Imported malaria in Auckland, New Zealand

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Abstract

Aim To describe the current malaria situation in Auckland, New Zealand.

Method We collected data on all cases of malaria diagnosed in Auckland from 1 October 2008 to 30 September 2009. Enhanced surveillance was arranged with all hospital and community haematology laboratories in the region. Laboratories notified us when a diagnosis of malaria was made. After obtaining informed consent the patient was asked about their travel, prophylaxis taken and symptoms. Laboratory results were collected.

Results There were 36 cases of malaria in 34 patients. Consent could not be obtained from two patients so data is from 34 cases in 32 patients. (One patient had Plasmodium falciparum (P.falciparum) then later P.vivax, the other had P.vivax and relapsed.) There were 24 males and 8 females with a median age of 21 years (range 6 months to 75 years). Eleven of the 32 were New Zealand residents. 8 of these 11 had travelled to visit friends or relatives (VFR) while 3 were missionaries. In this group 6 had P.falciparum, 4 P.vivax and one had both. Twenty-one of the 32 were new arrivals to New Zealand: 11 refugees and 10 migrants.

Conclusion Malaria in Auckland is seen in new arrivals and VFR travellers, not in tourist travellers.

Rates of malaria have fallen in a number of endemic countries in recent years\(^1\) and a corresponding drop in the number of imported cases has been seen in several high income countries.\(^2,3\) Rates of malaria in travellers to India,\(^4\) Asia\(^5\) and Africa\(^6\) have fallen.

Our aim was to describe the current malaria situation in Auckland, New Zealand.

Methods

We conducted a prospective observational study of all cases of malaria diagnosed in Auckland over a 12-month period (1 October 2008–30 September 2009). Ethics approval was obtained from the Northern Y Ethics Committee.

Enhanced surveillance was set up with all hospital and community haematology laboratories in the region, with the laboratories requested to notify the principal investigators or the treating infectious diseases physician whenever a case of malaria was diagnosed.

Following written informed consent, each study participant was interviewed. A closed ended questionnaire was used to record information which described their resident status in New Zealand, their travel history, whether any prophylaxis was taken and clinical symptoms present at the time of diagnosis.

Laboratory results from blood tests collected at the time the diagnosis of malaria was made were also reviewed. No patient was asked to have further blood tests or additional investigations.
Results

During the 12-month period of the study 36 cases of malaria were reported to us by the haematology laboratory services in Auckland. Consent could not be obtained from two of the cases, so data collected are from 34 episodes of malaria diagnosed in 32 patients. One patient was initially diagnosed with Plasmodium falciparum (P. falciparum), and presented 5 months later with P. vivax – presumably contracted during the same trip to Papua New Guinea. Another patient was diagnosed with P. vivax, but did not complete eradication treatment with primaquine and presented with relapsed infection.

Among the 34 episodes of malaria P. falciparum was diagnosed in 18 and P. vivax in 16 patients. Of the 32 patients 24 were male and 8 were female. The median age at the time of diagnosis was 21 years (range 6 months to 75 years).

Malaria in New Zealand residents—Only 11 of the 32 patients (29%) were New Zealand residents. Three of these were New Zealand born, and acquired their infection whilst travelling to malarious areas as missionaries. The remaining 8 patients were all “migrants”, but living permanently in Auckland and acquired malarial infection whilst returning to their country of origin to visit friends and relatives.

The countries of acquisition were Sudan, Kenya/Uganda, Nigeria, India, Thailand and Papua New Guinea. The median age of the New Zealand residents with malaria was 32 (14–64) years. One patient had P. falciparum followed 5 months later by P. vivax. Seven cases were P. falciparum and 5 were P. vivax.

Those with P. falciparum developed symptoms a median of 3 days after returning to New Zealand (0 to 26 days) although one had symptoms before returning home. Those with P. vivax developed symptoms a median of 43 days (10-274) after their return.

