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Differential Diagnosis of Illness in Travelers Arriving From Sierra Leone, Liberia, or Guinea: A Cross-sectional Study From the GeoSentinel Surveillance Network

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Abstract

Background—The largest-ever outbreak of Ebola virus disease (EVD), ongoing in West Africa since late 2013, has led to export of cases to Europe and North America. Clinicians encountering ill travelers arriving from countries with widespread Ebola virus transmission must be aware of alternate diagnoses associated with fever and other nonspecific symptoms.

Objective—To define the spectrum of illness observed in persons returning from areas of West Africa where EVD transmission has been widespread.

Design—Descriptive, using GeoSentinel records.

Setting—57 travel or tropical medicine clinics in 25 countries.

Patients—805 ill returned travelers and new immigrants from Sierra Leone, Liberia, or Guinea seen between September 2009 and August 2014.

Measurements—Frequencies of demographic and travel-related characteristics and illnesses reported.

Results—The most common specific diagnosis among 770 nonimmigrant travelers was malaria (*n* = 310 [40.3%]), with *Plasmodium falciparum* or severe malaria in 267 (86%) and non–*P. falciparum* malaria in 43 (14%). Acute diarrhea was the second most common diagnosis among nonimmigrant travelers (*n* = 95 [12.3%]). Such common diagnoses as upper respiratory tract infection, urinary tract infection, and influenza-like illness occurred in only 26, 9, and 7 returning travelers, respectively. Few instances of typhoid fever (*n* = 8), acute HIV infection (*n* = 5), and dengue (*n* = 2) were encountered.

Limitation—Surveillance data collected by specialist clinics may not be representative of all ill returned travelers.

Conclusion—Although EVD may currently drive clinical evaluation of ill travelers arriving from Sierra Leone, Liberia, and Guinea, clinicians must be aware of other more common, potentially fatal diseases. Malaria remains a common diagnosis among travelers seen at GeoSentinel sites. Prompt exclusion of malaria and other life-threatening conditions is critical to limiting morbidity and mortality.

Primary Funding Source—Centers for Disease Control and Prevention.

The emergence of Ebola virus disease (EVD) in eastern Guinea in December 2013 was followed by rapid spread to neighboring Liberia and Sierra Leone (1, 2). This outbreak has since grown into the largest Ebola virus epidemic in history, with more than 25 000 confirmed cases and 10 445 deaths as of 1 April 2015 (1, 3). Global spread of EVD, which has been a concern since the Guinean Ministry of Health declared the outbreak and the World Health Organization began monitoring it in March 2014 (4), has recently escalated, with almost 20 case patients now cared for outside West Africa (5, 6). The resulting international response and fear have sometimes led to delayed evaluation and management of non-Ebola-related febrile illnesses among travelers arriving from West Africa (7–10).

Patients with EVD typically present with fever; fatigue; myalgia; headache; and gastrointestinal symptoms, such as abdominal pain, diarrhea, and vomiting, which worsen over time; overt hemorrhage is less common (11–15). These nonspecific symptoms are shared by many other frequently encountered infectious diseases (16). A recent analysis of illness among travelers from Africa presenting at GeoSentinel sites revealed that those who had been in West Africa were most commonly diagnosed with *Plasmodium falciparum* malaria, viral syndromes, acute and chronic diarrhea, unspecified febrile illness, and respiratory tract infection (17). Of the 6 deaths in travelers returning from West Africa described in the analysis, 5 were due to severe *P. falciparum* malaria and 1 was due to disseminated tuberculosis (17).

Current EVD case definitions are relatively nonspecific and generally consist of a history of travel to a country with widespread Ebola virus transmission and presence of fever or other symptoms (18, 19). To characterize the types of illness commonly encountered in travelers arriving from Sierra Leone, Liberia, or Guinea (the countries with widespread Ebola virus transmission), we analyzed GeoSentinel data from September 2009 through August 2014 for

travelers and new immigrants from these 3 West African countries. Our aim was to provide an evidence base to inform the differential diagnosis of sick travelers from the Ebola epidemic region and improve evaluation and medical management.

