

## Research

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# Recognition of Imported Tropical Infectious Disease in Returned Travelers in a University Hospital Emergency Department

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## ABSTRACT

**Objective:** Healthcare workers practising in Ireland may encounter tropical illness in the returned traveler. This study aimed to establish the awareness of tropical diseases in front-line healthcare professionals working in an Irish hospital.

**Methods:** A questionnaire was administered to doctors and nurses working in an Irish university teaching hospital. The respondents' ability to obtain a travel history, to recognize tropical illness in returned travelers and to demonstrate awareness of the geographical distribution of tropical diseases was evaluated.

**Results:** Fifty clinicians completed the survey (29 doctors and 21 nurses), most of whom had not previously worked in the tropics and had not received formal training in tropical or travel medicine. The following items were not routinely included in their travel histories: illness in traveling companions, water and food consumption, insect and animal bites. Tropical illness was infrequently considered in patients presenting with a variety of common symptoms. There was a poor level of familiarity of several tropical infectious diseases. There was a tendency for doctors to underestimate the prevalence of dengue infection. A substantial proportion of doctors were not confident in their ability to manage a patient with malaria. The educational activities preferred by the majority of respondents were tropical disease manuals, workshops and wall charts.

**Conclusion:** This study highlights a low level of knowledge of tropical medicine among a sample of healthcare workers who may be called upon to assess the returned tropical traveler. Opportunities for training in tropical medicine should be provided to emergency department clinicians.

**KEYWORDS:** Recognition; Tropical; Infectious disease; Emergency department.

## INTRODUCTION

With the marked increase in international travel,<sup>1</sup> and the growth of the migrant population living in Western European countries, multidisciplinary healthcare workers practising in Ireland are increasingly likely to encounter tropical illness in the returned traveler. Although most post-travel-related health problems in travelers to developing countries are mild, up to 8% of travelers seek care from a physician when they return to their home country.<sup>2-5</sup> Common diagnoses revealed by the GeoSentinel Surveillance Network Database in Europe include enteric fever, acute viral hepatitis, and influenza.<sup>6</sup> Life-threatening infectious diseases, such as *Plasmodium falciparum* malaria, melioidosis, and African trypanosomiasis, were reported in a study of GeoSentinel records of 53 tropical or travel disease units in 24 countries.<sup>7</sup> Lack of awareness of the possibility of tropical infectious disease in the differential diagnosis of an ill returned traveler could precipitate potentially complicated or fatal diagnostic delay.

Little is known about the preparedness of frontline emergency department clinical personnel in European healthcare institutions to promptly diagnose imported tropical infec-

tious diseases in returning travelers. The current study aimed to establish the level of awareness of tropical diseases in a sample of healthcare professionals working in a major Irish teaching hospital; to evaluate their level of awareness of the geographical distribution of tropical diseases; and to characterise the ability of the healthcare team to record a detailed travel history, recognize tropical illness in returned travelers, identify the tropical disease risks associated with specific travel itineraries, and express their training needs in relation to clinical tropical medicine.

## METHODS

The research protocol for this descriptive, cross-sectional survey was approved by the local clinical research ethics committee. A self-administered questionnaire was distributed to a convenience sample of Emergency Department (ED) doctors (16-item questionnaire) and triage nurses (13-item questionnaire) working at University Hospital Galway in Ireland. The questionnaire enquired about the previous training, if any, received by the healthcare team in tropical medicine, their awareness of the components of a comprehensive travel history, their ability to recognize tropical illness in returned travelers, their knowledge of the geographical distribution of tropical diseases, and of the infectious disease risks posed by specific travel itineraries. Survey respondents were also asked about their degree of confidence in managing a patient with imported malaria. The study also invited the ED clinicians to nominate their preferred educational activities in relation to clinical tropical medicine. Data were entered into a Microsoft Excel database, imported into IBM SPSS Statistics version 21.0, and analyzed using descriptive and inferential statistics. A two-sided chi-squared test was used to determine if there was a significant difference between expected and observed frequencies, with  $<0.05$  representing statistical significance.

