Special Report: Cholera

♦♦♦

Cholera in the Americas

A severe cholera epidemic is in progress in several countries of South America. Hardest hit is Peru, where the first cases were reported on 23 January 1991 in the town of Chancay, on the Pacific coast near Lima, and shortly thereafter in Chimbote, 400 km to the north of Chancay. In both places, an increase in the number of adults seeking medical care for acute diarrhea was noted, leading health authorities to suspect cholera. The causal agent was quickly isolated from patients' feces and was identified as *Vibrio cholerae,* serovariant 01, biotype El Tor, serotype Inaba. Its mode of introduction into Peru is still undetermined.

The epidemic spread quickly. Within days, cases were reported in the coastal cities of Piura and Lima, and the disease spread along 2,000 km of the heavily populated Peruvian coast in two weeks, reaching all of the coastal departments. The mountain and tropical forest regions were affected approximately 16 and 29 days, respectively, after the start of the epidemic. Despite preventive measures instituted by neighboring countries, the epidemic spread to Ecuador on 28 February, to Colombia on 8 March, to Chile on 16 April, and to Brazil on 22 April. The first cases were recognized in the United States on 24 April, in Mexico on 13 June, in Guatemala on 24 July, and in Bolivia and El Salvador in August.

In Ecuador, the outbreak began in Campamento La Puntilla, El Oro Province, which is located on the Pacific Coast a few kilometers from the Peruvian town of Túmbez. It is believed that the outbreak stemmed from a septic tank that overflowed at high tide and contaminated a nearby well, and that the *V. cholerae* was introduced by fishermen from Túmbez who had recently visited the area. The disease spread quickly to neighboring towns and thence northward to Guayaquil and beyond.

In Colombia the first case was identified near the city of Tumaco, Nario Province, also on the Pacific Coast and close to the border with Ecuador, but more than 800 km away from the epidemic area. Epidemiologic investigation has not determined its origin. In Chile the first area to be affected was the Santiago Metropolitan Region, 1,700 km to the south of the border with Peru.

As of 28 August, 285,913 cases had been reported to PAHO and had resulted in 3,070 deaths (Table 1). (In contrast, in 1990 only 69,361 cases were notified to WHO worldwide, almost all of them from Africa and Asia—*1.*) The low overall case fatality rate (around 1%) has been

Sources: Pan American Health Organization, "Cholera Situation in the Americas," "Historical Background of Cholera in the Americas," "Epidemiological Surveillance of Cholera," "Clinical Diagnosis and Treatment of Cholera," "Environmental Health, Prevention and Control of Cholera," *Epidemiol Bull* 12(1991), pp. 1–20; Pan American Health Organization, "Cholera in the Americas," document CE107/25 (Washington, D.C.: PAHO, 1991), pp. 3–7.

Table 1. Cumulative number of cholera cases and deaths, by country in the Americas, reported to PAHO through 28 August 1991.

Country	Cases	Deaths	Date of last report
Bolivia	4	0	27 August 1991
Brazil	45	1	20 August 1991
Chile	41	2	29 July 1991
Colombia	5,037	97	20 August 1991
Ecuador	34,123	551	3 August 1991
El Salvador	2	0	21 August 1991
Guatemala	1	0	24 July 1991
Mexico	399	3	6 August 1991
Peru	246,246	2,416	15 August 1991
United States of America	15	0	21 August 1991
Total	285,913	3,070	

attributed to the prompt actions of health authorities in informing the public of the extent of the epidemic, its causes, and precautions to take, as well as the response of the health services.

ANTECEDENTS

Cholera is an acute enteric bacterial infection produced by the ingestion of the causal agent, which is passed into the environment in the feces of infected persons. Major epidemics of the past have been identified as water-borne, but direct person-to-person contact and indirect transmission through foods contaminated with excreta via fingers or flies can also be sources of infection.

The disease has been recognized for centuries, but until the 1800s it was confined to Asia (2). Since that time, seven pandemics have occurred. Cholera first reached the Americas in 1832 during the second pandemic (1829–1850), and outbreaks occurred sporadically throughout the Region from then until 1895, as the third, fourth, and fifth pandemics expanded. The sixth pandemic (1899–1923) did not reach the Americas, and no more cholera cases were reported in this hemisphere until 1973, when a case of unknown origin occurred in Texas, U.S.A. Since that time, sporadic cases have been identified along the Gulf of Mexico coast of the United States, linked to the consumption of raw shellfish harvested from Gulf waters.

