



Public Health
England

Protecting and improving the nation's health

Malaria Imported Into the UK: 2015

Implications for those advising travellers

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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Introduction

Malaria is a serious and potentially life threatening febrile illness caused by infection with the protozoan parasite Plasmodium. It is transmitted to humans by the bite of the female Anopheles mosquito in tropical and subtropical regions of the world. There are five species of Plasmodium that infect humans: *P. falciparum* (responsible for the most severe form of malaria and the most deaths), *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*.

Malaria does not occur naturally in the UK but travel-associated cases are reported in those who have returned to the UK or arrived (either as a visitor or migrant to the UK) from malaria endemic areas.

More information about malaria is available at:

<https://www.gov.uk/government/collections/malaria-guidance-data-and-analysis>

Methodology

This report presents data on malaria imported into the UK in 2015, mostly based on figures reported to the PHE Malaria Reference Laboratory (MRL). Although the MRL dataset is the most complete source of information about malaria available in the UK, a capture-recapture study estimated that the MRL surveillance system captured only 56% of cases in England (66% for *Plasmodium falciparum* and 62% for London cases) [1]; furthermore, some of the epidemiological information is incomplete [2].

Malaria surveillance data is used to inform the UK malaria prevention strategy [3] so it is essential that the data is as complete as possible. Since 2013, the PHE Travel and Migrant Health Section has been attempting further to improve the quality of this dataset by ensuring any cases that have been reported in the PHE public health case management database (HPZone) are also included in the final dataset as well as supplementing epidemiological information, where available, from HPZone. This means that data reported from 2013 onwards may not be directly comparable with previous reports although any differences are thought to be very small.

Malaria is a notifiable disease and clinical and laboratory staff are obligated under law to notify cases to their 'Proper Officer' [4]; however, in 2015, only 15% of malaria cases reported to MRL were officially notified (provisional data) [5]. Clinical and laboratory staff are therefore reminded of the need to notify cases to the designated local public health authority and to report all cases to PHE MRL; a form for this purpose is available at

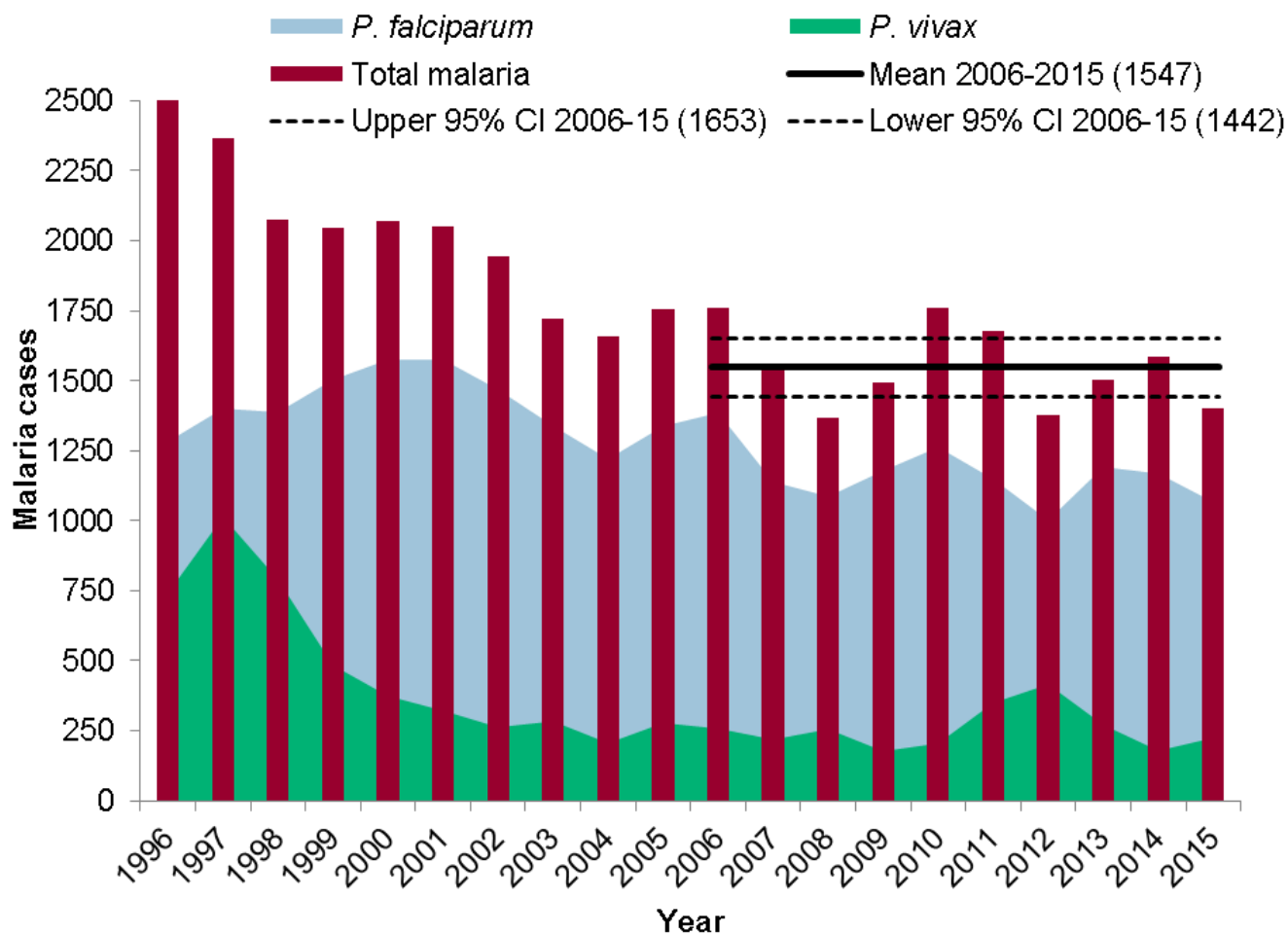
<https://www.gov.uk/guidance/mrl-reference-diagnostic-and-advisory-services>. For more details on methods of MRL data collection, please refer to the article: Smith et al, Imported malaria and high risk groups, BMJ: 2006 [6].