## RESULTS

Fifty healthcare workers completed the survey (29 doctors and 21 nurses). The majority of medical respondents (76%,  $n=22$ ) were non-consultant hospital doctors. Forty-five percent ( $n=9$ ) of the nurses surveyed worked on a weekly basis as triage nurses in the Emergency Department. Most of the doctors (72%,  $n=21$ ) and nurses (57%,  $n=12$ ) in the survey had not previously worked in a tropical or sub-tropical region (Figure 1). The majority of doctors (66%,  $n=16$ ) and nurses (67%,  $n=14$ ) had not received formal training in tropical or travel medicine. The training received by doctors was considered to be less than satisfactory in 38% ( $n=5$ ) of cases, and by nurses in 60% ( $n=3$ , Figure 2). The difference between the satisfaction rate of both professional groups was not statistically significant ( $p=.608$ ).

The following items were not routinely included in the travel histories of the clinicians surveyed (Figure 3), and were more likely to be omitted by ED triage nurses than by ED doctors (NS=not significant): illness in a traveling companion ( $p=0.032$ ), use of malaria chemoprophylaxis ( $p=0.009$ ), water

and food consumption practices (NS), insect bites (NS), and animal bites (NS). Tropical illness was unlikely to be considered in patients presenting to the ED with shortness of breath, skin rash, joint pain, headache, fatigue and confusion by both doctors and nurses (Figure 4). There was no statistically significant difference between professional groups in relation to the consideration of tropical illness based on these clinical presentations.

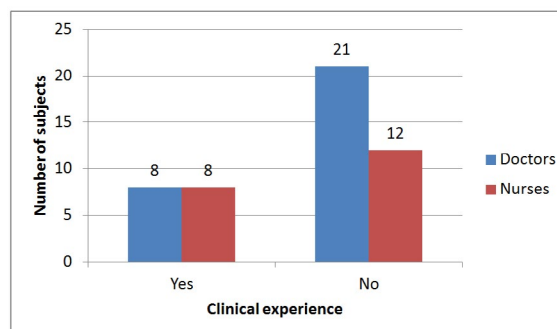


Figure 1: Previous clinical experience in tropical regions.

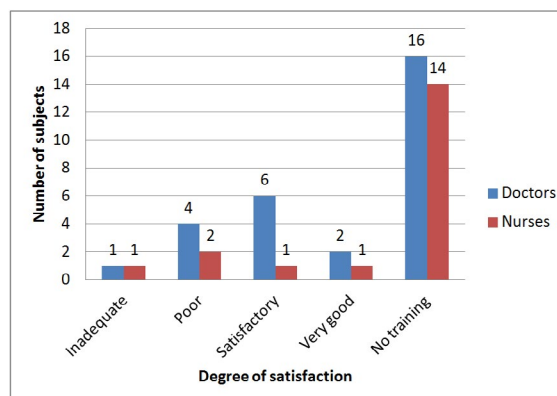


Figure 2: Satisfaction with previous tropical medicine training.

There was a poor level of diagnostic confidence in relation to a range of tropical infectious diseases with a significant proportion of both medical (Figure 5) and nursing (Figure 6) staff declaring unfamiliarity with important tropical diseases. Doctors were statistically more likely to declare confidence in diagnosing the following tropical infectious diseases compared to nurses: dengue ( $p=0.001$ ), schistosomiasis ( $p<0.0001$ ), hepatitis A ( $p=0.011$ ), leishmaniasis ( $p=0.001$ ), cutaneous larva migrans ( $p=0.001$ ), trypanosomiasis ( $p=0.001$ ), and filariasis ( $p=0.001$ ). There was a tendency for doctors to overestimate the global distribution of malaria and yellow fever, while underestimating the prevalence of dengue infection (Table 1), upon considering specific travel itineraries. There was a reasonable level of awareness of the incidence of imported malaria in Ireland. Twenty-five percent ( $n=7$ ) of medical respondents underestimated the annual incidence of imported malaria. A sizeable but non-statistically significant proportion of doctors (66%,  $n=19$ ,  $p=0.79$ ) were less than confident in their ability to manage a patient with malaria in an Irish hospital setting (Figure 7). The educational activities preferred by the majority of respondents were tropical disease manuals, designated workshops and wall charts (Figure 8). Nurses were more likely to express a preference for weekend courses ( $p=0.035$ ).

