

Table. Percentage of 233 hospital staff correctly answering cholera knowledge assessment questions near the start of a cholera epidemic in the Dominican Republic, 2010

Topic	No. (%)
Importance of rehydration	207 (89)
Suspected cholera case definitions	206 (88)
Nutrition for cholera patients	198 (85)
Ideal type of intravenous fluid	189 (81)
Infection control measures	175 (75)
Environmental cleaning	168 (72)
Risk factors for disease	157 (67)
Handling cadavers	146 (63)
Quantity and timing of intravenous fluid	128 (55)
Uses of bleach solution	128 (55)
Treatment of mild dehydration	125 (54)
Identification of severe dehydration	122 (52)
Treatment of severe dehydration	108 (46)
Disinfection methods	100 (43)

staff who may provide direct care to patients, such as nurses, and other personnel who may share infection control responsibilities. Hospital staff should maintain ongoing communication with public health leadership.

**Consuelo Mendoza,  
Elissa Meites, Elizabeth Briere,  
Jacqueline Gernay,  
Oliver Morgan,  
and Nelson Rodriguez Monegro,  
for the Hospital Preparedness  
Working Group<sup>1</sup>**

Author affiliations: Ministerio de Salud Pública y Asistencia Social, Santo Domingo, Dominican Republic (C. Mendoza, N. Rodriguez Monegro); Centers for Disease Control and Prevention, Atlanta, Georgia, USA (E. Meites, E. Briere, O. Morgan); and Pan American Health Organization, Santo Domingo (J. Gernay)

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<sup>1</sup>Additional members of the Hospital Preparedness Working Group who contributed data: Ada Compres, Edelmira Espallat, Carolina Garcia, Lucas Gomez, Cesarina Hernandez, Rosa Sanchez, and Lilian de los Santos, Ministerio de Salud Pública y Asistencia Social, Santo Domingo, Dominican Republic; Javier Gabaldón and Alberto Romero, Pan American Health Organization/World Health Organization, Santo Domingo; and Robert Quick and Jennifer Verani, Centers for Disease Control and Prevention, Atlanta, GA, USA.

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Address for correspondence: Elissa Meites, Centers for Disease Control and Prevention, 1600 Clifton Rd NE, Mailstop E02, Atlanta, GA 30333, USA; email: [emeites@cdc.gov](mailto:emeites@cdc.gov)

## Understanding the Cholera Epidemic, Haiti

**To the Editor:** After the devastating outbreak of cholera in Haiti in mid-October 2010, several hypotheses have emerged regarding the origin of the outbreak. Some articles and media reports pointed to the United Nations peacekeepers from Nepal as the source. Piarroux et al. drew a similar conclusion from their epidemiologic study (*J*). Nepal did experience an outbreak of cholera during August–October 2010, in which 72 cases of infection with *Vibrio cholerae* O1, serotype Ogawa, were confirmed, mostly among young adult males. The cases peaked from mid-September to early October (Figure; online Appendix Figure, [wwwnc.cdc.gov/EID/article/17/11/11-0981-FA1.htm](http://wwwnc.cdc.gov/EID/article/17/11/11-0981-FA1.htm)), and no deaths occurred. Despite this similarity in timing, I believe several points need to be considered before a firm conclusion is reached.

Cholera strains isolated in Haiti were genetically most similar to strains detected in Bangladesh in 2002 and 2008; thus, cholera was most likely introduced into Haiti from southern

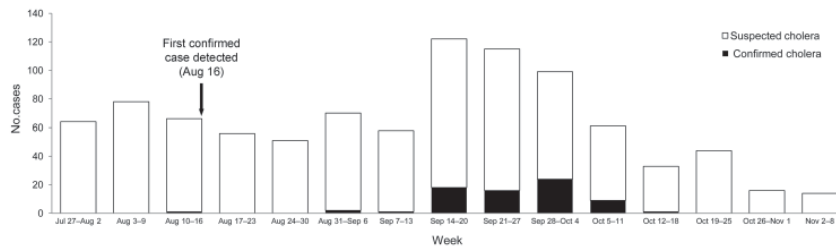


Figure. Patients with confirmed and suspected cases of cholera admitted to Sukraraj Tropical and Infectious Disease Hospital, by week, Katmandu, Nepal, July–November 2010. Case definitions: suspected cholera, acute watery diarrhea, with or without vomiting, in a child >5 years of age; confirmed cholera, isolation of *Vibrio cholerae* O1 or O139 from feces of any patient with diarrhea.

Asia (2). Despite the genetic similarity in the strains, no attempt was made by the researchers to ascertain and rule out the source of the outbreak in Bangladeshi policemen stationed at Mirebalais between September and October 2010. Another, although less likely, source for the introduction of cholera into Haiti could have been travelers or relief workers who may have recently been to southern Asia. Most relief workers probably come from countries without endemic cholera, but they cannot definitely be ruled out as a source of cholera in Haiti. For example, in industrialized countries, cholera has been detected among travelers, albeit in smaller numbers, returning home from cholera-endemic areas (3,4). However, Piarroux et al. offered no information about travelers or relief workers or whether they had been screened for *V. cholerae* infection before coming to Haiti (1). Of note, the United Nations reported that none of the Nepalese peacekeepers was found to be positive for the strain in Haiti (5); hence, other possible explanations for the origin of the outbreak simply cannot be overlooked.

