiple-choice questions and one open question was specifically created for this study. The first 4 questions characterised the experts: practising country, sex, age and number of monthly pre-travel-consultations undertaken. The country list included all European Union (EU-) and European Free Trade Association (EFTA) countries. The next 23 questions were about malaria prophylaxis recommendations.

In the questions regarding malaria chemoprophylaxis we built risk groups of travellers. There were 11 travel scenarios. Our defined risk groups were: short term traveller (2 weeks), long term traveller (2 months), pregnant women in first trimester, breast-feeding mother, 6-years old tourist child, tourist infant (8 kg), VFR family with limited budget, traveller with liver cirrhosis due to hepatitis C virus (HCV) and traveller with renal impairment (glomerular filtration rate (GFR) < 30 ml/min). All travel scenarios were to sub-

Saharan Africa.

The experts were asked whether they would prescribe malaria chemoprophylaxis to each risk group or not. If so, they could order by choice (1st preference, alternative choice) one out of three malaria chemoprophylaxis: atovaquone/proguanil, doxycycline or mefloquine. The goal was to have two answers regarding each risk group of traveller: i.e. expert opinion on the first and the second choice of chemoprophylaxis.

Concerning the questions about mosquito bite measures the experts had to answer “yes” if they recommend the measure routinely for travellers visiting malaria-endemic areas of sub-Saharan Africa, or “no” if not.

The questionnaire responses were collected and analysed by Survey monkey. We compared the national recommendations of United Kingdom (UK), Germany (DE), Switzerland (CH) and from the Centers for Disease Control and Prevention from the United States of America (U.S. CDC), and the international recommendations of the World Health Organization (WHO) for the special risk groups. The medication specifications and recommendations on contraindications and precautions of the European electronic Medicines Compendium (eMC) were considered for the background to the discussion and recommendations. The electronic Medicines Compendium (eMC) lists information about all medicines, which are approved either by the UK Medicines and Healthcare Products Regulatory Agency (MHRA) and/or European Medicines Agency (EMA). It is provided from the medicine regulatory agencies. It serves as an important source of product information.

4. Results

The questionnaire was sent to 110 pre-travel medicine experts. A total of 49 experts participated on this study; the response rate was 44.55%. 87.75% of them (n = 43) completed the whole questionnaire. The experts participated from 19 different countries (see Table 1). 61.22% of the participants were older than 50 years (n = 30) and 63.27% were male (n = 31). In 48.98% of the experts' clinics, more than 200 pre-travel consultations are done per month.

4.1. Malaria chemoprophylaxis recommendations

The results of the questionnaire are reported in Table 2 and Table 3. All scenarios involved malaria-endemic areas of sub-

Table 1
Participated countries on the malaria survey.

Countries	%, (Number)
Austria	6.12% (3)
Belgium	8.16% (4)
Croatia	4.08% (2)
Denmark	6.12% (3)
Finland	8.16% (4)
France	12.24% (6)
Germany	4.08% (2)
Ireland	2.04% (1)
Italy	6.12% (3)
Lithuania	2.04% (1)
Netherlands	4.08% (2)
Norway	2.04% (1)
Portugal	8.16% (4)
Romania	2.04% (1)
Slovak Republic	2.04% (1)
Spain	2.04% (1)
Switzerland	12.24% (6)
Turkey	2.04% (1)
United Kingdom	6.12% (3)

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