429. Delayed Diagnosis of Leprosy in a Non-Endemic Area: Lessons From a Retrospective Case Series

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Background. While the epidemiology of Hansen’s Disease (leprosy) in endemic countries has been thoroughly investigated, similar studies in the United States are lacking, where fewer than 200 cases are diagnosed each year. We sought to assess the epidemiologic and clinical characteristics of leprosy cases seen at three large Boston teaching hospitals.

Methods. We conducted a retrospective analysis of all patients age ≥18 diagnosed with leprosy as defined by ICD codes at three academic medical centers from 1980 to 2017. Each record was independently reviewed for accuracy of the clinical and laboratory findings for each patient. Demographic, clinical, and laboratory data were extracted and analyzed.

Results. In total, 116 records were reviewed; 27 cases of leprosy were identified. Mean age at presentation was 40 years (range, 19–62); 66% of patients were male. Forty-eight percent of patients were Hispanic, 22.2% were Asian, and 18.5% were African. Most patients were immigrants (88.9%), originating from South America (33.3%), the Caribbean (18.5%), Sub-Saharan Africa (18.5%), and South Asia (14.8%). Both cutaneous and neurologic involvement was commonly observed (59.2%). Diagnosis was made by skin or nerve biopsy in 67.7% of cases. A prior diagnosis of leprosy was present in 51.9%. Interestingly, for cases of newly diagnosed leprosy, 25.9% of diagnoses were made by dermatologists, 11.1% by neurologists, and 3.7% by infectious diseases physicians. Fifty-six percent of patients had been incorrectly diagnosed by other healthcare providers prior to their leprosy diagnosis, and the median time from symptoms onset to diagnosis was 22 months.

Conclusion. Though not endemic to the United States, leprosy remains a clinical problem, particularly in immigrant populations. We observed that a sizeable proportion of leprosy cases were initially misdiagnosed by physicians, frequently resulting in month-long delays in diagnosis. Clinicians should have a high index of suspicion for leprosy in immigrants from endemic countries with cutaneous lesions and neurophyopathy, and opportunities for enhanced clinician awareness, targeted education, and multidisciplinary management exist.

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430. The First Reports of Leprosy and Melioidosis in the Aftermath of Hurricanes Irma and Maria—Saint Thomas/Saint John District, US Virgin Islands, September–October 2017

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Background. Following Hurricanes Irma and Maria, the first cases of leprosy and melioidosis were identified in the US Virgin Islands (USVI). Leprosy and melioidosis are potentially fatal bacterial diseases caused by Leptospira species and Burkholderia pseudomallei, respectively; both are found in contaminated water/soil and outbreaks have been documented following extreme weather events.

Methods. Querying the USVI arbovirus syndrome surveillance system and Emergency Department (ED) records from two hospitals, we identified patients in the 2.5 months post-hurricanes demonstrating symptoms consistent with leptospiro-sis/melioidosis. Available patient blood samples underwent rapid diagnostic testing (RDT) for anti-Leptospira IgM and were sent to the US Centers for Disease Control Prevention for confirmatory microscopic agglutination testing (MAT). A subset were tested with a B. pseudomallei antigen RDT, and water collected from sites of potential Leptospirosis-contamination were tested by PCR.

Results. An initial query of the syndromic surveillance database yielded 17 patients warranting testing; 15 available patient samples were tested for leptospirosis and were negative (2 tested for melioidosis—negative). Following efforts to enhance this system to prospectively detect leptospirosis/melioidosis, 15 additional patient samples were obtained and tested for leptospirosis; one tested positive. We reviewed 5,200 ED charts, identifying six patients warranting testing; five available patient samples were tested for leptospirosis; one tested positive (1 tested for melioidosis—negative). Altogether, as of April 2018, there are three leprosy cases and two melioidosis confirmed cases in USVI. One of three water samples collected from sites associated with patients with leprosy tested PCR-positive for Leptospira species.

Conclusion. This investigation documents the first cases of leptospirosis and melioidosis in USVI and demonstrates how USVI’s surveillance system was adapted to establish ongoing leptospirosis/melioidosis surveillance. Collectively, although not confirmed by detection of B. pseudomallei in the environment, both leptospirosis and melioidosis may be endemic in the USVI.

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431. Enhanced Malaria Surveillance in Greece, 2009–2017

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Background. During 2009–2012, sporadic locally acquired (LA) P. vivax malaria cases and clusters were reported in Greece, a malaria-free country. Evrotas, an agricultural area in southern Greece with large migrant population from the Indian sub-continent, was the most affected area. In 2011–2017, we implemented enhanced malaria surveillance to timely detect and treat cases.

