Epidemiological Report

Cholera
Historic Series 2010 – 2021

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BRIEF HISTORY

Cholera is an acute infectious intestinal disease caused by enterotoxin from the bacterium *Vibrio cholerae*. It is known that approximately 75% of those infected remain asymptomatic, while those who develop it have mostly mild or moderate symptoms and only 10% to 20% manifest the severe form, which if not treated promptly can lead to severe complications and death. Considered an acute diarrheal disease (ADD), it is characterized by a decrease in the consistency of stools (liquid or semi-liquid) and an increase in the frequency of evacuation (minimum of three episodes in 24 hours) for up to 14 days, which may be accompanied by fever, nausea and vomiting.[1]

The clinical manifestations of cholera also include abdominal pain and, in severe forms, cramps, dehydration and shock. Stools may look like greenish-yellow water, without pus, mucus, or blood; in some cases there is, at first, the presence of mucus. Another typical aspect of stool is "rice water". In most cases, diarrhea is abundant and uncontrollable, and the patient may have numerous bowel movements daily and, consequently, be taken to a state of severe dehydration and shock.

It is a notifiable disease, that is, the suspected cases must be informed to the local epidemiological surveillance and to the Central CVE (08000-55 54 66) within 24 hours. This dynamic aims to ensure adequate clinical, laboratory and epidemiological investigation of the case and its contacts, as well as early control of outbreaks/epidemics.

For reporting purposes, cases that occur in two situations, described below, are considered suspect.

In areas **WITHOUT a declared cholera outbreak**:

- individual from areas with confirmed cases of cholera who present ADD up to the tenth day of arrival;
- individual over 5 years of age who shows sudden, liquid and profuse diarrhea, whose presence of severe dehydration, acidosis and circulatory collapse reinforces the suspicion; and
- contact person of a suspected or confirmed case of cholera who presents ADD within ten days after contact, regardless of age group. It is important that contact occurred during the period of transmissibility, that is. within 20 days of the onset of symptoms in the primary case (suspected or confirmed).

In areas **WITH a declared cholera outbreak**:

• Individuals with ADD and epidemiological link with a suspected or confirmed case of cholera, regardless of age group.

CHOLERA IN THE WORLD

The various cholera epidemic outbreaks occurred mainly between the years 1817-1823, 1826-1837, 1846-1862, 1864-1875 and 1881-1896, even reaching the present day. In Brazil, the disease remained at epidemic and/or endemic levels in several Northeastern states until 2001, the same occurring in regions of Asia, Africa, the Middle East (countries in conflict/war) and the Americas, with major and most recent outbreaks in Haiti, Dominican Republic, Cuba and Mexico.[2]

According to the new report from the World Health Organization (WHO), the world had a 60% drop in the number of cases in 2018. Despite this, the disease killed 2,990 people in 34 countries that same year. In the period, 499,447 cases were reported, the vast majority in Yemen, with 371,326 cases.[3]

In the following year, 2019, there was a decreasing trend in cholera infections. The UN cited the occurrence of cases in some Portuguese-speaking countries, with Angola having 1,546 cases and 24 deaths, the highest rates among Portuguese-speaking nations. Mozambique ranked second with 910 infections. Cape Verde and São Tomé and Príncipe did not report a single case.[3]

Based on this scenario, the necessary multidisciplinary approach is reinforced, based on prevention, preparedness and response, together with an efficient surveillance system, fundamental to mitigate outbreaks, control in endemic areas and reduce deaths.[4] So, to eliminate cholera and, consequently, solve the problem, there is a Global Task Force on Cholera Control (GTFCC), based at WHO, which consists of a network of 50 active partners, including academic institutions, non-governmental organizations and United Nations agencies.[5] The WHO also created, in 2017, the strategy "Ending cholera: a global roadmap to 2030", which aims to eliminate the disease in 20 countries by 2030.

The global roadmap has three strategic axes[5]

- Early detection and rapid multisectoral – including community – response, engagement, strengthening surveillance and laboratory capacity, health systems, and readiness to provide and support rapid response teams to contain outbreaks.

- A multisectoral approach to preventing cholera recurrence requires countries and partners to focus on hotspots, the relatively small areas most affected by the disease. Its transmission

can be stopped in these areas through measures that include basic water, sanitation and hygiene (WASH) and use of oral vaccines (OCV).