Table 1. Episodes of malaria diagnosed in Auckland by traveller type, country visited and species

<table>
<thead>
<tr>
<th>Country</th>
<th>P. vivax NZers</th>
<th>P. vivax New Entrants</th>
<th>P. falciparum NZers</th>
<th>P. falciparum New Entrants</th>
<th>Refugees</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papua New Guinea</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>2</td>
<td>10</td>
<td>1</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uganda</td>
<td></td>
<td></td>
<td>11</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uganda/Kenya</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>11</td>
<td>34</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Rates of imported malaria in travellers from Auckland

<table>
<thead>
<tr>
<th>Country</th>
<th>Number with malaria</th>
<th>Number of short-term travellers*</th>
<th>Rate/1,000,000/mth residence in malarious areas†</th>
<th>VFR with malaria</th>
<th>Number of VFRs</th>
<th>Rate/1,000,000/mth for VFRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>3</td>
<td>9728</td>
<td>62</td>
<td>3</td>
<td>5939</td>
<td>101</td>
</tr>
<tr>
<td>Nigeria</td>
<td>2</td>
<td>99</td>
<td>4,040</td>
<td>2</td>
<td>25</td>
<td>16,000</td>
</tr>
<tr>
<td>PNG</td>
<td>3</td>
<td>950</td>
<td>630</td>
<td>1</td>
<td>68</td>
<td>2,941</td>
</tr>
<tr>
<td>Sudan</td>
<td>1</td>
<td>17</td>
<td>11,764</td>
<td>1</td>
<td>17</td>
<td>11,764</td>
</tr>
<tr>
<td>Thailand</td>
<td>1</td>
<td>9830</td>
<td>20</td>
<td>1</td>
<td>1441</td>
<td>138</td>
</tr>
</tbody>
</table>

Notes:
Numbers of travellers obtained from departure records for 12 month period from October 2008 (Short-term NZ traveller departure totals, Statistics New Zealand)
* Assumes one-third of New Zealand travellers are from Auckland
† Assumes average length of stay in malarious areas is two weeks
Data for one patient not included as they had visited Kenya and Uganda.

Table 2 shows the cases of malaria among travellers from Auckland who visited one country, short term (<12 month) New Zealand departures to those destinations and VFR departures to those destinations in the year to September 2009. Rates of malaria are very high for travellers to Nigeria and Sudan, high for Papua New Guinea and low for India and Thailand. Rates in VFRs to those countries are even higher.

Chemoprophylaxis was taken by 6 of the New Zealand residents, with all reporting only partial (50% on average) compliance. None of them continued the prophylaxis after their return to New Zealand. Four had taken doxycycline and 2 could not recall what they had taken.

All developed symptoms of fever, with 8/12 also reporting shaking chills/rigors and 7/12 reported gastrointestinal symptoms (abdominal pain, nausea or vomiting). Headache was reported by 6/12, and myalgia or arthralgia by 5.

In 11 of the cases the diagnosis was made by examination of a peripheral blood smear preparation, and 1 case (P.falciparum) was diagnosed by an immunochromatographic (rapid antigen) test.

All were treated with appropriate therapy; the 7 cases of P.falciparum were treated with quinine/doxycycline or quinine/clindamycin and of the 5 cases of P.vivax 3 were treated with chloroquine/primaquine and 2 with mefloquine/primaquine. All patients in this group were admitted to hospital except 2 with P.vivax. No patient required intensive care but the one patient who had P.falciparum followed by P.vivax had marked anemia on both occasions and required transfusion. She had used artemisin-based combination therapy self treatment two weeks before presenting with P.falciparum.

Malaria in new entrants—Another 11 cases of malaria were diagnosed in 10 patients who all arrived in New Zealand as “new entrants”, i.e., they were new arrivals who had come to New Zealand to study (8 of the patients) or as part of a family migrating to New Zealand permanently (2). In this group, 9 were migrants from India, 1 from Pakistan, and all were diagnosed with P.vivax. None had taken
antimalarial prophylaxis. The median age of this group was 21 years (3–75). They presented a median of 138 days (1–327) after arriving in New Zealand. All reported fevers. Shaking chills were reported in 10, headache in 6, gastrointestinal symptoms in 5 and myalgia in 2.

In all 11 cases the diagnosis was made by peripheral blood smear examination. All received treatment with chloroquine, but only 9 cases reportedly received eradication therapy with primaquine. As mentioned previously, 1 patient who did not take the primaquine prescribed because he couldn’t afford it represented 2 months later. Seven of these 11 patients were admitted to hospital for a mean of 1.6 days (1-3).

