

**2010 Haiti Earthquake
Pre-Decision Brief**

LEPTOSPIROSIS

Key Recommendations

- **Diagnostic capacity and surveillance:**
 - Conduct outreach to encourage health care providers to consider leptospirosis in the differential diagnosis of acute febrile illnesses and to undertake laboratory investigation for leptospirosis and other potential causes.
 - Increase availability of rapid diagnostic test (RDT) kits for initial diagnosis and access to laboratory facilities with capacity to perform those tests. A negative test may not exclude the diagnosis, and therefore repeat testing of highly suspect cases should be considered.
 - Sustain surveillance for acute febrile illness in healthcare facilities, monitor reports, and ensure that control measures are implemented in an affected area.

- **Prevention**
 - Inform residents to **minimize contact with surface water** such as lakes and streams that may be potentially contaminated with urine from animals.
 - **Move camps out of standing water** where necessary.
 - If working in potentially contaminated waters, use **personal protective equipment (PPE)**, such as clothing, boots, shoes, and gloves.
 - **Establish rodent control program and dispose of garbage appropriately.**
 - Have water available that is free of environmental contamination with animal urine.
 - In the event of a large outbreak, the Haitian Ministry of Health could consider a mass prophylaxis of doxycycline administered weekly for at-risk populations.

1. What was the situation in Haiti prior to the earthquake?

Leptospirosis is known to be endemic throughout the Caribbean Basin and Central America and is a reportable condition in Haiti. Factors associated with leptospirosis endemicity include tropical climate, stagnant waters, poor levels of sanitation, flooding, and proximity of potential mammalian reservoirs to human populations. The Haitian System of Sanitary Information reported between 6,500 and 11,000 cases of Icteric Febrile Syndrome (Syndrome Ictérique Febrile, or SIF) annually between 2005 and 2008. More than 12,700 cases of SIF were reported between January and June 2009. A Haitian study from the early 1960's reported that 30% of identified icteric infections were leptospirosis (Laroche 1965).

Since a large proportion of patients with leptospirosis are never tested or reported, surveillance in Haiti tends to underestimate disease prevalence. A previous report on a serological survey of leptospirosis based on agglutination testing against live antigen (cutoff titer of 1:100) indicated that 64.9% transitional Haitian immigrants in Cuba had antibodies to leptospirosis (Pupo et al, 1983). Information on outbreaks in Haiti has not been published. There were no detected outbreaks following the hurricanes in 2005 or 2008.

Leptospirosis infection occurs through contact of mucous membranes and skin with urine or tissues from infected animals or fresh water contaminated with urine from infected animals. Person-to-person transmission of leptospirosis is extremely rare. The highest number of cases occurs during the rainy season and is often associated with flooding; outbreaks have also been noted to occur after hurricanes in the Caribbean. Because leptospirosis has non-specific symptoms, can be fatal, and outcome may be improved with prompt therapy, it is important to include leptospirosis in the differential diagnosis of acute febrile illnesses.

2. What is the likelihood of cases/outbreaks of this disease developing in the near future?

- Leptospirosis cases have occurred since the 2010 Haiti earthquake and more cases are likely to occur given the increased presence of risk factors which may predispose the population to an outbreak. The oncoming rainy season and potentially severe weather events capable of causing flooding have the potential to result in additional cases and possibly large outbreaks, as has occurred following severe flooding in Puerto Rico (Sanders, 1996), Hawaii (Gaynor et al., 2007) and Laos (Kawaguchi et al, 2008), and after an earthquake in Japan (Aoki et al, 2001).
- There are a few reports of leptospirosis with other co-morbidities, such as HIV infection or viral hepatitis, but no generalizations can be made due to the paucity of data.