Data analysis for this report was conducted by the PHE Travel and Migrant Health Section and colleagues at the MRL have reviewed and approved the report.

General trend

In 2015, 1,400 cases of imported malaria were reported in the UK (1,319 in England, 49 in Scotland, 21 in Wales and 11 in Northern Ireland), 11.7% lower than reported in 2014 (N=1,586) and 11.6% below the mean number of 1,583 cases reported between 2005 and 2014 [Figure 1].

Figure 1. Cases of malaria in the United Kingdom: 1996 to 2015



In the last 10 years (between 2006 and 2015), the total number of malaria cases reported in the UK each year has been fluctuating around a mean of 1,547 (95% CI: 1,442-1,653); this is a significant decrease of 23% ($p < 0.01$) compared to the mean for the previous 10 years (2,018, 95% CI: 1,826, 2,210).

The majority of the cases in 2015 were caused by *P. falciparum*, which is consistent with previous years, although the proportion of the total increased slightly compared to 2014, as there was a decrease in the number of *P. ovale*, *P. malariae* and mixed infections in 2015 (Table 1).

Table 1. Malaria cases in the UK by species: 2015 and 2014

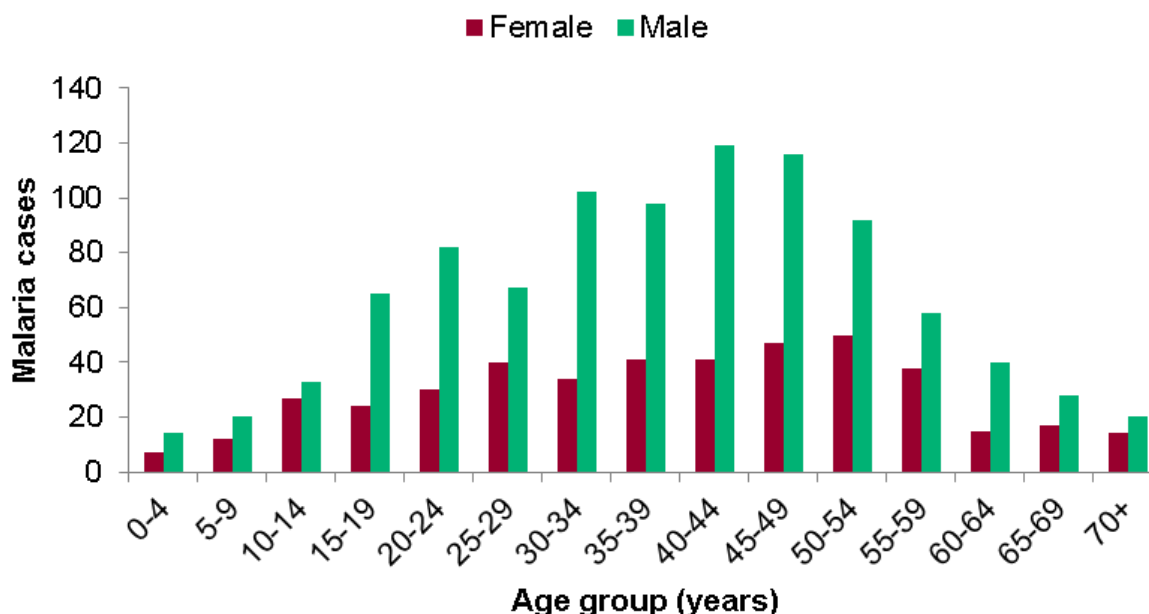
Malaria parasite	Cases (% of total)	
	2015	2014
<i>P. falciparum</i>	1,068 (76.3%)	1,169 (73.7%)
<i>P. vivax</i>	207 (14.8%)	225 (14.2%)
<i>P. ovale</i>	95 (6.8%)	130 (8.2%)
<i>P. malariae</i>	23 (1.6%)	41 (2.6%)
Mixed	7 (0.5%)	21 (1.3%)
Total	1,400	1,586

There were six deaths from malaria reported in 2015 compared to three in 2014, all from falciparum malaria acquired in Western Africa. There is a small variation in the number of deaths from malaria in the UK every year but the total for 2015 is in line with the annual average of 6 over the last 10 years. As the number of deaths from vivax malaria in any year is very low, PHE MRL data over 27 years has been combined and demonstrates that old age is a major risk factor for severe vivax as well as falciparum malaria, with all vivax deaths occurring in those aged over 50 years [7].

Age and sex