Methods. We applied the WHO case definitions for imported, LA, and introduced cases. We raised awareness among clinicians and investigated all reported cases. We actively screened for fever in the local population in the place of exposure of LA cases, and weekly, the migrant population in Evrotas, from April to November every year (active case detection, ACD). We distributed rapid diagnostic tests (RDTs) to enhance local diagnostic capacity. In 2015–2017, we established enhanced malaria surveillance in refugee/migrant hosting centers (RMHC).

Results. In 2009–2017, 662 malaria cases were reported (67% P. vivax); 561 were imported, including 442 (79%) in migrants from endemic countries and 119 in travelers. The median annual number of imported cases in migrants increased from 32 (range 12–64) in 2009–2014 to 85 (range 65–91) in 2015–2017. In 2015–2017, 23% (n = 55) of all cases in migrants were points of entry. RMHC and 20 LA P. vivax cases were reported in Greece, including 36 and 10 cases in Evrotas, respectively, while in 2013–2017, the annual median number of LA P. vivax cases decreased to 6 (range 0–8); all were introduced cases. RDTs contributed to the diagnosis in almost 100% of cases in Evrotas. In 2015–2017, 96% of cases in RMHC or points of entry. In Evrotas, during ACD, time from disease onset to diagnosis decreased from 6 days in 2011 to 0.5 days in 2017.

Conclusion. Following the 2011–2012 peak of LA cases and the implementation of PH measures, the number of LA cases decreased substantially, despite the increased migrant influx. However, the presence of local competent vectors, combined with cases from malaria-endemic countries, heightens the risk of re-introducing malaria in receptive malaria-free areas. Although resource demanding, enhanced malaria surveillance contributed to minimizing the transmission risk and should be continued.

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432. Hold That Buzz: Timely Malaria Medication Access in New Orleans, Louisiana

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Background. Malaria is a global health concern. Given increasing global travel and migration, hospitals may struggle to meet immediate malaria treatment needs resulting in serious and potentially fatal outcomes. New Orleans is a mid-size city with a significant, large immigrant population, large tourism industry, major academic centers with international faculty and many international industries with a diversity of medical systems. Assessing malaria medication accessibility across various clinical settings would address major gaps in treatment capacity and efficacy.

Methods. Inpatient pharmacy directors and formularies at three New Orleans-area hospitals (an academic medical center, a large safety-net hospital and a community hospital) were queried about their first-line antimalarial agents in stock within the hospital pharmacy, time needed to obtain both IV and PO first-line antimalarial agents, and barriers to expanding the formulary (including cost, number of cases, side effects, and shelf life of medications). The queries were carried out using a medications order system survey.

Results. First-line IV medications could not be provided in <24 hours at any of hospitals surveyed; however, all provided a form of first-line antimalarial coverage from 24–48 hours. Two of three hospitals provided oral artemisinin-based combination therapies (ACTs) on their hospital formulary available in <24 hours and all three provided ACTs on their outpatient formularies. All hospitals surveyed could obtain intravenous ACTs from the CDC within 24–48 hours. Barriers identified for availability of oral ACTs and other antimalarials included the number of cases seen reported by all three hospitals1 and cost of medication (reported by one hospital).

Conclusion. Oral first-line malaria treatments including ACTs could be obtained in the surveyed hospitals within 24–48 hours and all hospitals could obtain IV ACTs from the CDC within 24–48 hours. The main barrier preventing hospitals from providing ACTs included other anti-malaria medications was infrequency of malaria cases; cost was a secondary concern. This information can be used in attempts to educate hospital systems about appropriate and timely malaria treatment, inform policy and procedures, and design systems to track malaria diagnosis and treatment.

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433. Impact of Malaria Prophylaxis on Risk of Travelers’ Diarrhea Among International Travelers
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Background. International travelers are often at risk for travelers’ diarrhea (TD) and malaria. Doxycycline has activity against pathogens causing TD but hasn’t been used as TD prophylaxis since the 1980s when resistance emerged. We evaluated the incidence of and risk factors for TD, and whether the choice of malaria prophylaxis was associated with risk of TD.

Methods. TravMIL is a prospective observational study enrolling subjects presenting to six military travel clinics. We analyzed pre- and post- travel surveys from travelers to regions outside of the continental United States, Western or Northern Europe, Canada or New Zealand between July 2010 and August 2018. TD was defined as ≥3 loose stools in a 24 hour period or two liquid or loose stools in a 24 hour period and 21 of the following: nausea, vomiting, abdominal pain, fever, or bloody stool. Characteristics of trip and traveler, and use of malaria prophylaxis (doxycycline, other, and none) were analyzed to determine risk factors for TD. A Poisson regression model with robust error correction was used to estimate relative risk of TD.