3. Should an outbreak occur, how would this be detected?

- The Health Cluster has established sentinel site surveillance for clinical signs of leptospirosis throughout Haiti, with additional coverage for Port-au-Prince. An outbreak would be suggested by an increase in the number of cases of acute febrile illness with severe headache, myalgia, rash, and/or conjunctival suffusion; the illness is sometimes biphasic with a potentially complicated second phase characterized by jaundice, renal dysfunction, pulmonary dysfunction, and/or hemorrhagic manifestations. Sometimes the latter severe disease manifestations may occur early during the disease course. Differential diagnoses are broad and include malaria, dengue fever, typhoid fever, typhus, meningococcal disease, viral hepatitis, and influenza.
- For initial diagnosis using RDTs, the Rapid Dot ELISA (GenBio) test may be conducted at local health facilities. The assay detects IgM antibody response in acutely ill patients 4-7 days after symptom onset. It is relatively simple to perform, and health professional or clinical laboratory technical staff should be able to conduct this testing. However, the assay does require heating to 50°C and therefore a heating block or water bath and electrical power supply for the laboratory are necessary. A single positive result supports classifying suspected cases of leptospirosis as probable and would be considered adequate to initiate treatment and public health investigations to identify additional cases. If supplies of these kits are limited, treatment may be initiated based on clinical presentation. A subset of positive ELISA samples may be confirmed by the micro-agglutination test (MAT) at a reference laboratory.
- Definitive laboratory confirmation of leptospirosis by either culture and isolation of *Leptospira* spp. from clinical specimens, or the detection of a four-fold change in titer on paired serum samples by the micro-agglutination test (MAT) requires diagnostic laboratory support beyond the current capacity in Haiti. Confirmatory testing would need to take place at reference laboratories, such as CDC in Atlanta or the Caribbean Epidemiology Center (CAREC) of the Pan American Health Organization/World Health Organization.
- Supplies of RDT Rapid Dot Elisa IgM kits for initial laboratory testing should be maintained in Haiti to allow for rapid detection of cases and outbreaks.

4. What options for public health action should be considered in the event of an outbreak?

- Treatment options for patients with signs/symptoms of leptospirosis include oral doxycycline, ampicillin, and amoxicillin for mild cases; moderate or severe cases will require intravenous antimicrobial therapy with penicillin, ceftriaxone, or ampicillin (Red Book, CCHM). For moderately or severely ill patients with compatible illness, early antibiotic treatment should be strongly considered regardless of testing availability or results.
- Measures to control an outbreak of leptospirosis include enhanced surveillance for acute febrile illness to detect cases early, and targeted mass prophylaxis in areas with high numbers of cases. Mass prophylaxis should consist of a single dose of 200 mg of doxycycline to all persons over 8 years old, excluding pregnant women, administered once a week while in a high-risk environment. This prophylaxis regimen was demonstrated to have 95% preventive efficacy against infection when tested in a population from non-endemic areas entering a hazard area for leptospirosis (Takafuji, 1984), and was found to have a significant protective effect against clinical illness when studied in a population in an endemic area (Sehgal, 2000). Duration of prophylaxis should be decided by local health authorities, in consultation with technical experts. No prophylaxis recommendations have been developed for pregnant women and children <8 years of age; we advise monitoring and early treatment with penicillin for those with compatible illness if there is evidence of leptospirosis.
- Personal Protective Equipment (PPE), including boots and gloves, should be worn and actions taken to avoid exposure to surface water sources that could be contaminated with animal urine, such as lakes, streams, and water in agricultural settings. Local Non-Government Organizations may be utilized to distribute PPE.
- Public health campaigns should be conducted to educate the public on routes of transmission, clinical signs and symptoms of infection, methods for control and prevention of disease, and the appropriate use of PPE.
- Having access to chlorinated water serves as the most effective control measure to date for waterborne bacterial disease in Haiti by reducing exposure related to collection from unsafe water sources. Point-of-use water treatment and safe water storage have been used successfully in Haiti for over 15 years to reduce the incidence of waterborne bacterial disease. However, this approach has not been widely implemented, nor is it currently being implemented in settlements for internally displaced persons.
- Exclusion of rodents and other small mammals from domiciles will decrease the risk of contact with infected urine. Improved sanitation and hygiene will reduce the risk of leptospirosis as well as other foodborne and waterborne infections.

Additional measures, such as an assessment of potential animal reservoirs to determine the most likely source of an outbreak, may be undertaken if adequate laboratory capacity is available for culture isolation and MAT testing. Investigation of leptospirosis serovars or serotypes present in animal reservoirs and determination of their geographical distribution may be useful for development of long-term control and prevention programs. Vaccines are available for several animal species, including livestock and canines. Future considerations may include combining animal vaccination for leptospirosis with other vaccination campaigns, such as for rabies.

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