

SHORT REPORT

Low detection of *Vibrio cholerae* carriage in healthcare workers returning to 12 Latin American countries from Haiti

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SUMMARY

This investigation was undertaken to characterize the prevalence of intestinal *Vibrio cholerae* in healthcare workers (HCWs) returning from Haiti due to the ongoing cholera epidemic. Eight hundred and fifty asymptomatic HCWs of the Cuban Medical Brigade, who planned to leave Haiti, were studied by laboratory screening of stool culture for *V. cholerae*. A very low percentage (0.23%) of toxigenic *V. cholerae* serogroup O1, serotype Ogawa was found. To the best of our knowledge, this study represents the largest reported screening study for *V. cholerae* infection in asymptomatic HCWs returning from a cholera-affected country. Cholera transmission to health personnel highlights a possible risk of transmitting cholera during mobilization of the population for emergency response. Aid workers are encouraged to take precautions to reduce their risk for acquiring cholera and special care should be taken by consuming safe water and food and practising regular hand washing.

Key words: Public health emerging infections, surveillance, *Vibrio cholerae*.

Cholera is a waterborne and foodborne infectious disease caused by *Vibrio cholerae* serogroup O1 or O139 [1]. Transmission of cholera from person-to-person, including healthcare workers (HCWs) during epidemics, has rarely been documented [2].

On 21 October 2010, the Haitian Ministry of Public Health and Population (MSPP) reported a cholera epidemic caused by *V. cholerae* serogroup O1, biotype El Tor, and serotype Ogawa [3].

The Cuban Medical Brigade in Haiti (CMB-H) is one of the partners in the control of cholera [4] that were deployed as part of disaster relief efforts to

Haiti. During the first year of the epidemic, CMB-H health personnel from Cuba and several Latin American countries treated about 76000 Haitian patients infected with cholera [5, 6].

Upon confirmation of the cholera epidemic in Haiti, the Cuban Ministry of Public Health (MINSAP) recommended that all aid workers should take precautions and implement protective measures when working in Haiti [7]. In addition, surveillance of *V. cholerae* testing of intestinal carriage in HCWs returning to Cuba and other countries was implemented. In this study, we present the results of the 17 months of this laboratory surveillance.

The study was launched on 1 February 2011 and concluded on 30 June 2012. Nine-hundred and twenty-two members of the CMB-H, including medical doctors, nurses and other personnel, who planned

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to leave Haiti within a week were identified for the intervention.

They were asked to provide a fresh stool sample for screening of *V. cholerae* at 'La Renaissance' hospital laboratory in Port au Prince. In addition, all these HCWs were treated with a single dose of 300 mg doxycycline for 4–5 days after stool specimen was submitted [7].

The Institutional Review Board of CMB-H approved the study. All 922 participants were informed about the purpose, procedures, risks, and benefits of the study, and their written consent was provided.

All stool samples were inoculated into alkaline peptone water (pH 8.5) for 6–8 h at 37 °C and plated onto thiosulphate citrate bile salt sucrose (TCBS) Kobayashi agar (Biolife, Italy) and incubated at 37 °C overnight. Suspected colonies were identified as *V. cholerae* by standard biochemical tests and serotyping [8]. Toxigenic activity was detected by multiplex PCR using primers targeting the *ctxAB* and the *tcpA* genes [9]. For isolated toxigenic *V. cholerae*, a second stool sample was collected 1 week later. As positive control, two isolates of *V. cholerae* serogroup O1 serotype Ogawa, previously confirmed at the Haitian Laboratoire National de Santé Publique, were used.

Of 922 HCWs, a total of 850 (92.2%) were selected for stool screening of *V. cholerae*; 72 were excluded because they had received antibiotics for different reasons in the previous 3 weeks.

In the present study, toxigenic *V. cholerae* O1, serotype Ogawa was isolated in two (0.23%) faecal samples from 741 HCWs travelling to Cuba. *V. cholerae* carriage was not detected in any of the remaining 109 medical doctors who travelled to 11 other cholera non-affected countries: Argentina, Bolivia, Colombia, Chile, Ecuador, Mexico, Nicaragua, Panama, Peru, El Salvador and Uruguay. In order to ensure that the source of infection was completely eliminated in each asymptomatic carrier, another stool culture was performed after chemoprophylaxis was administered [10]. The second stool sample collected from both positive individuals was negative. Epidemiological interview with the identified carriers revealed that both had consumed good-quality drinking water (bottled) and food, as was the case for the rest of the CMB-H members [5].

Several international medical corps in Haiti: Médecine Sans Frontières, Médecins du Monde, International Medical Corps, World Vision, the CMB-H, among other partners, worked closely with MSPP

to provide healthcare to the cholera patients at different cholera treatment facilities [4, 11]. In addition, small mobile units of the CMB-H had been working in remote areas of Haiti under campaign conditions (in improvised locations such as small churches or rural schools) for a minimum period of 3 months. These HCWs were in close contact with the local population, and lived in an environment where circumstances were more suitable for the transmission of cholera, such as contaminated water supply and crowded living conditions following the 2010 earthquake [5, 6].