Age and sex were known for 1,391/1,400 cases; of these the majority (69%, 954/1,391) were male, consistent with previous years. Males dominated all age groups (Figure 2) and the median age was 39 years for males and 40 for females. Children aged under 18 years accounted for 11% (160) of all cases.

Figure 2. Cases of malaria in the UK by age and sex: 2015 (N=1,391)



Geographical distribution

London continues to report the largest proportion of cases in England (681/1,319, 52%).

Table 2. Cases of malaria in the UK by geographical distribution: 2015 and 2014

Geographical area (PHE centre)	2015	2014	% change
London	681	779	-13%
West Midlands	122	115	6%
South East	120	133	-10%
East of England	115	113	2%
North West	114	121	-6%
Yorkshire and Humber	68	97	-30%
South West	52	59	-12%
East Midlands	39	48	-19%
North East	8	10	-20%
England total	1,319	1,475	-11%
Scotland	49	76	-36%
Wales	21	33	-36%
Northern Ireland	11	2	450%
UK total	1,400	1,586	-12%

Travel history and ethnic origin

Of those with travel history/country of residence information available (976/1,400, 70%), the majority of malaria cases reported had travelled abroad from the UK (744/976, 76%). Cases that travelled abroad from the UK includes those where reason for travel was holiday, business/professional, civilian/air crew, armed forces or visiting friends and relatives. The remaining cases were new entrants, which includes UK expats and foreign students (141/976, 14%) and foreign visitors to the UK (91/976, 9%). Of the six deaths reported, three were white British and two were of Black African ethnicity or African descent. For the five cases where travel history was known, all travelled abroad from the UK.

Of the 744 cases that travelled abroad from the UK, reason for travel was known for all of the cases (100%). Of these, 595/744 (80%) had visited family in their country of origin (also known as visiting friends and relatives, or VFR travellers), 105/744 (14%) travelled for business (including armed forces and civilian air crew) and 44/744 (6%) travelled for a holiday.