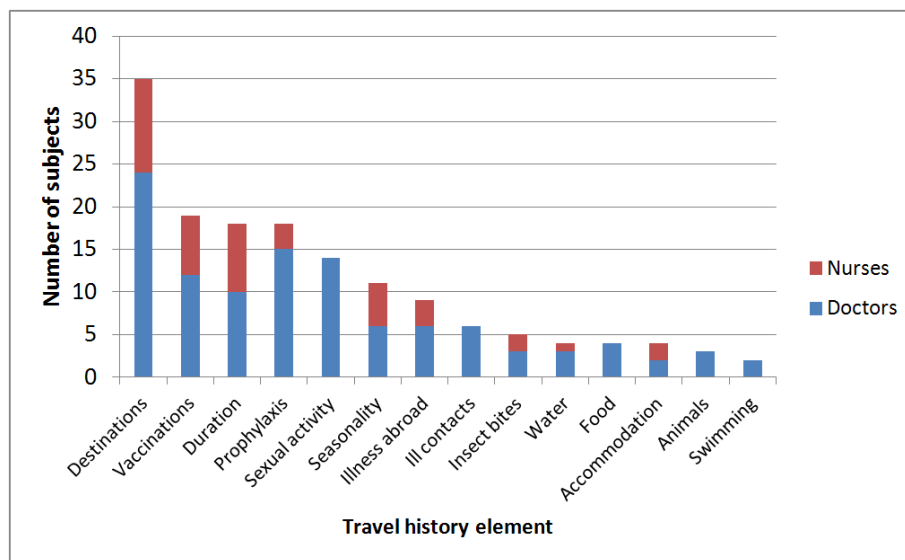


Figure 3: Elements of travel history routinely recorded.

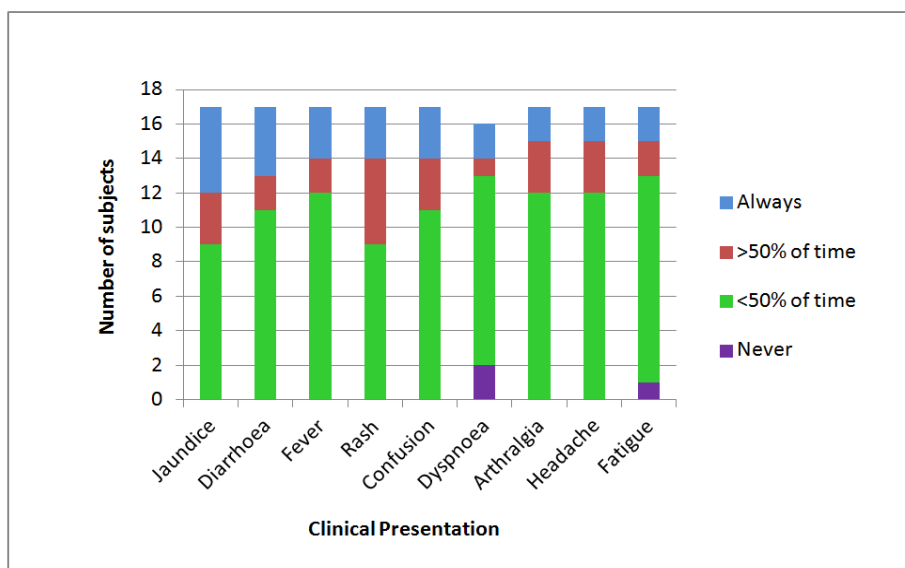


Figure 4: Physician likelihood of considering tropical disease in returned travellers.

The internal consistency of the Likert scale items on the questionnaire administered to doctors and nurses was high, with a Cronbach's alpha coefficient of 0.900 ( $n=43$ ).