Methods

Data Source

Data were collected using the GeoSentinel Global Surveillance Network platform. This network comprises 57 specialized travel and tropical medicine clinics on 6 continents that provide routine clinical care to ill travelers and contribute anonymous, delinked travel surveillance data on these patients to a centralized database (additional details are available at www.geosentinel.org) (20, 21). GeoSentinel's data collection protocol is classified as public health surveillance and not as human subjects research requiring submission to institutional review boards.

GeoSentinel sites are staffed by specialists in travel and tropical medicine and are typically secondary or tertiary points of care for patients who self-refer or are referred from emergency departments or primary care providers or who are admitted to site-associated hospitals. Physicians at the sites determine the final diagnoses and diagnostic codes, which are selected from a standardized list of 522 diagnostic entities, some of which are etiologic (such as *Streptococcus pneumoniae*) and others of which are syndromic (such as cough). Syndromic codes are entered when an etiologic code cannot be assigned because of use of empirical therapy, self-limited disease, or inability to justify complete or sophisticated work-up as part of routine clinical practice. GeoSentinel sites contribute microbiologically confirmed data, where available, based on the best reference diagnostic tests (including molecular diagnostics) available at the time. "Probable" diagnoses are restricted to patients with pathognomonic physical findings (such as tick eschar), clinical response to highly specific therapy, or classic presentation and exposure history with laboratory exclusion of other possible causes.

Definitions and Classifications

Six possible travel purpose designations were used in this analysis: tourism; business; missionary, volunteer, research, or aid work; visiting friends and relatives (VFR); student; and immigration (including refugees). A VFR traveler was defined as a first- or second-generation immigrant who returned to their or their parents' homeland to "visit friends and relatives." This term usually applies to travelers going from a high-income country of current residence to a low-income country of origin (22). Country of exposure was determined only when ascertainable by the evaluating clinician and was based on travel itinerary, disease endemicity, and incubation periods.

Inclusion Criteria

We analyzed demographic, clinical, and travel-related data on travelers arriving or immigrating from Sierra Leone, Liberia, or Guinea and seen at any GeoSentinel Surveillance Network site from 1 September 2009 through 31 August 2014. We included only patients with a probable or confirmed final diagnosis (specific etiologic or syndromic

diagnosis as described earlier) and a presenting chief symptom other than asymptomatic screening (Figure).

Statistical Analysis

Data were managed in a Structured Query Language database and analyzed for the frequency of travel-related diagnoses by using descriptive statistics. SPSS software (IBM) was used for all statistical computations.

Role of the Funding Source

The GeoSentinel Surveillance Network has an independent Data Use and Publication Committee that oversees analyses of the database from conception to final knowledge product and comprises 5 site directors outside the Centers for Disease Control and Prevention (CDC). Staff from the CDC were involved in the study design; collection, analysis, and interpretation of data; and writing of the manuscript. The final manuscript also received CDC internal clearance.

Results

Patients and Demographic Characteristics

For the surveillance period reported, more than 100 000 records were entered into the GeoSentinel Surveillance Network database (Figure). Of those, 1180 persons had traveled to or immigrated from Sierra Leone, Liberia, or Guinea. We evaluated 805 patients who had confirmed or probable diagnoses and at least 1 presenting chief symptom (>1 diagnosis was possible for each patient). Major demographic characteristics are summarized in Table 1. The most common purpose of travel was VFR (29%), followed by business (27%) and the collective group of missionary, volunteer, research, or aid work (27%) (Table 1). Duration of travel was highly variable, although nonimmigrants traveled for a median of 36 days (range, 0 to 5111 days). Systemic febrile illness was the most common syndrome classification, occurring more than twice as often as the second most frequent syndrome (acute diarrhea) (Table 1).