**Malaria in refugees**—The third subgroup comprised 11 refugees, who were all diagnosed through the Auckland Refugee Centre. Four of the 11 reported their country of origin to be Congo, but all 11 had arrived from Uganda. Only 1 of these patients was symptomatic (reporting long standing abdominal discomfort), and 2 were screened for malaria due to the clinical finding of splenomegaly. The remaining 8 cases were all screened for malaria on the basis of close relationship with an index case. The median age of this group was 12 years (6 months -34 years).

All patients in this group were diagnosed with *P. falciparum*, and again the diagnosis was made by peripheral blood smear examination. Three received quinine and doxycycline, 2 received quinine and clindamycin and 6 were prescribed 2 doses of mefloquine. Two refugees were admitted to hospital and 2 were seen but not admitted for the initiation of their treatment. The remainder received all their treatment at the Auckland Refugee Centre.

**Discussion**

Although rates of imported malaria have decreased recently in a number of countries, it remains an important diagnosis with an associated morbidity and potential mortality. During the study period a total of 36 cases of malaria were diagnosed in Auckland. With an estimated 1.4 million residents, this equates to 2.5 cases of imported malaria per 100,000 people per annum. This is higher than the national rate of 0.9 per 100,000 in 2008 and 1.2 in 2009. This higher rate is partly explained by the cases seen in quota refugees as they are screened in Auckland prior to settling around the country.

In a similar study by our unit in 1993 43 cases were diagnosed in Auckland. Other New Zealand rates prior to the introduction of laboratory based reporting in 2008 are unreliable as cases are underreported by clinicians.

Despite New Zealanders’ passion for travel, and thousands of Kiwis visiting malarious areas each year (for example in the twelve months to September 2009 11,599 New Zealanders gave Indonesia as their main destination, 17,299 Malaysia, 9,737 Philippines, 8,323 Vietnam and 11,721 Vanuatu), not a single case was diagnosed in a New Zealand tourist traveller.

Nor were any of our 1130 defence personnel deployed overseas over the study time period diagnosed with malaria after returning to Auckland. Their deployments included Malaysia, Timor, Pakistan and the Solomon Islands.
Of concern is the number of cases of malaria diagnosed in New Zealand residents with family ties in malarious areas who travelled to visit friends and relatives. Elevated malaria risk in this group is well described. The reasons are multiple and include longer duration of travel, more rural travel and less use of preventive strategies because of lack of awareness, financial constraints and provider factors. This is a group to which further education and appropriate prophylaxis strategies should be targeted.

New Zealand is a popular destination for foreign students, with large numbers from South East Asia and India. Accordingly it can be expected that malaria will continue to be diagnosed in this patient group, and GPs and physicians alike should ensure they take a thorough travel history and request a malaria screen when seeing a “New Entrant” patient presenting with fever.

Malaria continues to be diagnosed in our refugee population. Of note 8 of the 11 patients diagnosed in this group were completely asymptomatic. This implies that all refugees from a malarious area should be screened as part of their immigration “work up”. It is recommended that all refugees are screened for malaria on arrival in Australia.

At the time of the study quinine was standard first line therapy for P. falciparum malaria in our region however now artemesinin based treatment is often used. Malaria prevention advice for many travellers continues to be important and should include the need to avoid mosquito bites from sunset to sunrise. Use of clothing, repellents and permethrin impregnated bed nets should be emphasised. Malaria risk remains high and widespread in many of the malarious parts of Africa, Papua New Guinea and Solomon Islands. Thus most travellers to these regions should use prophylaxis with mefloquine, doxycycline or malarone.

For many other destinations malaria rates vary from high to low and the need for prophylaxis thus needs to be individualised depending on the regions a traveller is visiting and their planned activities. This makes knowledge of risk areas vital when giving pretravel advice. (Useful maps can be seen on sites such as www.fitfortravel.nhs.uk.) For example while parts of Cambodia have high rates of malaria, the risk to a traveller only visiting Phnom Phen, Siem Reap and Angkor Wat is low and prophylaxis unnecessary. Similarly many travellers visiting only the high altitude areas of Bolivia and Peru do not need malaria prophylaxis.

Competing interests: Nil.

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References:
2. Imported malaria cases and deaths, United Kingdom: 1990–2009.  

3. Arboviral diseases and malaria in Australia, 2007/08: Annual report of the National Arbovirus and Malaria Advisory Committee  