## DISCUSSION

This study, though limited by its sample size, single centre location, and non-standardized instrument, provides useful insights into the familiarity of Emergency Department doctors and nurses with respect to the recognition and management of tropical infectious diseases presenting for emergency hospital care with a variety of symptoms. The lack of previous experience of working in a tropical healthcare setting was prominent in this group, and it is possible that many of those who had worked in a tropical country originated from such countries as the questionnaire did not record ethnicity or the country where basic nursing or medical education were undertaken.

Over two thirds of those surveyed had not completed any formal training in tropical medicine, reflecting the general lack of emphasis on this subject in undergraduate and postgraduate medical and nursing curricula. Currently there is no active taught postgraduate programme in tropical medicine in Ireland and the respected full-time courses available locally in the London School of Hygiene and Tropical Medicine<sup>8</sup> and the Liverpool School of Tropical Medicine<sup>9</sup> offer limited places and may be difficult to complete for full-time clinicians.

In a post-travel evaluation, it is recommended that the clinician considers several factors, including the severity of illness, travel itinerary, the timing of illness in relation to travel, underlying medical conditions which could affect susceptibility to infection, vaccines received, compliance with malaria chemoprophylaxis, and the individual's exposure history, which must include information on insect bites, contaminated food and water,

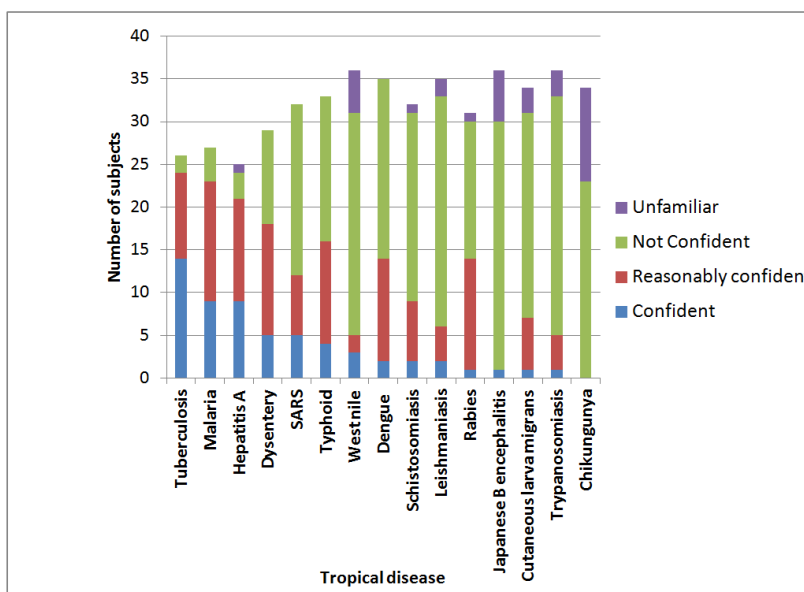


Figure 5: Recognition of specific tropical diseases by doctor.

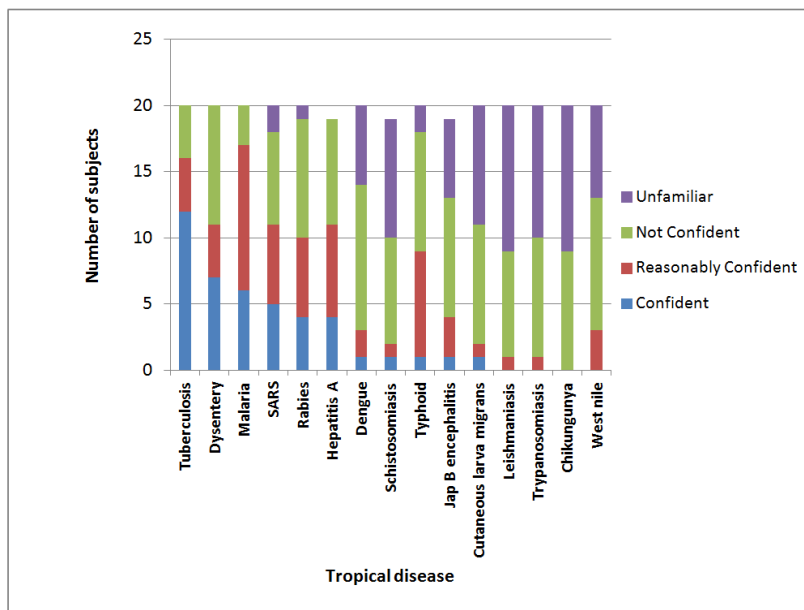


Figure 6: Recognition of specific tropical diseases by nurses.