Diagnoses

We identified 1062 diagnoses (954 confirmed and 108 probable) in the 805 ill travelers and new immigrants coming from countries with widespread Ebola virus transmission. The most frequent diagnoses among nonimmigrant travelers from Sierra Leone, Liberia, or Guinea were malaria (primarily *P. falciparum*), acute diarrhea, a nonspecific viral syndrome, influenzalike illness or upper respiratory tract infection, and febrile illness not otherwise specified but lasting less than 3 weeks (Table 2). The most frequent diagnoses among immigrants were latent tuberculosis, dental caries, schistosomiasis, strongyloidiasis, and giardiasis (Table 2). There were 57 children (younger than 18 years) among the 805 ill travelers and new immigrants. The most common diagnosis among them was malaria (40.3%), followed by giardiasis (8.8%), anemia (7%), cutaneous fungal infection (7%), and upper respiratory tract infection (5.3%). Table 3 lists the most common travel-related diagnoses for travelers presenting with a chief symptom of fever or gastrointestinal symptoms.

Malaria was the most common diagnosis for adults and children traveling for all reasons other than immigration (Tables 2 and 3). Only 39% (n = 122) of ill returned travelers with malaria had received pretravel counseling. Most malaria was caused by *P. falciparum* (Table 3), followed by *P. ovale*. We recorded only 2 patients with confirmed dengue and 8 with enteric fever due to *Salmonella enterica* serotype Typhi (Table 3). Notably absent were diagnoses of spotted fever rickettsioses; chikungunya; EVD; and any other severe zoonotic viral hemorrhagic fever (VHF) endemic in Africa, such as Lassa fever, Marburg fever, or yellow fever. Five patients with acute HIV infection presenting with fever were entered into the database (Table 3). Acute diarrheal illness was a common diagnosis; however, confirmation of specific causative bacterial pathogens, including *Campylobacter*, nontyphoidal *Salmonella*, and *Shigella*, was rare (Table 3).

Discussion

Our analysis of GeoSentinel data highlights the spectrum of disease in a large group of travelers and new immigrants arriving from the 3 West African countries with widespread Ebola virus transmission and evaluated at our specialized posttravel clinics. In our analysis, malaria accounted for two fifths of the total diagnoses, in contrast to no diagnoses of EVD or any other severe zoonotic VHF (even those endemic in Africa) during the period analyzed. Travel-acquired zoonotic VHFs are rarely encountered in posttravel medicine clinics because these diseases typically occur in epidemics, are notifiable diseases, and are associated with movement restrictions (23–25). *Plasmodium falciparum*, a potentially fatal infection, accounted for 86% of the malaria diagnoses reported. Malaria has been estimated to be at least 1000 times more likely than VHF to be diagnosed in febrile travelers arriving from the region (26). Understanding the geographic distribution of febrile illnesses among arriving travelers is essential in the development of a differential diagnosis and care plan (17, 18, 27), and the constellation of signs and symptoms and the incubation period is also helpful.

Current guidance calls for triage and evaluation of ill travelers arriving from countries with widespread Ebola virus transmission or uncertain control measures (28, 29). Patients who present with fever are typically categorized as having high, intermediate, low (but not zero), or no identifiable risk on the basis of their history. Depending on the risk category, it is recommended that clinical evaluation be conducted under strict isolation procedures (19, 28, 29).

In some instances, patients placed in strict isolation while being evaluated for EVD have experienced delays in receipt of timely evaluation and appropriate treatment for alternate diseases (10). These delays were reportedly due to infection control concerns. In addition, testing for alternate infectious diagnoses or other noninfectious conditions has reportedly been delayed pending a negative Ebola virus test result, with associated delays in therapy (10). To further complicate the diagnostic problems, malaria co-infection has been reported in patients with Ebola virus infection (11, 15, 30). In these instances, a positive result on a malaria rapid test or blood smear does not necessarily rule out EVD. Finally, patients presenting within 3 days of symptom onset may be too early in the course of their infection to reliably generate a positive EVD test result. These patients may require additional Ebola

virus testing, which may contribute to the additional delays in determining the definitive diagnosis and rapidly administering appropriate therapy. Every effort should be made to avoid delays in diagnosing and treating patients in whom EVD is in the differential diagnosis.