Based on genetic studies of the causal agent carried out by the U.S. Centers for Disease Control, the epidemic in the Americas is considered to represent part of the seventh pandemic, which began in 1961 when the disease broke out of an endemic area in the Celebes (Sulawesi), Indonesia (2).

The exact mechanisms of the very rapid spread of the current epidemic in the first few weeks remain open to speculation. However, several factors account for its intensity. Isolations of the cholera vibrio from municipal water supply systems indicate that these systems have been an important route of transmission in Peruvian coastal cities. Consumption of food and beverages sold in the streets under unhygienic conditions is also an important risk factor. In addition, irrigation of local melon fields with untreated wastewater may have led to contamination when the fruit was sliced. Sea water and seafood may also have played a part in the current epidemic, since the cholera

vibrio was isolated from water, mussels, and fish near municipal sewer outlets in Chancay and La Chira, Peru (*3*).

THE DISEASE AND ITS TREATMENT

Cholera produces profuse watery stools, vomiting, rapid dehydration, acidosis, and circulatory collapse. However, many cases are mild and cannot be distinguished clinically from other types of diarrhea; these cases are epidemiologically important because they allow the bacillus to continue circulating in the community. The vibrios are shed during the acute phase and for a few days after recovery.

The incubation period is usually two to three days. The course of the disease ranges from one to six days, and diarrhea can end spontaneously. Susceptibility and resistance are variable, but clinical cholera most often appears among the lowest socioeconomic groups. In endemic areas, most persons acquire antibodies by early adulthood.

The metabolic disorders associated with cholera are caused by the rapid loss of water and electrolytes. Without treatment, the case fatality rate of serious cholera can reach 50%. With adequate treatment, it is around 1%.

Most cholera patients can be adequately treated by the oral administration of a glucose-electrolyte solution. An oral rehydration salts (ORS) solution is recommended. Intravenous rehydration is normally only needed by severely dehydrated patients who are in shock, unconscious, or otherwise unable to drink. After signs of dehydration have disappeared, maintenance therapy with ORS is important in order to meet the normal daily fluid requirement until diarrhea and vomiting cease. Food should also be given when possible.

Many patients improve even without antibiotics if the electrolytes and water lost are adequately replaced, but antibiotic treatment can reduce the volume and duration of diarrhea and shorten the period during which cholera vibrios are excreted. Tetracycline is the antibiotic of choice. Doxycycline, a long-acting form of tetracycline, is preferred when available because it requires only one dose, but it is not recommended for children. For vibrio strains resistant to tetracycline, alternatives antibiotics are furazolidone or trimethoprim/sulfamethoxazole, and if these are unavailable, erythromycin or chloramphenicol (*4*).

PREVENTION

The spread of cholera can be combatted through a number of activities designed to promote the sanitary disposal of human waste, a safe water supply, and hygienic food preparation. Public education and epidemiologic surveillance of the course of the epidemic are integral to these efforts. Below are guidelines for interventions that should be put into action when cholera appears in a community. Some of the environmental health measures can be implemented immediately, while others are medium- and long-term measures that require greater investments of capital.

Sewage and Excreta Disposal

Although most of the urban population in Latin America is served by sewage collection systems, there are few sewage treatment facilities. Wastewater is usually discharged untreated into rivers and the ocean, resulting in extensive contamination from fecal matter and other elements. Construction of municipal sewage treatment facilities would protect people against not only cholera but other pathogens. Sewage stabilization ponds are more efficient at removing the cholera

vibrio than are conventional treatment plants.

For areas not served by sewerage, pit latrines are an alternative for safe disposal of excreta. Care should be taken that they are not dug where they will contaminate wells. In situations of extreme poverty where latrines are not immediately feasible, people should be educated to bury their own excreta.

Sewage from hospitals caring for cholera patients should be adequately treated before discharge to inactivate or kill the cholera vibrio. This can be accomplished be acidifying the contents of bedpans and toilets to a pH of less than 3.5 for five minutes, or by disinfecting with sufficient chlorine to obtain a residual of 5 mg/liter for five minutes. Sewage from ships and airplanes arriving from cholera-endemic areas should likewise be adequately treated.