#### Sher Bahadur Pun

Author affiliation: Sukraraj Tropical and Infectious Disease Hospital, Teku, Nepal

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Address for correspondence: Sher Bahadur Pun, Clinical Research Unit, Sukraraj Tropical and Infectious Disease Hospital, Teku, Kathmandu, Nepal; email: [drsherbdr@yahoo.com](mailto:drsherbdr@yahoo.com)



**In Response:** We read with great interest the letter by Pun, which suggests that Bangladeshi policemen in Mirebalais could have introduced cholera into Haiti (1). However, we want to emphasize that the first Haitian cholera case occurred in Meille, just next to the Nepalese military camp—not in Mirebalais or Hinche, where Bangladeshi policemen served. The location of the first case was stated in our article (2) and confirmed by the United Nations (UN) panel of experts on the cholera outbreak in Haiti (3). The UN panel also reported that major sanitation deficiencies likely resulted in contamination of a stream flowing within a few meters of the Nepalese camp. No other humanitarian forces were working in the small hamlet of Meille.

As acknowledged by Pun, Nepalese soldiers left for Haiti just when a cholera epidemic was raging in their country. According to the UN panel report, “a careful analysis of the MLVA [multilocus variable-number tandem-repeat analysis] results and the *ctxB* gene indicated that the strains isolated in Haiti and Nepal during 2009 were a perfect match.” Nepalese strains had been made available to the UN Panel from the International Vaccine Institute in Seoul, South Korea (3).

Referring to UN press conferences, Pun stated that “none of the Nepalese peacekeepers was found to be positive for the [*V. cholerae*] strain in Haiti.” However, it should be remembered that no testing of the soldiers was performed. Although the UN panel reported that “no cases of severe diarrhea and dehydration occurred among MINUSTAH [United Nations Stabilization Mission in Haiti] personnel during this period,” the panel provided no information concerning mild or moderate diarrhea.

Overall, evidence overwhelmingly supports the conclusion that the UN military camp in Meille was the source of the Haitian cholera

epidemic. The person who brought cholera into Haiti could not be identified because of the lack of an early, independent investigation in the camp.

**Renaud Piarroux,  
Robert Barrais, Benoît Faucher,  
Rachel Haus, Martine Piarroux,  
Jean Gaudart, Roc Magloire,  
and Didier Raoult**

Author affiliations: Université de la Méditerranée, Marseilles, France (R. Piarroux, B. Faucher, J. Gaudart, D. Raoult); Ministère de la Santé Publique et de la Population, Port-au-Prince, Haiti (R. Barrais, R. Magloire); Service de Santé des Armées, Paris, France (R. Haus); and Université de Franche-Comté, Besançon, France (M. Piarroux)

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Address for correspondence: Renaud Piarroux, Université de la Méditerranée, UMR MD3, Faculté de Médecine de la Timone, 27 Blvd Jean Moulin, Cedex 05, Marseille 13385, France; email: [renaud.piarroux@ap-hm.fr](mailto:renaud.piarroux@ap-hm.fr)

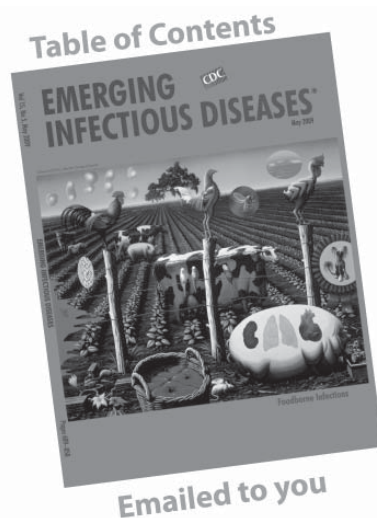
#### Correction

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In the article Reassortment of Ancient Neuraminidase and Recent Hemagglutinin in Pandemic (H1N1) 2009 Virus (P. Bhoumik, A.L. Hughes), errors were made in selection of the hemagglutinin (HA) and neuraminidase (NA) sequences for the initial and subsequent data sets. As a result, the authors incorrectly concluded that the NA gene of the pandemic (H1N1) 2009 virus is of a more ancient lineage than the HA. Other researchers (and the authors) have not been able to reproduce the findings when using HA and NA matched pairs from viruses chosen on the basis of geography and time and correctly have pointed out errors in the data set that make the original conclusions invalid.

Submitted by Priyasma Bhoumik and Austin L. Hughes; corresponding author: Austin L. Hughes, Department of Biological Sciences, University of South Carolina, Columbia, SC 29208; email: [austin@biol.sc.edu](mailto:austin@biol.sc.edu)

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