The aforementioned delays may also interfere with the immediate management of patients with undiagnosed illness severe enough to require escalation to critical care support. The risks associated with evaluating and caring for patients with EVD are recognized and debated (31, 32), but delaying such care may limit life-saving treatment for patients who are more likely to have malaria or sepsis syndromes (10, 33).

Where adequate laboratory capacity exists, ruling out malaria in febrile travelers from West Africa is critical to limiting morbidity and mortality. In situations where laboratory infrastructure is inadequate or a diagnostic result will be delayed, administration of empirical antimalarial therapy and broad-spectrum antibiotic coverage for bacteremia is imperative and potentially life-saving (34). In addition, for ill travelers from these regions who are unable to communicate their clinical history (such as those with a diminished level of consciousness), a parenteral antimalarial (if a malaria diagnosis will be delayed or laboratory infrastructure is lacking) and antibiotics are indicated. This indication is supported by our data, which showed that nearly 10% of ill travelers with malaria had severe or cerebral disease, which has a poor prognosis that is most effectively mitigated by prompt initiation of parenteral treatment. Patients with a confirmed diagnosis of malaria who are still considered at risk for EVD may continue to require isolation precautions until EVD is excluded. However, those with malaria who improve clinically and defervesce during antimalarial treatment and who do not have signs of concomitant EVD (such as large-volume diarrhea), even if they are at risk for EVD, may come out of isolation unless their clinical status changes within the 21-day Ebola virus incubation period.

Acute diarrhea was the second most common diagnosis after malaria, including diarrhea caused by *Campylobacter*; nontyphoidal *Salmonella*; *Shigella*; and protozoa, such as *Giardia intestinalis*. Travelers' diarrhea typically has a short incubation period (2 to 7 days), with fever usually persisting for only a few days (26). In contrast, EVD-associated diarrhea is frequently large-volume and severe, is usually not bloody, develops after the emergence of high fever, and persists for several days (13, 14). By the time severe EVD-associated diarrhea develops, other more suggestive signs of EVD may be present, such as truncal maculopapular rash; conjunctival injection; and, in fewer than 30% of patients, bleeding (13, 14).

The third to fifth most common illnesses among travelers in our analysis were nonspecific febrile, viral, or mononucleosis-like syndromes; influenza-like illnesses; and upper respiratory tract infection. Collection of a complete vaccine history among travelers presenting with fever must also be a component of the medical evaluation. Respiratory illnesses are common in travelers from all regions (20, 21), including West Africa, and influenza viruses circulate year-round in the tropics (35). Hence, it is important to verify up-to-date influenza vaccination in travelers, although vaccine efficacy may vary individually and seasonally (35). Meningococcal vaccine provides coverage only for the A, C, Y, and

W135 serogroups. The B serogroup rarely circulates in West Africa, but the X serogroup is increasingly reported (36). Although both the live, attenuated oral typhoid vaccine and the killed parenteral typhoid vaccine provide only 55% to 70% protection against illness caused by *S. enterica* serotype Typhi, they have higher efficacy against fatal forms of disease (37).

Although typical travel-acquired infections, such as dengue, chikungunya, measles, spotted fever rickettsioses, and brucellosis, often begin with a nonspecific febrile illness similar to EVD, they were infrequent or absent among travelers from Sierra Leone, Liberia, and Guinea in this analysis. Similarly, we found no diagnoses of meningococcal meningitis.

Risk for travel-related illness is particularly high in VFR travelers (20–22, 38). Although such travelers made up only 29% of our sample, they accounted for 44% of malaria diagnoses and 2 of 5 patients with acute HIV infection. They also were more likely to return with a systemic febrile illness (68.5% vs. 41% of non-VFR travelers); had higher rates of hospitalization for their illness (43% vs. 21% of non-VFR travelers); and had the lowest rates of pretravel encounter (33%) of any type of traveler, a finding that past studies have noted (22, 39). Because malaria is preventable with chemoprophylaxis and insect precautions, poor uptake of pretravel advice and intervention may translate into a proportionately higher incidence of malaria among VFR travelers. Travelers to a country with widespread transmission should have a pretravel consultation to ensure that malaria chemoprophylaxis is prescribed and vaccinations are administered. These key interventions will not only prevent disease but also inform the differential diagnosis. Thus, it is important to extend educational efforts in West African immigrant communities to improve coverage of pretravel care.