- An effective coordination mechanism for technical support, advocacy, resource mobilization and partnership at local and global levels. To this end, the GTFCC has a strong support structure that allows nations to intensify efforts to control cholera, based on cross-sectoral programs, led by countries and supporting them with human, technical and financial resources.

CHOLERA IN BRAZIL

Cholera spread throughout the world in the 19th century. In Brazil, the 1990s were characterized by very intense epidemics of the El Tor Inaba type. Between 1991 and 1999, the disease affected all regions of the country, with a total of 167,885 cases and 2,015 deaths, and major epidemics in the Northeast. After this period, there was a significant reduction in cholera-related records, with the last autochthones identified in 2005 in the state of Pernambuco, with five cases of the disease.

In 2006 and 2011, two cases were reported, one imported from Angola and the other from the Dominican Republic. In July 2017, the Pernambuco Health Department issued an alert for cholera, after the identification by environmental monitoring of *V. cholerae* O1, that has the ability to cause the disease in humans. Samples were collected in the municipalities of Tracunhaém (Açude do Fundão), Correntes (Rio Mundaú) and Aliança (Rio Siriji). In addition, other samples were positive for the bacteria without epidemic potential (non-O1 and non-O139) in Tracunhaém (Açude do Bar do Caranguejo), Limoeiro (Rio Capibaribe), Timbaúba (Rio Capibaribe-Mirim) and Salgueiro (sewage outlet from bus terminal).

The samples of water from rivers and dams were analyzed by the Central Laboratory of Public Health of Pernambuco (Lacen) and by the Oswaldo Cruz Foundation (Fiocruz), in Rio de Janeiro.

ETIOLOGICAL AGENT

Cholera is caused by the enterotoxin of the bacterium *Vibrio cholerae* O1 or O139. Until 1993 it was believed that the only vibrios that caused epidemics were those of serogroup O1. It was later discovered and established that serogroup O139 also had this potential, recognized since 1992.

There is no difference in the disease caused by the two serogroups.[5] Other serogroups (non-O1

and non-O139), as well as non-toxigenic strains of serogroups O1 and O139, can also cause diarrhea, but less severe than cholera and without epidemic potential.[1]

V. cholerae O1 has two biotypes: classic and El Tor Inaba, which have different phenotypic and genotypic properties, pathogenicity and patterns of infection and survival in human hosts. El Tor Inaba strains are often associated with asymptomatic infections, lower mortality rate, better survival in the environment and in the human host, and greater efficiency of person-to-person transmission, when compared to classical strains, which cause more severe clinical manifestations.[1]

There are two types of reservoirs for *V. cholerae*: **human beings**, who may be asymptomatic carriers, and the **aquatic environment**. This, naturally, is part of the marine and fluvial microbiota and is present freely or associated with crustaceans, molluscs, fish, shellfish, algae and aquatic birds, among others, including abiotic surfaces. This makes transmission possible through the consumption of these raw or undercooked animals. Furthermore, these associations allow the bacterium *V. cholerae* to persist in the environment during interepidemic periods.[1]

TRANSMISSION MODE

Transmission occurs mainly through the ingestion of water contaminated by feces or vomits of patients or carriers of the bacterium. And also, by eating food contaminated by the hands of product handlers or by flies, in addition to the consumption of ice made with contaminated water. Person-to-person spread by direct contact can also occur.

EPIDEMIOLOGICAL SITUATION IN THE STATE OF SÃO PAULO (SSP)

