TYPHOID and PARATYPHOID FEVER

Pre-decision Brief for Public Health Action

Haiti ■ Feb 2010

Key Recommendations

- The most effective control measure to prevent cases and outbreaks of typhoid, paratyphoid, and other waterborne enteric illnesses is water chlorination. This can be best accomplished by centralized chlorination of water delivered by piped networks or tanker trucks. Where these are not available, point-of-use water treatment and safe water storage should be used.
- If possible, key prevention measures and surveillance should be strengthened prior to onset of the rainy season. This should include maximizing access to safe water supplies and improving personal hygiene practices in internally displaced person settlements. Water distributed via piped networks or tankers needs to be chlorinated effectively.
- An increase in the number of reported cases of acute febrile illness, followed by laboratory confirmation of *Salmonella* serovar Typhi (*S.* Typhi) or *S.* Paratyphi A or B, should trigger a public health response to ensure that control measures are being implemented in the affected area. Baseline data are not available, but typhoid is known to be endemic in Haiti. An initial epidemiological assessment should be performed to determine whether cases are clustered in space and/or time.
- A single-dose vaccine for typhoid is available, but the efficacy of vaccination as a primary outbreak control measure has not been documented. Before a vaccination campaign is undertaken, a group of experts should be convened to consider whether such a campaign is warranted. If a vaccination campaign is initiated, careful evaluation of impact should be planned from the outset.

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

- Typhoid fever is endemic in Haiti. During most years, United States surveillance identifies cases among travelers returning from Haiti.
- There are no reliable data on the incidence of typhoid or paratyphoid in Haiti.
- Although staff training has been provided post-earthquake, it is uncertain whether the range of tests required to diagnose typhoid was being conducted at the National Public Health Laboratory (LNSP) in the period before the earthquake.

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

- There have been anecdotal reports of past outbreaks in Haiti, but detailed information has not been published. There were no recognized typhoid fever outbreaks following the hurricanes in 2005 and 2008.
- There has been a single instance of a typhoid outbreak identified following a natural disaster. This outbreak followed a cyclone in Mauritius in 1980. Municipal water supplies were contaminated following a water mains rupture.[1]
- Outbreaks have occurred when water used for drinking and/or preparing food was contaminated with sewerage containing *S.* Typhi. With one notable exception, infected food workers have caused only small outbreaks.
- *S.* Typhi and *S.* Paratyphi are almost always transmitted by ingestion of contaminated water or food vehicles. In contrast, direct person-to-person contact transmission of typhoid and paratyphoid, or transmission via fomites, is believed to be exceedingly uncommon.

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

- The Health Cluster has established sentinel site surveillance for clinical signs of typhoid/paratyphoid fever throughout Haiti, with additional coverage for Port-au-Prince.
- An outbreak of typhoid/paratyphoid fever would be suggested by an increase in the number of cases of acute febrile illness with abdominal pain, with or without intestinal perforation or neurological abnormalities.
- Laboratory confirmation of *S*. Typhi or *S*. Paratyphi as the etiologic agent will be essential to distinguish typhoid/paratyphoid from numerous other causes of acute febrile illness. A rapid diagnostic test (Tubex TF, IDL Biotech, Bromma, Sweden) can detect typhoid (but not paratyphoid) antibody in patient serum. In field trials, the Tubex TF kit had a sensitivity of 60–78% and a specificity of 58–89%.
- CDC has sent rapid diagnostic tests for *S*. Typhi and supplies for blood and stool culture and antimicrobial susceptibility testing of *S*. Typhi and *S*. Paratyphi isolates to the LNSP.

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

- The most effective control measure for waterborne bacterial disease in Haiti is water chlorination. Most of the affected population in Port-au-Prince receives water either through the piped water supply or from water tankers. Enhanced chlorination and improved monitoring of water supplies will be essential in response to an outbreak in these areas.
- Point-of-use water treatment and safe water storage have been used successfully in Haiti for more than 15 years to reduce the incidence of waterborne bacterial disease. In areas without piped or tanker-delivered water, point-of-use chlorination and safe water storage need to be implemented.
- Improved sanitation and hygiene will reduce the risk of foodborne and waterborne outbreaks of typhoid fever and of other enteric infections.
- There are two licensed typhoid vaccines: a single-dose parenteral vaccine (Typhim Vi, Sanofi Pasteur) and an oral four-dose live attenuated vaccine (Vivotif, Berna). There are no licensed paratyphoid vaccines.
- The success of mass vaccination programs in countries where typhoid is endemic has led to vaccination being considered for outbreak control. However, the evidence concerning effectiveness in outbreaks is limited:
  - A cluster randomized clinical trial in Kolkata, India, an endemic area, showed that typhoid Vi vaccine can be effective at reducing disease risk among vaccinated populations, with 80% effectiveness in children 2–4 years of age, 59% effectiveness in children 5–14 years of age, and 48% effectiveness in persons 15 years of age or older.[2]
  - A Chinese Vi typhoid vaccine was used in a school-based outbreak in China and showed 71% effectiveness for children vaccinated during the outbreak, which was comparable to the 73% effectiveness seen in children vaccinated in a school-based campaign conducted before the outbreak began. However, the use of the vaccine did not control the outbreak. [3]
  - An uncontrolled open use of a Vi typhoid vaccine in Russian troops in Tajikistan at the time of an epidemic of waterborne typhoid has been cited as evidence of successful control,4 but vaccination occurred at the same time that the city water system was re-chlorinated and cases dropped substantially in the non-vaccinated host population as well.[5]

- The single-dose parenteral vaccine is effective for individual use and would be the logical choice for use in an outbreak setting. It is licensed for use in adults and children at least 2 years of age. Immunity is engendered about two weeks after injection. However, this vaccine has not been used for outbreak control in a disaster setting, nor has its effectiveness as an outbreak control measure been established.
- Injection safety must be maintained if the parenteral Vi vaccine is used, to avoid inadvertent transmission of bloodborne viruses to other patients or vaccinators.

References

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