Results. A total of 3,227 travelers enrolled: 62.1% male, median age of 39 (IQR 27-59), median travel duration 19 days (IQR 12, 49). 32% traveled to Africa, 40% to Asia, and 27% to the Caribbean, Mexico, Central, or South America. Military travel (46%) and vacation (40%) were most common reasons for travel. 29% took doxycycline for malaria prophylaxis, 50% other prophylaxis (89% atovaquone-proguanil), and 30% took none. Compared with those on no or other prophylaxis, doxycycline was associated with decreased risk for TD (RR 0.62 [0.47-0.82], P < 0.01), as was military travel (RR 0.57 [0.47-0.70], P < 0.01). Increased risk of TD was associated with female gender (RR 1.28 [1.09-1.50], P < 0.01), staying in a hotel (RR 1.30 [1.10-1.53], P < 0.01), travel to tropical South America (RR 1.34 [1.09-1.64], P < 0.01), and duration of travel (RR 1.00 [1.00-1.01], P > 0.01).

Conclusion. Compared with taking other or no prophylaxis, use of doxycycline for malaria prophylaxis is associated with lower TD risk, suggesting potential changes in resistance patterns, anti-inflammatory effects, or association with other unmeasured risk factors. Doxycycline may impact TD risk independently of other risk factors.

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434. Neurocysticercosis in Houston
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Background. Neurocysticercosis (NCC) is a central nervous system infection that occurs by ingesting the larval form of the parasite, Taenia solium. It is the most common parasitic disease of the central nervous system in developing countries, and the most common cause of acquired epilepsy. Even though seizures are the most common presenting symptom, NCC can present with many manifestations.

Methods. This is a retrospective chart-review cohort study. Patients referred to the Neurology Clinic at Smith Clinic in Houston from January 2013 to December 2015 for a diagnosis of headache and/or seizure were evaluated. The prevalence of NCC was determined, as well as epidemiological characteristics for those referred to the clinic for a diagnosis of headache and/or seizure. All NCC patients were Hispanic/Latino, and the overall prevalence of NCC among those with a headache and/or seizure diagnosis was 0.92%. The prevalence among those with headaches was 0.25% and those with seizures was 1.37%. Based on ArcMap software and the zip codes of those diagnosed with NCC, most cases appear in the south-central area of the city.

Conclusion. NCC has now spread to the developed world mainly due to increased migration, although sporadic cases of local transmission have also been documented. Our data could help develop a preliminary but current epidemiological profile of NCC in Houston and determine if there are areas of high prevalence within certain communities.

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435. Serological Cross-Reactivity Between Rickettsia japonica and Orientia tsutsugamushi, and Among Orientia tsutsugamushi Serotypes
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Background. The rickettsial diseases Japanese spotted fever (JSF) and scrub typhus (ST) are caused by Rickettsia japonica and Orientia tsutsugamushi, respectively. The diseases share clinical symptoms, such as fever, rash, and eschar. However, there are no systematical investigations of the serological cross-reactivity between R. japonica and O. tsutsugamushi. Also, it has still been unclear the serological cross-reactivity among O. tsutsugamushi serotypes.

Methods. We analyzed 1,406 cases tested by indirect immunoperoxidase assay (IP) using seven rickettsial antigens—one R. japonica and six O. tsutsugamushi serotypes (Kato, Karp, Gilliam, Irie/Kawasaki, Hirano/Kuroki, and Shimokoshi)—between 2003 and 2016 at two reference centers in Japan. Patient sera were 2-fold diluted from 1:40 to 1:40,960, and the titer was expressed as the reciprocal values. We defined the serology diagnosis as positive when a 24-fold increase in the IP IgM/IgG titer against O. tsutsugamushi or R. japonica was observed in the paired samples or if the IP IgM titer was ≥230.

Results. Of the 1,406 cases, 154 JSF and 138 ST cases were diagnosed by paired samples, and 13 JSF and 52 ST cases were diagnosed by a single sample. Figure 1a shows the serology results of 154 JSF cases—6 cases showed an IgG titer ≥240 against O. tsutsugamushi without any significant elevation and four cases showed a non-significant IgM elevation of <320, which had none/few cross-reactions with other O. tsutsugamushi serotypes. Figure 1b shows the serology results of 138 ST cases, none showing any rise in the IgM/IgG titer against R. japonica or O. tsutsugamushi. Also, it has still been unclear the serological cross-reactivity among O. tsutsugamushi serotypes.

Conclusion. There is no serological cross-reaction or no recall reaction between R. japonica and O. tsutsugamushi. The cross-reactivity among O. tsutsugamushi vary.

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Figure 1a. Diagnosed as Japanese spotted fever by paired samples (N=154)

Figure 1b. Diagnosed as scrub typhus by paired samples (N=138)