From 2010 to 2021, 18 suspected cases of cholera were reported, 17 of which were discarded and 1 confirmed in the laboratory (Graph 1).
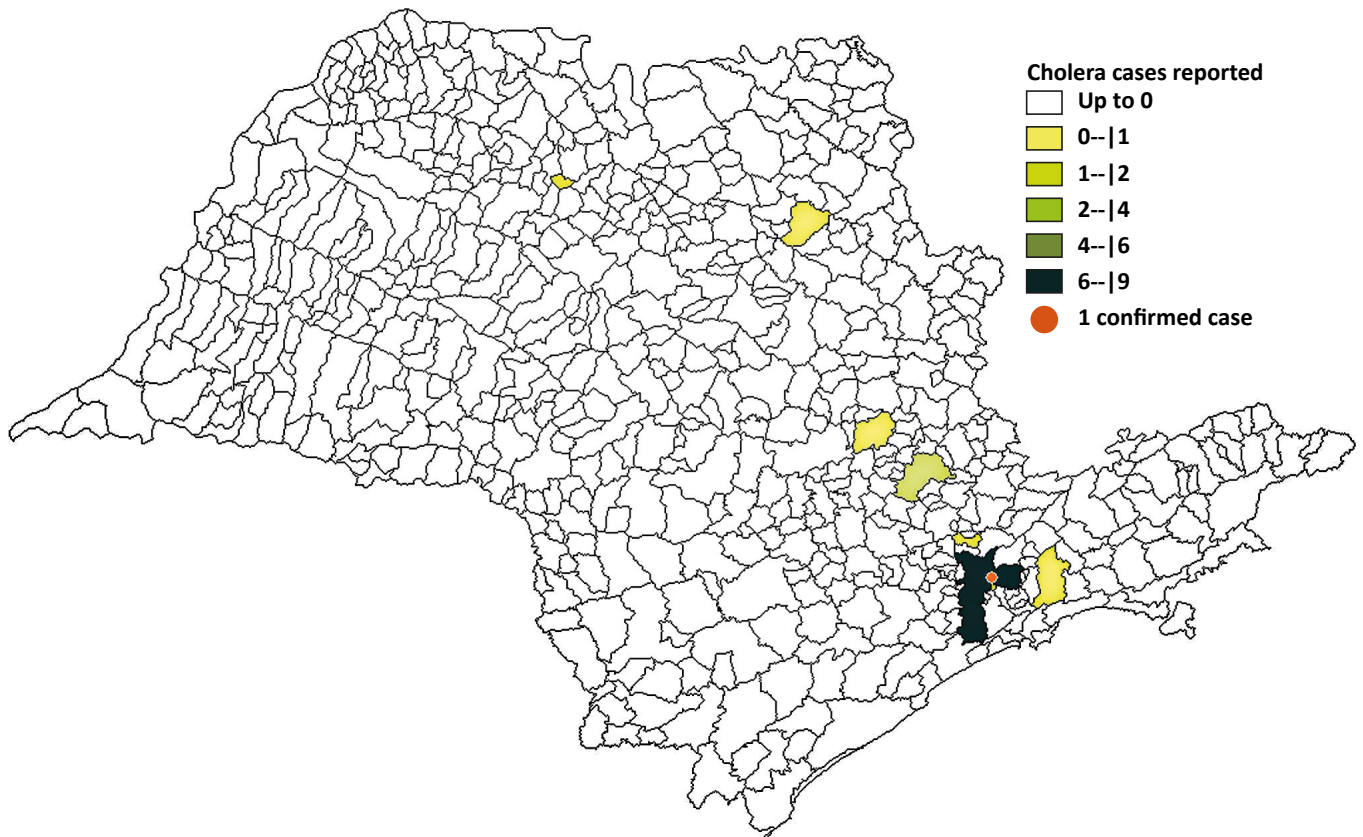
Graph 1. Reported cases of cholera, according to the closure criteria by year of notification. SSP, 2010 to 2021.*
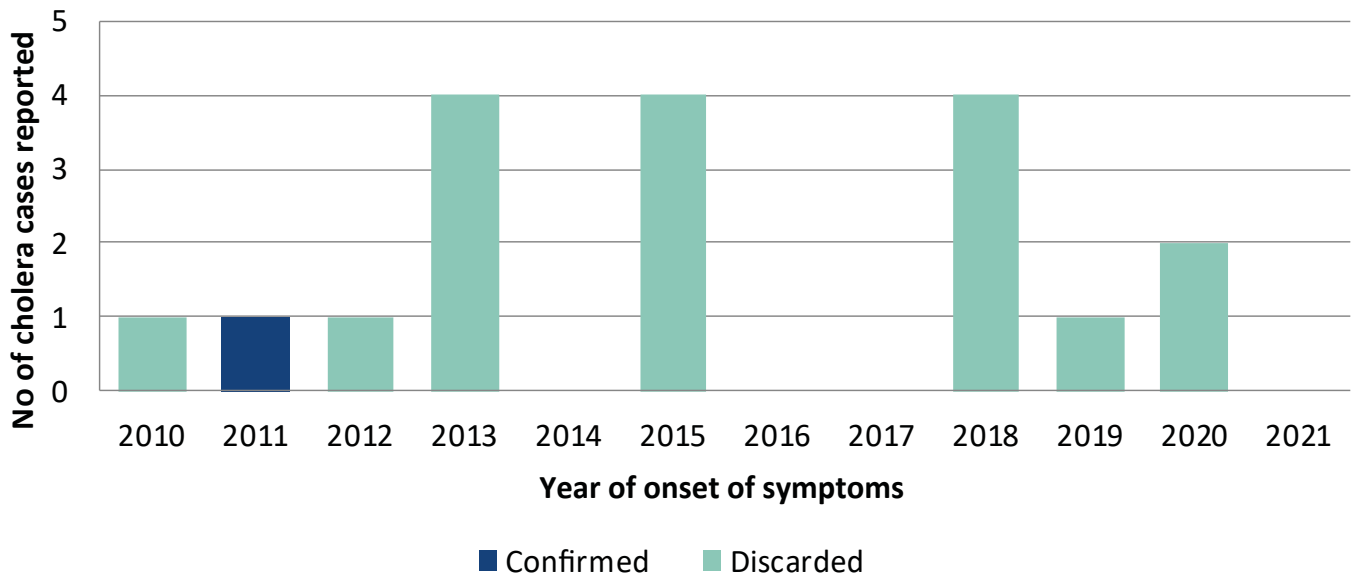
Source: DFWD/ESC/SHD-SP. *Data extracted from Sinan and handled by DFWD on June 20, 2022.