freshwater swimming, purpose of trip, accommodation type, and any treatment accessed locally.<sup>10</sup> In a study of long-term travelers visiting GeoSentinel sites, Chen and co-workers<sup>11</sup> found that long-term travelers experienced greater levels of chronic diarrhoea, giardiasis, *Plasmodium falciparum* or *Plasmodium vivax* malaria, chronic fatigue, eosinophilia, cutaneous leishmaniasis, schistosomiasis, and amebiasis. In a study of a large, multicentre database of febrile returned travelers, Wilson and colleagues<sup>12</sup> found that over 17% of travelers with fever had a vaccine-preventable infection or falciparum malaria, and that malaria was responsible for 33% of the 21 deaths recorded in febrile returned travelers. Important clues may arise in the initial investigation of the ill returned traveler, including the possibility of helminthic infection in the returning traveler with eosinophilia.<sup>13</sup>

An interesting finding in the current study was the reluctance of healthcare staff to routinely record a detailed travel history and to consider tropical disease when faced with a patient who presents with a variety of common symptoms, such as fever, headache and arthralgia. The ill patient may not volunteer a history of travel, or may be too unwell to provide a reliable history, and the Emergency Department clinicians may not prioritise tropical illness in their differential diagnosis owing to lack of familiarity or case exposure. This failure to consider tropical infections was compounded by a stated lack of familiarity with a range of common tropical infectious diseases, all of which may be imported by an asymptomatic traveler returning from endemic parts of the world during the incubation period of the disease. While there was a tendency to overestimate the global

Travel itinerary	Den n (%)	Mal n (%)	Sch n (%)	Hep n (%)	Typ n (%)	YF n (%)	JE n (%)
Business man spent 4 nights in a hotel in Southern India (n=25)	13 (52)	17 (68)	3 (12)	19 (76)	12 (48)	6 (24)	1 (4)
Medical student spent 2 months in rural Philippines (n=24)	16 (67)	16 (67)	8 (33)	16 (67)	12 (50)	11 (46)	11 (46)
Aid worker spent 4 months in Ethiopia (n=26)	9 (23)	21 (81)	13 (50)	13 (50)	13 (50)	10 (38)	1 (4)
Flew from Lima to Cuzco and trekked the Inca trail (n=25)	7 (28)	10 (40)	7 (28)	11 (44)	11 (44)	13 (52)	1 (4)
Spent 1 week in Istanbul, Turkey (n=23)	1 (4)	2 (9)	3 (13)	17 (74)	10 (43)	2 (9)	0 (0)
Flew to Buenos Aires and visited the Iguassu falls (n=23)	7 (30)	14 (61)	6 (26)	15 (65)	11 (48)	6 (26)	1 (4)
Trans-Siberian railway from Moscow to Beijing (n=22)	7 (32)	4 (18)	2 (9)	14 (64)	12 (55)	3 (14)	10 (45)
Flew from Rio de Janeiro to Manaus in the Amazon (n=24)	13 (54)	20 (83)	10 (42)	13 (54)	10 (42)	12 (50)	3 (13)
Honeymoon couple travelled on a 1-week Nile cruise (n=24)	7 (29)	12 (50)	10 (42)	17 (71)	16 (67)	4 (17)	2 (8)
Family spent 2 weeks in Cape Town, South Africa (n=20)	5 (25)	11 (55)	3 (15)	15 (75)	9 (45)	3 (15)	1 (5)
Flew from Bangkok to Hanoi visiting coastal Vietnam (n=23)	13 (57)	13 (57)	7 (30)	13 (57)	11 (48)	10 (43)	14 (61)
Flew to Bangkok and spent 2 weeks on Phuket (n=21)	6 (29)	10 (48)	6 (29)	16 (76)	9 (43)	6 (29)	6 (29)
Stopped over in Singapore for 2 nights en route to Perth (n=16)	3 (19)	6 (38)	3 (19)	9 (56)	5 (31)	3 (19)	6 (38)
Two-week trip to Cuba (n=18)	6 (33)	10 (56)	3 (17)	15 (83)	2 (11)	2 (11)	1 (6)