This analysis has limitations. Our results pertain to ill arriving travelers and new immigrants presenting for care at GeoSentinel Surveillance Network sites and may not apply to all ill international travelers. GeoSentinel is an epidemiologic surveillance system that is not designed to capture comprehensive and objective clinical and laboratory details. Latent tuberculosis was the most common diagnosis among ill immigrants but would not have accounted for their presenting symptoms; thus, in some cases, the final diagnosis may not reflect the chief symptom. Travelers who have illnesses with incubation periods that are short (such as influenza) or very long (such as hepatitis B virus) may be underrepresented because they sought care in alternate locations. Similarly, we are unable to provide data on incubation periods for the represented diagnoses because the date of symptom onset was only recently added to the GeoSentinel data collection instrument. In addition, calculation of incidence rates is impossible because the database lacks a denominator of all travelers from all countries to a specific region (40). Finally, because of the nature of many GeoSentinel sites, children are probably underrepresented in the database.

In summary, ill travelers from Sierra Leone, Liberia, or Guinea presenting at GeoSentinel surveillance sites are most frequently diagnosed with malaria, a clinical entity that requires prompt diagnosis and rapid initiation of treatment to limit morbidity and mortality and one whose diagnosis is almost necessarily delayed by the procedures and protocols in place for evaluating suspected EVD. Therefore, the differential diagnosis of illness in travelers arriving from countries with widespread Ebola virus transmission must include not only

EVD but also malaria and other more common infections, such as influenza, other respiratory tract infections, and travelers' diarrhea. The optimal strategy is preventing infections through comprehensive pretravel interventions and, for ill travelers, promptly diagnosing and treating illnesses, such as malaria, and initiating empirical treatment if bacteremia, influenza, or meningitis is suspected.

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Appendix: The GeoSentinel Surveillance Network

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EDITORS' NOTES

Context

When evaluating ill travelers arriving from West Africa, physicians must be aware of infections other than Ebola virus disease (EVD) that travelers are likely to have acquired there.

Contribution

In 57 travel clinics in 25 countries, malaria was diagnosed in 40% of nonimmigrant travelers arriving from West Africa and was usually serious. Diagnosis and therapy of malaria should not be delayed during evaluation for EVD.

Caution

Travelers seeking care in specialty travel clinics may not be representative of all ill returned travelers.

Implication

Early diagnosis and therapy for malaria is essential in ill travelers returning from West Africa. Co-infection with malaria and EVD has been reported.