Notified in 2011, this case, registered in the city of São Paulo, was not autochthonous, but imported from the Dominican Republic and detected by the municipality (Figure 1).

Figure 1. Spatial distribution of reported and confirmed cholera cases, by municipality of residence. SSP, 2010 to 2021.*
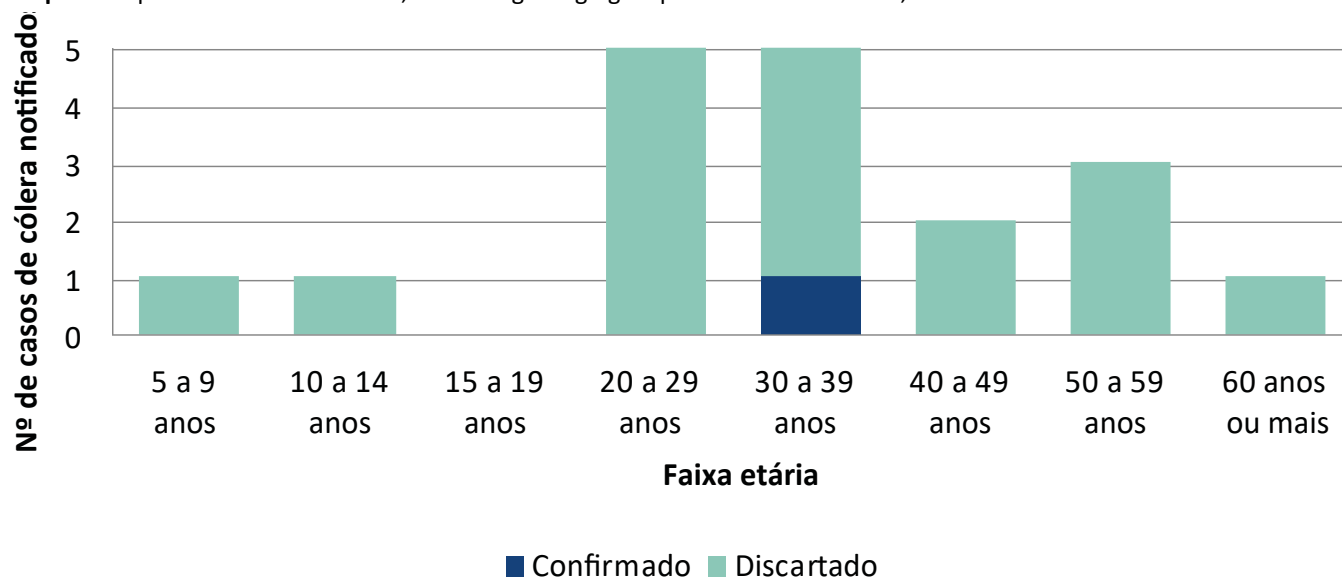

Source: DFWD/ESC/SHD-SP. *Data extracted from Sinan and handled by DFWD on June 20, 2022.

The capital of São Paulo has the highest gross number of notifications in the period (9), followed by Campinas (2). It is worth mentioning that one of the cases is a person residing in the Federal District, which was notified by the municipality of Guarulhos.