Country/region of birth for cases that travelled abroad from the UK

Country or region of birth information was known for 531 (71%) of 744 cases that travelled abroad from the UK, of which almost two-thirds were born in Africa [Figure 3].

Figure 3. Region of birth for malaria cases that travelled abroad from the UK: 2015 (N=531)

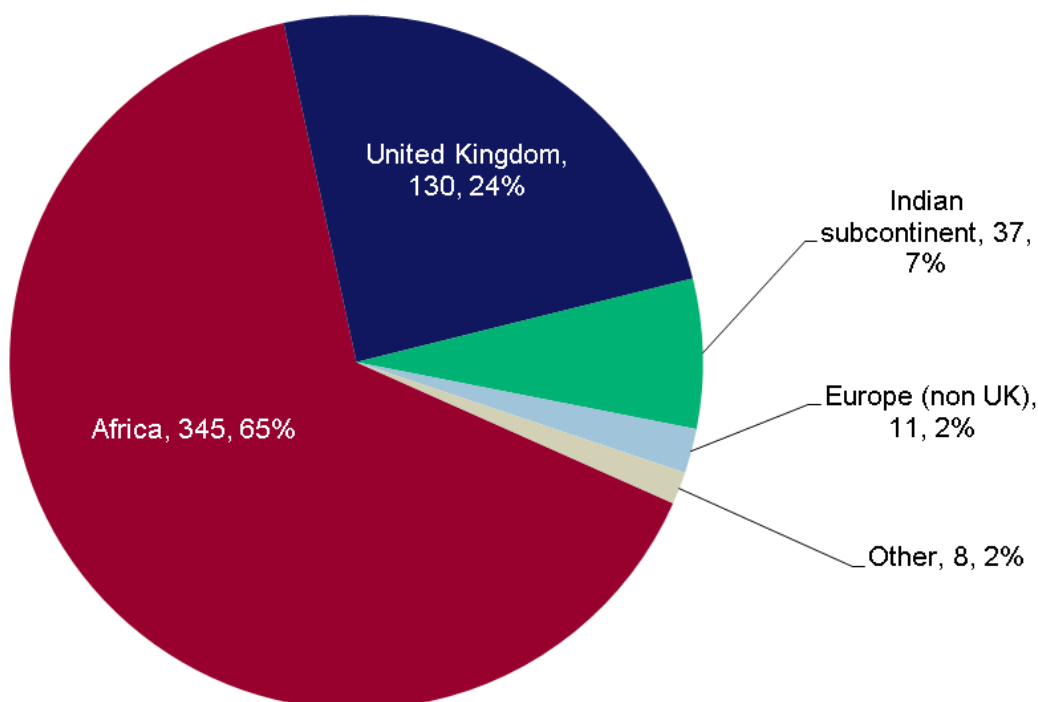


Table 3. Malaria cases that travelled abroad from the UK by region of birth and proportion of VFR travellers: 2015 (N=531)

Region of birth	N	VFR	% VFR
Africa	345	335	97%
Europe – UK	130	43	33%
Indian subcontinent	37	36	97%
Other*	19	8	42%