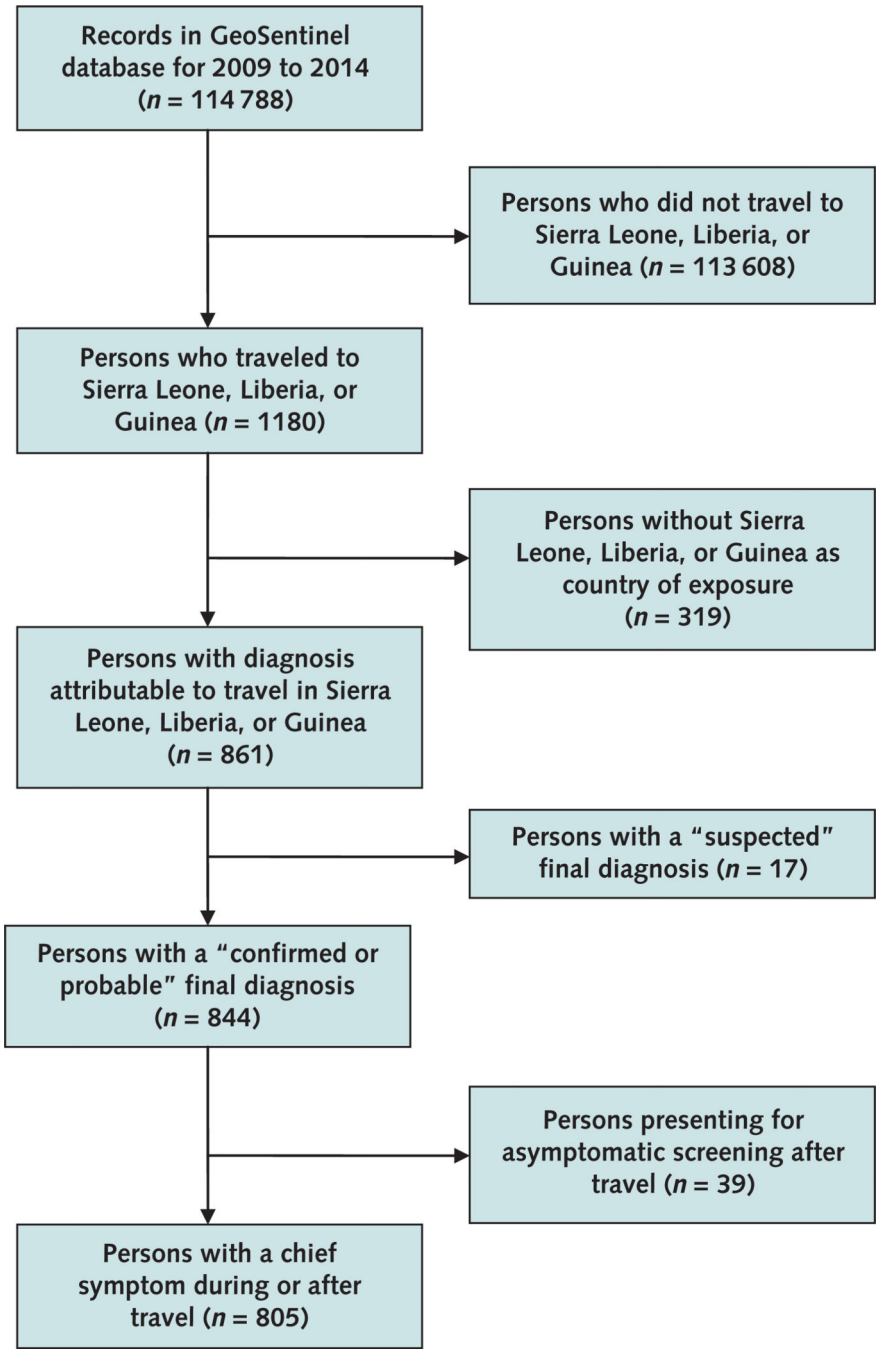

Figure. 1.
Study flow diagram.

Table 1

Demographic Characteristics of 805 Returned Travelers or New Immigrants Presenting at a GeoSentinel Surveillance Network Site for Care of an Illness Related to Travel to Sierra Leone, Liberia, or Guinea, 2009–2014*