Regarding the distribution by age group, from 2010 to 2021 it was possible to observe that the notifications were concentrated in people aged 20 to 29 years and 30 to 39 years, with the confirmed case progressing to a cure (Graph 2).

Graph 2. Reported cases of cholera, according to age group closure criteria. SSP, 2010 to 2021.*

Source: DFWD/ESC/SHD-SP. *Data extracted from Sinan and handled by DFWD on June 20, 2022.

Among the 20 discarded cases, it is inferred that 95% (19) were based on laboratory criteria and only 5% (1) were based on clinical-epidemiological criteria. Among the symptoms most frequently reported in the notifications are diarrhea (88.8%), abdominal pain (66.6%) and vomiting (61.1%) (Table 1). It should be noted that the confirmed case manifested only yellowish watery diarrhea and fever.

Table 1. Frequency of symptoms reported in reported cases of cholera. SSP, 2010 to 2021.*

Symptoms	Presence (n)	Frequency (%)	Absence (n)	Frequency (%)	Not informed (n)	Frequency (%)
Diarrhea	16	88.8%	1	5.5%	1	5.5%
Cramps	2	11.1%	14	77.7%	2	11.1%
Fever	8	44.4%	9	50%	1	5.5%
Vomiting	11	61.1%	6	33.3%	1	5.5%
Abdominal pain	12	66.6%	3	16.6%	3	16.6%
Shock	1	5.5%	16	88.8%	1	5.5%
Dehydration to some degree	10	55.5%	4	22.2%	4	22.2%

Source: DFWD/ESC/SHD-SP. *Data extracted from Sinan and handled by DFWD on June 20, 2022.

In this context, although in the state of São Paulo (SSP) there have been no autochthonous cases since 1995, since the last records of this type of date from the period 1991 to 1994, the risk of detection of imported cases cannot be excluded. Thus, the surveillance system needs to remain sensitive, proceeding with the immediate notification of any and all episodes that meet the case definition, given the need to continue proving the non-existence of the disease, as well as its detection as early as possible.

Environmental monitoring is carried out by Cetesb, so that water collection in sewers is carried out aiming at monitoring the pathogens found in this environment and the possible identification of *V. cholerae* O1 or O139, which so far, in the evaluated period, has not occurred.

CONTROL AND PREVENTION

It is worth mentioning that in 2014 the São Paulo Cholera Contingency Plan was created, whose objective is to guide the execution of timely response actions in the event of a public health emergency caused by the disease. This plan is based on three axes:

- assessment of the risk of adverse events, detailing the scenarios in which they may occur;
- establishment of steps/actions to prepare for responses that are necessary or to improve existing ones; and
- clear definition of response actions in the event of their occurrence.

The plan's activities are divided according to activation level, by reference to response capacity at the local and state levels (Chart 1):

Chart 1. Activation level and respective types of activities carried out by the Cholera Contingency Plan.

Level	Activity
Level 0: event monitoring	It includes routine surveillance activities regarding the monitoring of waterborne and foodborne diseases. There are reports of suspected but unconfirmed cases of cholera.
Level 1: localized emergency (continues) (conclusion)	There is case detection in a clinical sample, and the local level may need resources to respond to the emergency and complementary support (state or federal), with the possibility of sending a public health emergency response team.
Level 2: widespread emergency	It is estimated that the risk is significant, surpassing the response capacity of the municipal and state spheres, requiring the mobilization of additional resources and complementary support from the federal instance, with the dispatch of a public health emergency response team.
Level 3: emergency with risk of national spread	The risk represents a threat of national relevance with an impact on different spheres of SUS management, requiring a broad government response. This event constitutes a situation of exceptional gravity and may culminate in the declaration of a public health emergency of national importance (Espin).

Source: DFWD/ESC/SHD-SP.

In addition, the prevention measures developed are recommended to all municipalities in São Paulo, in line with the recommendations of the Ministry of Health.

- Distribution of 2.5% sodium hypochlorite in critical areas and in the network of basic units, that is, in places with basic sanitation problems, especially areas of invasion and landless settlements, among others;
- dissemination of educational guidelines (on the CVE website and in the media in alert situations):
  - o leaflets on the need for strict hygiene and handwashing and campaigns to raise awareness of threats of reintroduction of cholera; and
  - o dissemination in campaigns and in the media of leaflets and booklets on good practices in food preparation and disinfection of fruits and vegetables, which extends to all waterborne and foodborne diseases; and
- population access to treated water and basic sanitation.

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