Disinfection of the Water Supply

This measure is one of the most effective, feasible, and lowest cost interventions to prevent or curtail the spread of cholera. Fortunately, the cholera vibrios are very susceptible to chlorine. Exposure to 1.0 mg/l for 30 minutes will destroy or inactivate more than 99.9% of the bacteria. Where disinfection facilities already exist, they should increase the level of chlorine residual to a minimum of 0.5 mg/l in all parts of the system. In distribution systems without house connections (standpost type), the level of residual should be increased to 2.0 mg/l. This level will not only destroy *V. cholerae* in the distribution system, but will also help disinfect household containers and assure sanitation in food preparation. Chlorine levels throughout the system should be closely monitored and deficiencies quickly corrected.

Currently, the water supplied to many populations in Latin America is not disinfected. In the presence of a cholera threat, communities are advised to install disinfection facilities in their water systems and maintain the recommended levels of chlorine residual. The overall cost of disinfection is quite low—less than US$1.00 per capita per year.

Communities without water systems that are served by tank trucks are advised to disinfect water at the time the tank is filled and monitor the chlorine residual (ideally, about 3.0 mg/l) at the point of delivery.

If none of the above is feasible or appropriate to the type of water supply, household water should be boiled for two to three minutes or disinfected with chlorine or iodine tablets. Attention must also be given to disinfecting containers and utensils.

Food Safety

Food contaminated with polluted water can act as a vehicle for cholera transmission. It is important that food be cooked adequately, particularly seafood, which is commonly eaten raw or undercooked throughout Latin America. The risk of cholera transmission via food is discussed in a separate report (p. 274).

Personal Hygiene and Education

Motivation and education of the public are probably the most important components of a cholera control program. The importance of proper personal hygiene and sanitary food handling practices must be stressed (e.g., washing hands after defecation and before eating or handling food). People must also be alerted to the dangers of eating food of dubious hygiene (such as food from street vendors).

Public information systems and the

media should be used to maximum advantage. In this regard, educational videos can be very effective. They should be shown on television, at community meetings, and in schools and other forums. Radio and newspapers, as well as social organizations, should also be enlisted in the educational campaign.

Epidemiologic Surveillance

Tracing the source of suspected cases provides a solid basis for control efforts. An effective surveillance system for cholera and other enteric diseases should have four components: coordination at the local or central level to receive and analyze information, prepare plans, initiate and coordinate research, and issue periodic reports; daily reporting from each patient care facility; data collection from sources outside regular reporting channels (such as pharmacists, gravediggers, municipal officers, and others); and laboratory services, since laboratory confirmation is essential for surveillance and systematic culturing of excreta samples from sewerage is also helpful.

Community health workers must be trained to recognize probable cholera cases and immediately report them to the appropriate health authority. This entity should immediately arrange for bacteriologic and epidemiologic investigation. At this point, a report should be submitted to PAHO, in accordance with the International Health Regulations, so that PAHO in turn can disseminate the information to the Member States of WHO.

A brief surveillance report from the coordinating entity issued frequently in the form of a newsletter during a cholera outbreak will encourage the support and cooperation of the local physicians and health workers responsible for reporting cases.

Chemoprophylaxis and Vaccination

Mass treatment of a community with antibiotics has never succeeded in limiting the spread of cholera. It not only diverts attention and resources from effective measures but in several countries has contributed to the emergence of antibiotic resistance in the vibrio. However, selective prophylaxis of close contacts of cholera patients can be useful. Doxycycline is the drug of choice, since only one dose in needed.

The vaccines currently available are not sufficiently effective or long-lasting to help control cholera. Even more important, vaccination wastes scarce resources and produces a false sense of security, not only for those vaccinated but for health authorities. In view of these limitations, the Twenth-third World Health Assembly in 1973 abolished the requirement in the International Health Regulations for a certificate of vaccination against cholera. Most experts advise against vaccination for travelers. The prospects for a more effective vaccine are discussed in a separate report (p. 278).

Travel and Trade Restrictions

Such restrictions between countries or between different areas of the same country cannot prevent the spread of cholera. The import restrictions some countries quickly imposed after the current outbreak have had a dire impact on the production and export of Peruvian marine products. These restrictions are not in accordance with WHO recommendations (see the following report) and stand in contrast to the good will that many of those same countries have shown in providing aid and expertise to the stricken countries. Various sources place the cost to Peru of lost exports be-

tween $US10 million and $US40 million so far.