Characteristic	All Travelers (*n*= 805)	Purpose of Travel					
		Visiting Friends and Relatives (*n*= 235)	Business (*n*= 220)	Missionary Volunteer Research, or Aid Work (*n*= 216)	Tourism (*n*= 83)	Immigration (*n*= 35)	Student (*n*= 16)
Sex†							
Male	503 (62.5)	153 (65.1)	181 (82.3)	91 (42.1)	49 (59.0)	12 (34.3)	6 (37.5)
Female	301 (37.4)	81 (34.5)	39 (17.7)	125 (57.9)	34 (41.0)	23 (65.7)	10 (62.5)
Median age (range)*y*	34 (1–95)	33 (1–88)	41 (4–72)	33 (7–67)	36 (1–95)	28 (4–61)	20.5 (13–27)
Patient type							
Inpatient	219 (27.2)	102 (43.4)	62 (28.2)	27 (12.5)	24 (28.9)	2 (5.7)	2 (12.5)
Outpatient	586 (72.8)	133 (56.6)	158 (71.8)	189 (87.5)	59 (71.1)	33 (94.3)	14 (87.5)
Median travel duration (range)*d*	36 (0–5111)	38 (7–4880)	33 (2–5111)	57 (2–3115)	22 (0–3712)	NA	40 (27–1320)
Pretravel medical encounter							
Yes	420 (52.2)	77 (32.8)	123 (55.9)	144 (66.7)	43 (51.8)	NA	12 (75.0)
No	221 (27.5)	110 (46.8)	51 (23.2)	26 (12.0)	24 (28.9)	NA	1 (6.3)
Unknown	164 (20.4)	48 (20.4)	46 (20.9)	46 (21.3)	16 (19.3)	NA	3 (18.7)
Syndromic diagnoses‡							
Systemic febrile illness	396 (49.2)	161 (68.5)	112 (50.9)	70 (32.4)	41 (49.4)	6 (17.1)	6 (37.5)
Acute diarrhea	158 (19.6)	20 (8.5)	50 (22.7)	56 (25.9)	17 (20.5)	8 (22.9)	7 (43.8)
Other gastrointestinal	94 (11.7)	29 (12.3)	13 (5.9)	15 (6.9)	3 (3.6)	31 (88.6)	3 (18.7)
Respiratory	54 (6.7)	15 (6.4)	9 (4.1)	20 (9.3)	7 (8.4)	3 (8.6)	0 (0)

Characteristic	All Travelers (*n*= 805)	Purpose of Travel					
		Visiting Friends and Relatives (*n*= 235)	Business (*n*= 220)	Missionary Volunteer Research, or Aid Work (*n*= 216)	Tourism (*n*= 83)	Immigration (*n*= 35)	Student (*n*= 16)
Birth country							
Guinea	117 (14.5)	102 (43.4)	5 (2.3)	1 (0.5)	3 (3.6)	6 (17.1)	0 (0)
Liberia	45 (5.6)	25 (10.6)	0 (0)	2 (0.9)	2 (2.4)	16 (45.7)	0 (0)
Sierra Leone	59 (7.3)	41 (17.4)	2 (0.9)	2 (0.9)	4 (4.8)	10 (28.6)	0 (0)
Other[§]	584 (72.5)	67 (28.5)	213 (96.8)	211 (97.7)	74 (89.2)	3 (8.6)	16 (100)

NA = not available.

[*] Values are numbers (percentages) unless otherwise indicated.

[†] Missing for 1 traveler visiting friends and relatives.

[‡] Travelers could have >1 diagnosis.

[§] Top 5 others were the United States (*n* = 97), the United Kingdom (*n* = 87), Germany (*n* = 62), Canada (*n* = 61), and France (*n* = 57).

Table 2

Five Most Common Syndromic and Etiologic Diagnoses, by Purpose of Travel, Among 805 Ill Returned Travelers Seen at a GeoSentinel Surveillance Network Site With Diagnoses Related to Travel to Sierra Leone, Liberia, or Guinea, 2009–2014*

Rank	Nonimmigrant Travelers						Immigrants With Travel-Related Diagnoses (*n*= 35)
	All (*n*= 770)	Visiting Friends and Relatives (*n*= 235)	Business (*n*= 220)	Missionary Volunteer Research, or Aid Work(*n*= 216)	Tourism (*n*= 83)	Student (*n*= 16)	
1	Malaria: 310 (40.3) (*P. falciparum* or severe: 267 [34.7])	Malaria: 138 (58.7) (*P. falciparum* or severe: 126 [53.6])	Malaria: 87 (39.5) (*P. falciparum* or severe: 69 [31.4])	Malaria: 50 (23.1) (*P. falciparum* or severe: 39 [18.1])	Malaria: 30 (36.1) (*P. falciparum* or severe: 28 [33.7])	Malaria: 5 (31.3) (*P. falciparum* or severe: 5 [31.3])	LTBI: 15 (42.9)
2	Acute diarrhea: 95 (12.3)†	Acute diarrhea: 13 (5.5)†	Acute diarrhea: 34 (15.5)†	Acute diarrhea: 32 (14.8)†	Acute diarrhea: 12 (14.5)†	Acute diarrhea: 4 (25.0)†	Dental caries: 11 (31.4)
3	URTI/ILI: 32 (4.2)	Unspecified febrile illness lasting <3 wk: 9 (3.8)	Viral syndrome: 9 (4.1)	URTI/ILI: 13 (6.0)	Viral syndrome: 6 (7.2)	Superficial fungal infection: 3 (18.8)	Schistosomiasis: 11 (31.4)
4	Viral syndrome: 29 (3.8)	URTI/ILI: 8 (3.4)	Unspecified febrile illness lasting <3 wk: 6 (2.7)	PI-IBS: 11 (5.1)	URTI/ILI: 5 (6.0)	PI-IBS: 2 (12.5)	Strongyloidiasis: 6 (17.1)
5	Unspecified febrile illness lasting <3 wk: 24 (3.1)	Viral syndrome: 8 (3.4)	URTI/ILI: 6 (2.7)	Giardiasis: 8 (3.7)	PI-IBS: 4 (4.8)	Giardiasis: 2 (12.5)	Giardiasis: 5 (14.3)