Nosocomial *V. cholerae* infection has been described in the international literature, generally attributable to consumption of contaminated food and water [12–14]. Person-to-person contact is a very unusual mode of cholera transmission in hospital outbreaks [10]. In the current study the source of infection detected in *V. cholerae* carriers could not be identified. We can not rule out person-to-person transmission or via contaminated food or beverages sold by street vendors, even when it was denied by both carriers.

In the present report, all persons tested were healthy, clinically asymptomatic and experienced in the management of cholera cases. Most individuals infected with *V. cholerae* biotype El Tor remained asymptomatic or experienced only mild diarrhoea [7, 15].

Recently, the United Nations independent panel of experts that investigated the origin of the cholera epidemic in Haiti recommended screening personnel from cholera-endemic areas for the presence of *V. cholerae* before their departure or giving them a prophylactic dose of antibiotics, or both, in order to prevent similar outbreaks in the future [16].

After the emergency response, medical, military or any other humanitarian personnel travelling from Haiti may become carriers of cholera. These carriers could spread the disease to other countries, especially in areas with poor access to safe water and sanitation [3], including many of the Latin American countries where our health personnel travelled [5, 17]. Furthermore, after the cholera outbreak in Hispaniola, the number of cholera cases imported into the USA increased in comparison with US cases imported during the period 2000–2010. Two of these cases occurred in medical volunteers who participated in direct patient care in Haiti [18].

In the current study, prompt diagnosis and treatment of *V. cholerae* carriers in health personnel

planning to travel from a cholera-affected country could help to control the import and secondary transmission of cholera in Cuba.

Cholera cases traceable to the Haitian epidemic have already been reported in other industrialized countries such as England, and Germany [19], and also in Venezuela [20]. However, no secondary transmission of cholera occurred in these countries because of correct public-health procedures and environmental management [18, 19].

In July 2012, MINSAP confirmed the first cholera outbreak in Cuba in more than a century. It occurred in the coastal city of Manzanillo, Province of Granma. A month later it was reported that this outbreak included 417 cases and three deaths [21].

International reports speculate that the cholera outbreak in Cuba could have come from Haiti, imported by members of the CMB-H [22, 23]. Our study suggests that it would appear to be unlikely that such health personnel were responsible for introducing cholera to Cuba from Haiti as very few of them were carriers.

Historically, chemoprophylaxis for *V. cholerae* infection has been controversial [24]. Neither CDC nor WHO recommend its use for cholera prevention because of the increased risk for developing antibiotic resistance [2, 25]. However, some evidence regarding the effectiveness of targeted chemoprophylaxis in household contacts for reducing the incidence of *V. cholerae* infection exists [26–28].

In Kuchel, Mexico, no *V. cholerae*-positive carriers were detected in 75 randomly selected asymptomatic individuals previously treated with a prophylactic dose of doxycycline by the Department of Health of the Yucatan state government [29]. Recently, Farmer *et al.* suggested launching a closely monitored study about the effectiveness of doxycycline and azithromycin as prophylactic drugs in populations vulnerable to cholera, such as family members, HCWs, and cell-mates of infected persons [30].

The decision to administer antibiotic prophylaxis to HCWs should be made after evaluating their living conditions and food and water supplies, especially if they live under the same or similar conditions as the local population [5, 31].

Although not demonstrated in the current study, we consider the use of chemoprophylaxis a possible option for protecting medical personnel working in high-risk settings, e.g. countries with poor hygiene and sanitation, which could sustain cholera transmission, as in Haiti. In addition, antibiotic prophylaxis was

recommended even though there was no *V. cholerae* carriage, because of the reported intermittent excretion of this organism by carriers [26, 32]. Further research examining the role of targeted chemoprophylaxis in prevention of cholera acquisition in healthcare personnel is necessary. Even so, universal hygiene precautions should be the rule and this is the most important factor in disease prevention [1, 7, 17].

The current investigation has some limitations: We did not collect stool samples from all health personnel travelling abroad. There was no description of some potential risk factors for cholera acquisition, such as the use of antacids or altered gastrointestinal anatomy. Furthermore, only one stool specimen for culture of *V. cholerae*, was obtained per person.

The present work represents the largest reported screening study in asymptomatic HCWs ($n=850$) for *V. cholerae* infection. Although cholera transmission to healthcare personnel of the CMB-H and other international medical corps in Haiti [18] is rare, this study, however, highlights a possible risk of transmitting cholera during an emergency response situation [16]. Screening to identify asymptomatic carriers among healthcare personnel returning from cholera-affected areas may help to develop a strategy for prevention of cholera transmission. Aid workers are encouraged to take precautions to reduce their risk for acquiring cholera and special care should be taken with drinking water, food and to hand washing hygiene [7].

DECLARATION OF INTEREST

None.

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