Structure for a Preventive Program

The formation of a national environmental health committee, with subcommittees at the local or provincial level and in each major city, is recommended. The committee should include high-level representatives from the Ministry of Health and from national diarrheal disease control committees as well as the national water and sewerage agencies, pollution control agencies, solid waste collection and disposal sector, and others as appropriate. The local and municipal subcommittees should have a similar structure and have adequate linkage with local or municipal governments as well as civic and religious organizations and other NGOs.

These committees and subcommittees should be charged with the following functions: evaluating environmental health conditions; identifying areas of greatest risk; determining coverage of each class of environmental health service; detecting deficiencies in water quality and service; defining and developing measures to be taken by key environmental health entities and the general public; and assessing material and human resource needs to confront this health threat, particularly with regard to informing, educating, and motivating the general public to take individual and household precautionary measures. Local health services play a very important role in controlling the epidemic through preventive activities, early case detection, and prompt treatment.

RESPONSE OF PAHO

When cholera cases were first detected, the PAHO/WHO Representative (PWR) Office in Peru and the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS), located in Lima, immediately began assisting Peru's efforts to confront the epidemic. At PAHO Headquarters, a Cholera Task Force was formed to coordinate the international response, identify human and financial resources to address the emergency, and provide essential information to Member Countries and other agencies. The Task Force, which meets several times each week, includes representatives from the PAHO programs concerned with diarrheal diseases, laboratory support, emergency preparedness and disaster relief, environmental sanitation, information, communicable diseases, food safety, research, and epidemiology. The focal point is the Health Situation and Trend Assessment Program.

One of the first concerns of the Organization was to ensure that Peru had the means to provide the necessary medical attention for cholera cases. Shipments of additional oral rehydration salts, intravenous fluids, antibiotics, and other essential medical supplies were arranged, and external resources were sought. PAHO has processed over US$2 million in external assistance to Peru, of which about half has gone for medical supplies and ORS. The remaining funds have been used for environmental sanitation activities, health education, laboratory support, and related interventions. Of the total received, US$1 million came from the Inter-American Development Bank.

Another immediate concern was the economic impact of the restrictions initially placed on the importation of Peruvian products by some governments. A special effort was made to provide information about the low level of risk, and PAHO has continued to advise against restrictions on imported products.

It should be mentioned that consider-

able assistance, both in material and personnel, has been provided to Peru by other Member Countries. The PWR Office has actively coordinated much of the bilateral assistance to Peru.

In the other Latin American countries affected by cholera, the response of the PAHO/WHO Offices has been as prompt and comprehensive as in Peru. PAHO epidemiologists and other staff have been involved in field investigations and have helped the governments to institute control measures. Headquarters-based staff have provided technical assistance in many areas, including case management, environmental sanitation, and food safety.

The strengthening of national capacities in rapid resource mobilization, intercountry and intersectoral cooperation, emergency logistics, and communication have been promoted by PAHO as important components of the emergency phase of the cholera prevention and control strategy in the Region.

A significant need of the countries, both those affected and those still free of cholera, has been information about the status of cholera in the Region and measures that can be taken to control the disease. The Task Force has distributed frequent updates and various technical materials, including the 1991 revision of the *WHO Guidelines for Cholera Control*, which was translated into Spanish by PAHO. The Organization has provided support to country-level health education efforts, worked closely with the PWR Offices to disseminate information on how to prevent cholera, and developed a multimedia information kit to be distributed through the country offices.

To help countries prepare for the possible introduction of cholera, PAHO has hosted three meetings: the first in April, attended by representatives of 17 Latin American countries; another at the Caribbean Epidemiology Center in Trinidad and Tobago for the English-speaking Caribbean countries; and the third in Costa Rica for the Central American countries, the Dominican Republic, and Haiti. Subregional plans have been developed for the Andean countries and Central America.

More recently, the PAHO Secretariat drafted a regional plan for the prevention and control of cholera during the next two to three years, which will be outlined in a subsequent issue of the *Bulletin*.

REFERENCES

1. World Health Organization. Cholera in 1990. *Wkly Epidemiol Rec.* 1991;66(19):133–137.
2. World Health Organization. Cholera: the epidemic in Peru—part I. *Wkly Epidemiol Rec.* 1991;66(9):61–63.
3. World Health Organization. Cholera in Peru: update, May 1991. *Wkly Epidemiol Rec.* 1991;66(20):141–145.
4. World Health Organization. Cholera: the epidemic in Peru—part II. *Wkly Epidemiol Rec.* 1991;66(10):65–70.