ILI = influenza-like illness; LTBI = latent tuberculosis infection; *P. falciparum* = *Plasmodium falciparum*; PI-IBS = postinfectious irritable bowel syndrome; URTI = upper respiratory tract infection.

*Values are numbers (percentages). Travelers could have >1 diagnosis.

†Includes acute bacterial, parasitic, and viral diarrhea and acute diarrhea of unspecified cause.

Table 3

Most Common Diagnoses for Specific Causes Within Syndromic Presenting Symptoms Among 805 Ill Returned Travelers Seen at a GeoSentinel Surveillance Network Site With Diagnoses Related to Travel to Sierra Leone, Liberia, or Guinea, 2009–2014

Diagnosis, by Presenting Symptom	Patients *n* (%)*	Total Patients With Diagnosis in Database *n*
Fever(*n* = 267)		
Malaria	182 (58.0)	314
Plasmodium falciparum	142 (58.4)	243
Severe/cerebral	18 (64.3)	28
Plasmodium vivax	2 (100)	2
Plasmodium species unknown	9 (50.0)	18
Plasmodium ovale	8 (50.0)	16
Plasmodium malariae	3 (42.9)	7
Nonspecific viral syndrome	12 (41.4)	29
Systemic febrile illness, unspecified	15 (57.7)	26
URTI	6 (23.1)	26
Acute UTI	3 (33.3)	9
Enteric fever	6 (75.0)	8
Salmonella enterica serotype Typhi	1 (50.0)	2
Typhoid fever, unspecified	5 (83.3)	6
Influenza/ILI	4 (57.1)	7
Pneumonia	4 (57.1)	7
Lobar	3 (50.0)	6
Atypical	1 (100)	1
Acute HIV infection, febrile	4 (80.0)	5
Active tuberculosis	1 (33.3)	3
Pulmonary	0 (0)	2
Extrapulmonary	1 (100)	1
Dengue	2 (100)	2
Leptospirosis	1 (50.0)	2
Gastrointestinal (*n* = 186)		
Acute diarrhea†	54 (56.8)	95
Giardiasis	11 (45.8)	24
PI-IBS	17 (77.3)	22
Chronic diarrhea	8 (53.3)	15
Campylobacteriosis	5 (83.3)	6
Shigellosis	3 (100)	3
Dientamoebiasis	2 (66.7)	3

Diagnosis, by Presenting Symptom	Patients *n* (%)*	Total Patients With Diagnosis in Database *n*
Amoebiasis due to *Entamoeba histolytica*‡	2 (66.7)	3
Salmonellosis, nontyphoidal	0 (0)	1

ILI = influenza-like illness; PI-IBS = postinfectious irritable bowel syndrome; URTI = upper respiratory tract infection; UTI = urinary tract infection.

*Percentages were calculated using the total number of patients in the database as the denominator. Travelers could present with >1 symptom.

†Includes acute bacterial, parasitic, and viral diarrhea and acute diarrhea of unspecified cause.

‡Includes intestinal and extraintestinal amoebiasis.