N – cases where region of birth and reason for travel was known

VFR – cases that have travelled to visit family in country of origin

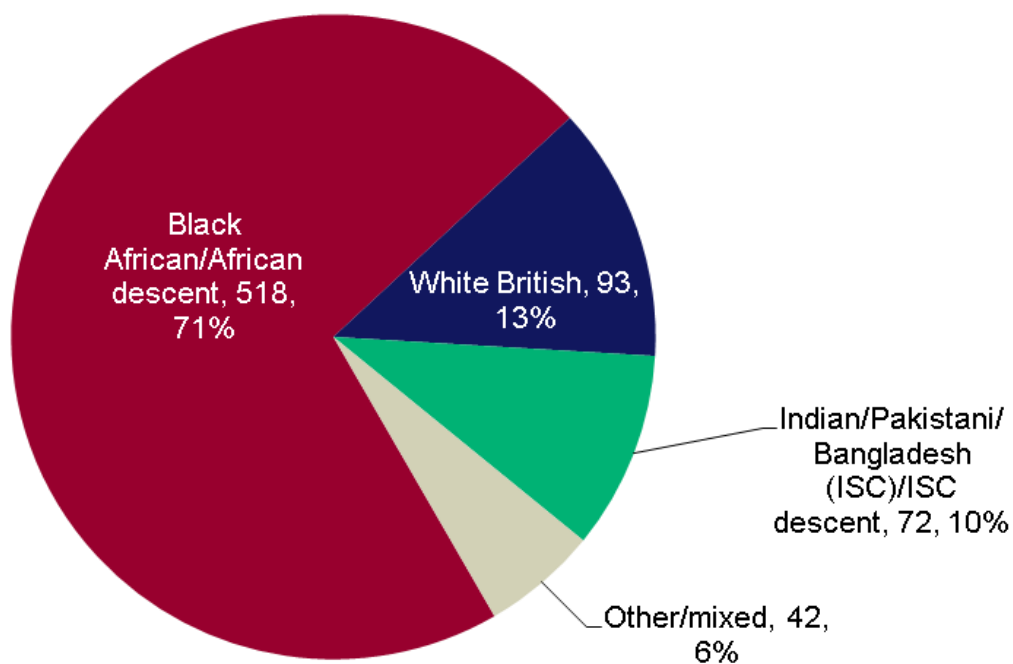
* includes non-UK Europe

Ethnicity for cases that travelled abroad from the UK

Where ethnicity was known, the majority of malaria cases that travelled abroad from the UK (71%, 518/725), were of Black African ethnicity or African descent (African descent is determined from other information about the patient if ethnicity is not given) (Figure 4).

For non-White British cases, where reason for travel was known, 588/632 (93%) were VFR travellers.

Figure 4. Ethnicity for malaria cases that travelled abroad from the UK: 2015 (N=725)



Country/region of travel for cases that travelled from the UK

Table 4 shows the breakdown of malaria cases reported by region of travel and parasite species and the top 20 countries of travel are shown in Table 5. The majority of cases (where travel history was known) continue to be acquired in Western Africa (482/744, 65%), followed by Eastern Africa (82/744, 11%) and Southern Asia (81/744, 11%).

While it is important not to over-interpret changes in individual countries because numbers are low, cases acquired in Sierra Leone decreased by over half in 2015 (42) compared to 2014 (98). The number of cases also decreased by approximately half in Uganda (17) and around a quarter in Ghana (87), Pakistan (44) and Côte D'Ivoire (34). It is possible that travel to Western Africa decreased due to the Ebola outbreak.

No cryptic cases were reported in 2015.

Table 4. Cases of malaria that travelled abroad from the UK by species and region of travel: 2015 and 2014

Region of travel [8]	<i>P. falciparum</i>	<i>P. vivax</i>	<i>P. ovale</i>	<i>P. malariae</i>	Mixed	2015 total	2014 total
Western Africa	449	1	23	8	1	482	631
Eastern Africa	68	2	9	3	-	82	131
Southern Asia	3	78	-	-	-	81	91
Middle Africa	62	1	8	1	-	72	79
Northern Africa	8	1	-	-	-	9	15
South America	-	6	1	-	-	7	8
Africa unspecified	5	-	-	-	-	5	8
Southern Africa	1	-	-	-	-	1	4
South-Eastern Asia	1	-	-	-	-	1	4
Western Asia	-	1	-	-	-	1	1
Central America	-	-	-	-	-	-	1
Oceania	-	-	-	-	-	-	1
Not stated	1	1	1	-	-	3	26
Total	598	91	42	12	1	744	1,000

Table 5. Cases of malaria that travelled abroad from the UK by species and top 20 countries of travel: 2015 and 2014