Key: Den = Dengue infection; Mal=Malaria; Sch=Schistosomiasis; Hep=Hepatitis A; Typ=Typhoid fever; YF=Yellow fever; JE=Japanese encephalitis.  
**Table 1:** Physician knowledge of global distribution of tropical disease.

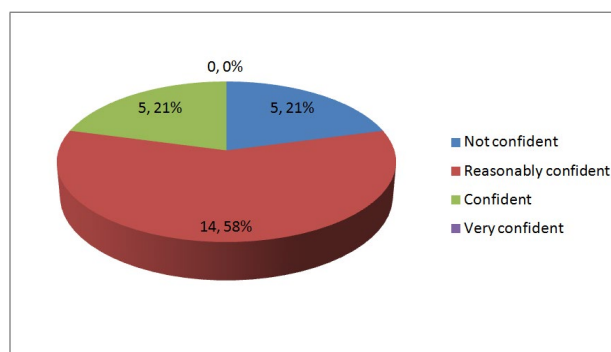


Figure 7: Confidence in management of malaria.

distribution of malaria, there were poor levels of confidence in managing malaria in an Irish hospital setting. This is especially significant given the increased burden of imported malaria in Ireland in recent years, predominantly among the visiting friends and relatives population.<sup>14</sup>

Most of the Emergency Department healthcare team members selected convenient educational activities from the list provided, with only 20% opting for a diploma course in tropical medicine. This may reflect their busy working lives with multiple competing responsibilities, the general nature of their typical diagnostic load, or the low priority given to tropical medicine in their careers to date.

Future studies should include larger random samples from hospitals throughout Ireland and other European countries, and should directly compare knowledge, attitudes and practices of indigenous and international graduates. A standardized curriculum in tropical medicine, delivered in common to nursing and medical students, should be designed as a first attempt to address the learning needs identified by this pilot study.

## CONCLUSIONS

This study is the first of its kind in Ireland to examine the preparedness of frontline Emergency Department healthcare

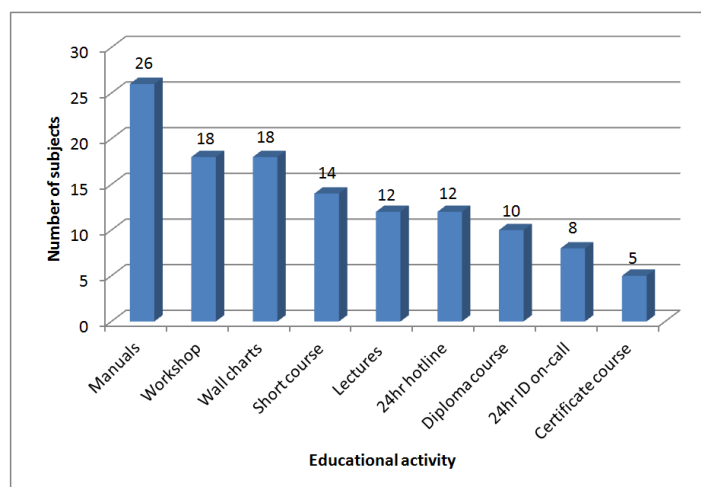


Figure 8: Preferred tropical medicine educational activities.

workers to diagnose and manage imported tropical infectious diseases in a hospital setting. Deficiencies were highlighted in the recording of a travel history, and there was a generally poor ability to recognize tropical illness in patients with a variety of presenting symptoms. Enhanced opportunities for training in tropical medicine should be provided to front-line healthcare professionals.