Country of travel	<i>P. falciparum</i>	<i>P. vivax</i>	<i>P. ovale</i>	<i>P. malariae</i>	Mixed	Total 2015	Total 2014
Nigeria	254	-	15	4	1	274	311
Ghana	81	-	3	3	-	87	118
Pakistan	1	43	-	-	-	44	61
Sierra Leone	37	1	4	-	-	42	98
Cameroon	34	1	4	-	-	39	43
Côte D'Ivoire	33	-	1	-	-	34	45
India	1	26	-	-	-	27	26
Kenya	19	1	1	2	-	23	26
Gambia	18	-	-	1	-	19	22
Uganda	13	-	4	-	-	17	35
Tanzania	12	1	1	-	-	14	12
Angola	12	-	1	-	-	13	8
Guinea	10	-	-	-	-	10	8
Malawi	10	-	-	-	-	10	19
Afghanistan	-	8	-	-	-	8	4
Sudan	7	1	-	-	-	8	15
Congo	6	-	1	-	-	7	19
Central African Republic	4	-	2	-	-	6	2
Senegal	5	-	-	-	-	5	4
South Sudan	4	-	-	1	-	5	4
Other Western Africa	11	0	0	0	0	11	25
Other Eastern Africa	10	0	3	0	0	13	35
Other Middle Africa	6	0	0	1	0	7	7
Africa unspecified	5	-	-	-	-	5	8
South America	0	6	1	0	0	7	8
Other	4	2	0	0	0	6	11
Not stated	1	1	1	-	-	3	26
Total	598	91	42	12	1	744	1,000

Prevention and treatment

Chemoprophylaxis

Among patients with malaria who had travelled abroad from the UK, where the history of chemoprophylaxis (antimalarial medication) was obtained, 490/576 (85%) had not taken chemoprophylaxis.

Of those that had taken some form of chemoprophylaxis, 74% (64/86) had taken a drug that is currently recommended by the PHE Advisory Committee for Malaria Prevention in UK Travellers (ACMP) for their destination [3]; however, this only represented 11% (64/576) of the total cases where chemoprophylaxis information was available. (Note that whether the cases had taken the drug regularly was poorly completed and should also be taken into consideration when interpreting this data).

Although the 2015 data is similar to that of the last 5-6 years, in the early 2000s the proportion of those who had not taken chemoprophylaxis was much lower (52% in 2000, 59% in 2001). The proportion of the total cases with chemoprophylaxis information that took a drug recommended by the ACMP has however remained between 11 and 16% since 2000.

This data implies that health messages about the importance of antimalarial chemoprophylaxis are still not reaching groups who are at particular risk of acquiring malaria, eg those who are visiting family in their country of origin, particularly those of Black African heritage and/or born in Africa, or they are not acting on these messages.

It seems likely that these groups are either not seeking or not able to access medical advice on malaria prevention before they travel, or they are not being given good advice, or they are not adhering to it; they may not perceive themselves to be at risk because the destination is familiar to them. Probably all these factors contribute. The burden of falciparum malaria in particular falls heavily on those of Black African ethnicity, and this group is important to target for pre-travel advice.

A recent analysis of malaria deaths over 20 years in the UK [9] showed that, while African born travellers visiting family in their country of origin are at particular risk of acquiring malaria; once acquired, the risk for mortality is significantly higher in those born outside Africa and travelling for other reasons (eg holiday travellers). There is also a strong association between increasing age and mortality, so elderly travellers should also be considered a particular risk group.

Prevention advice

Malaria, an almost completely preventable but potentially fatal disease, remains an important issue for UK travellers. Failure to take chemoprophylaxis is associated with the majority of cases of malaria in UK residents travelling to malaria risk areas. The number of cases in those going on holidays is small but there is continuing evidence that those of African or Asian ethnicity who are non-UK born and going to visit family are at increased risk of malaria, as well as a number of other infections [10]. The elderly are at particular risk of dying from malaria if they acquire the infection. Those providing advice should engage with these population groups wherever possible, including using potential opportunities to talk about future travel plans outside a specific travel health consultation, such as during new patient checks or childhood immunisation appointments [11].

The ACMP guidelines [3] and resources available from the National Travel Health Network and Centre (<http://travelhealthpro.org.uk/>) should assist clinicians in helping travellers to make rational decisions about protection against malaria.

Useful resources for travellers, including translated leaflets, are also available on [GOV.UK](http://gov.uk).

Taking fever seriously on return from a malaria risk area

P. falciparum can progress to severe and life-threatening illness, including cerebral malaria, if it is not diagnosed and treated promptly. Travellers returning from malaria risk areas should seek urgent medical advice for any symptoms, especially fever, during their trip or in the year following their return home, including a same day result malaria blood test.

Treatment guidelines and algorithms for clinicians are available from the British Infection Society: <http://interim.britishinfection.org/content/clinical-guidelines#ukmal>.

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