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#### CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

#### REFERENCES

- World Tourism Organization. UNWTO World Tourism Barometer. Available at [http://dtxq4w60xqpw.cloudfront.net/sites/all/files/pdf/unwto\\_barom14\\_06\\_dec\\_excerpt.pdf](http://dtxq4w60xqpw.cloudfront.net/sites/all/files/pdf/unwto_barom14_06_dec_excerpt.pdf) 2014; Accessed January 10, 2015.
- Freedman DO, Weld LH, Kozarsky PE, et al. Spectrum of disease and relation to place of exposure among ill returned travelers. *New England Journal of Medicine*. 2006; 354(2): 119-130. doi: [10.1056/NEJMoa051331](https://doi.org/10.1056/NEJMoa051331)
- Hill DR. Health problems in a large cohort of Americans traveling to developing countries. *Journal of Travel Medicine*. 2000; 7: 259-266. doi: [10.2310/7060.2000.00075](https://doi.org/10.2310/7060.2000.00075)
- Steffen R, deBernardis C, Banos A. Travel epidemiology - a global perspective. *International Journal of Antimicrobial Agents*. 2003; 21: 89-95. doi: [10.1016/S0924-8579\(02\)00293-5](https://doi.org/10.1016/S0924-8579(02)00293-5)
- Steffen R, Rickenbach M, Wilhelm U, Helminger A, Schar M. Health problems after travel to developing countries. *Journal of Infectious Diseases*. 1987; 7: 259-266.
- Boggild AK, Castelli F, Gautret P, et al. Vaccine preventable diseases in returned international travelers: results from the GeoSentinel Surveillance Network. *Vaccine*. 2010; 28(46): 7389-7395. doi: [10.1016/j.vaccine.2010.09.009](https://doi.org/10.1016/j.vaccine.2010.09.009)
- Leder K, Torresi J, Libman MD, et al. GeoSentinel surveillance of illness in returned travelers, 2007-2011. *Annals of Internal Medicine*. 2013; 158(6): 456-468. doi: [10.7326/0003-4819-158-6-201303190-00005](https://doi.org/10.7326/0003-4819-158-6-201303190-00005)
- London School of Hygiene and Tropical Medicine. Diploma in Tropical Medicine and Hygiene. Available at <http://www.lshtm.ac.uk/study/cpd/stmh.html> 2015; Accessed January 3, 2015.
- Liverpool School of Tropical Medicine. Diploma in Tropical Medicine and Hygiene. Available at <http://www.lstmed.ac.uk/learning--teaching/lstm-courses/professional-diplomas/dtmh> 2015; Accessed January 3, 2015.
- Fairley JK. General approach to the returned traveler. In: Brunette GW, Kozarsky PE, eds. *CDC Health Information for International Travel*. Atlanta, Georgia: Oxford University Press. 2014; 470-474.
- Chen LH, Wilson ME, Davis X, et al. Illness in long-term travelers visiting GeoSentinel clinics. *Emerging Infectious Diseases*. 2009; 15(11): 1773-1782. doi: [10.3201/eid1511.090945](https://doi.org/10.3201/eid1511.090945)
- Wilson ME, Weld LH, Boggild A, et al. Fever in returned travelers: results from the GeoSentinel Surveillance Network. *Clinical Infectious Diseases*. 2007; 44(12): 1560-1568. doi: [10.1086/518173](https://doi.org/10.1086/518173)
- Schulte C, Krebs B, Jelinek T, Nothdurft HD, von Sonnen-

burg F, Löscher T. Diagnostic significance of blood eosinophilia in returning travelers. *Clinical Infectious Diseases*. 2002; 34(3): 407-411. doi: [10.1086/338026](https://doi.org/10.1086/338026)

14. Health Protection Surveillance Centre. Burden of imported malaria in Ireland: recommendations for surveillance and prevention. Available at <http://www.hpsc.ie/AboutHPSC/ScientificCommittees/Publications/File,4680,en.pdf> 2010; Accessed January 10, 2015.