

# National Enteric Disease Surveillance: Cholera and Other *Vibrio* Illness Surveillance (COVIS)

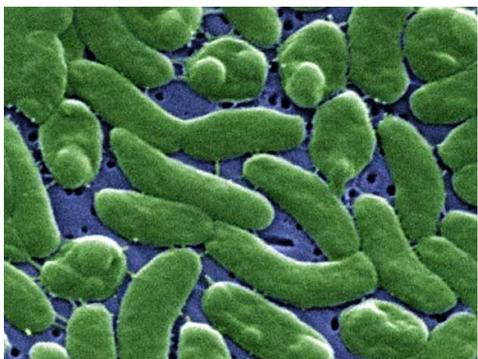
## Surveillance System Overview: Cholera and Other *Vibrio* Illness Surveillance (COVIS)

### Background on infection with species from the family *Vibrionaceae*

Infection with pathogenic species of the family *Vibrionaceae* can cause two distinct categories of infection: cholera and vibriosis, both of which are nationally notifiable.

Cholera is, by definition, caused by infection with toxigenic *Vibrio cholerae* O1 or O139 and was first reported in the United States in 1832. Infection is characterized by acute, watery diarrhea. An average of 5-10 cases of cholera are reported annually in the United States; most are acquired during international travel, however, on average 1-2 per year are domestically acquired. An increase in the number of cholera cases reported in the United States has occurred when there are cholera outbreaks in the Western Hemisphere, such as Latin America in the 1990s and Haiti in 2010, with almost all attributable to exposures during international travel. CDC annually reports to the World Health Organization all confirmed cholera cases diagnosed in the United States.

Vibriosis is caused by infection with any species of the family *Vibrionaceae* (excluding toxigenic *Vibrio cholerae* O1 and O139), with an estimated 80,000 cases and 300 deaths annually in the United States (1). The most common clinical manifestations are watery diarrhea, primary septicemia, wound infection, and otitis externa. Risk factors for illness include consumption of shellfish, particularly raw oysters, and contact with natural bodies of waters, especially marine or estuarine waters. Vibrios were first recognized as an important pathogen in the United States in the 1970s, and in January 2007, the Council of State and Territorial Epidemiologists (CSTE) recommended that infection with all *Vibrio* species be nationally notifiable; in 2011 the case definition of vibriosis was expanded to include infection with any species in the family *Vibrionaceae* (see the 'Overview of taxonomy' section for more details).



*Vibrio vulnificus*



*Vibrio cholerae*

The Cholera and Other *Vibrio* Illness Surveillance system (COVIS) was initiated by CDC, FDA, and the Gulf Coast states (Alabama, Florida, Louisiana, and Texas) in 1988 (3). By the early 2000s, several years before vibriosis became nationally notifiable, almost all states were voluntarily reporting. CDC maintains COVIS to obtain reliable information on illnesses associated with a species in the family *Vibrionaceae*; we provide this information, which includes risk groups, risk exposures, and trends to regulatory and to other prevention agencies. Using the COVIS report form (available at [http://www.cdc.gov/nationalsurveillance/PDFs/CDC5279\\_COVISvibriosis.pdf](http://www.cdc.gov/nationalsurveillance/PDFs/CDC5279_COVISvibriosis.pdf)), participating health officials report clinical data, including information about underlying illness; detailed history of seafood consumption, exposure to a body of water, exposure to drippings from raw or live seafood, or other contact with marine life in the 7 days before illness onset; and traceback information on implicated seafood. This information is used to develop

information to educate consumers about the health risks of seafood, as well as to help determine host, food, and environmental risk factors.

CDC serotypes all *V. parahaemolyticus* isolates received from state health departments. For *V. cholerae*, CDC tests for serogroups O1, O75, O139, and O141, and determines whether cholera toxin is present. Although all *Vibrio* infections are nationally notifiable, many cases are likely not recognized and reported because *Vibrios* are not easily identified on routine enteric media.

### Other sources of national-level vibriosis and cholera surveillance data

Several other systems at CDC conduct surveillance for *Vibrio* infection. The National Notifiable Diseases System (NNDSS) collects and compiles reports of nationally notifiable infectious diseases, including cholera and vibriosis (2). NNDSS collects data from states on both laboratory-confirmed and probable cases of infection (probable cases are defined as clinically ill persons with an epidemiological link to a confirmed case). The National Antimicrobial Resistance Monitoring System (NARMS) monitors antimicrobial resistance among enteric bacteria (including *Vibrio*) from humans (4). Since 2009, NARMS has requested submission of all *Vibrio* isolates from participating laboratories for antimicrobial susceptibility testing. The National Outbreak Reporting System (NORS) collects reports of foodborne, waterborne, person-to-person, and animal contact-associated enteric disease outbreaks from local, state and territorial public health agencies (5).

### Overview of taxonomy

The family *Vibrionaceae* comprises eight genera: *Aliivibrio*, *Catenococcus*, *Enterovibrio*, *Grimontia*, *Listonella*, *Photobacterium*, *Salinivibrio*, and *Vibrio* (6). Not all cause disease in humans.

Of the more than 200 *Vibrio cholerae* serogroups, only toxigenic O1 and O139 have caused large epidemics and are therefore referred to as causes of cholera. Serogroup O1 occurs as two biotypes – classical and El Tor – each of which occurs as three serotypes (Inaba, Ogawa, and, rarely, Hikojima) (7). Other serogroups of *V. cholerae* can also produce cholera toxin; however the illness they cause is reported as vibriosis, not cholera. In recent years, strains that have characteristics of both classical and El Tor biotypes have emerged; these strains have an El Tor chromosomal backbone are referred to as ‘altered El Tor’ strains.

Vibriosis is caused by infection with pathogenic species of the family *Vibrionaceae* (other than toxigenic *Vibrio cholerae* O1 and O139, which cause cholera, as described above). Taxonomic improvements resulted in some species previously in the genus *Vibrio* being reassigned to new genera. For example, *Vibrio hollisae* was reclassified to the new genus *Grimontia* as *G. hollisae*, and *Vibrio damsela* was transferred to the genus *Photobacterium* as *P. damsela* subsp. *damselae*. These reclassifications resulted in an expansion of the CSTE case definition of vibriosis in 2011 to include infection with any species in the family *Vibrionaceae*.

### References

1. Scallan E, Hoekstra RM, Angulo FJ, et al. Foodborne illness acquired in the United States – major pathogens. *Emerg Infect Dis*. 2011 Jan;17(1):7-15.
2. Centers for Disease Control and Prevention (CDC). Summary of Notifiable Diseases --- United States, 2010. *MMWR* 2012;59(53):1-111.
3. Levine WC, Griffin PM, et al. *Vibrio* Infections on the Gulf Coast: Results of First Year of Regional Surveillance. *J Infect Dis*. 1993; 167:479-83.
4. <http://www.cdc.gov/narms/>

5. <http://www.cdc.gov/outbreaknet/nors/>
6. Urbanczyk H, Ast JC, Higgins MJ, Carson J, Dunlap PV. Reclassification of *Vibrio fischeri*, *Vibrio logei*, *Vibrio salmonicida* and *Vibrio wodanis* as *Aliivibrio fischeri* gen. nov., comb. nov., *Aliivibrio logei* comb. nov., *Aliivibrio salmonicida* comb. nov. and *Aliivibrio wodanis* comb. nov. Int J Syst Evol Microbiol. 2007 Dec;57(Pt 12):2823-9.
7. Control of Communicable Diseases, 19th edition. David Heymann, Editor.

**Reference citation**

**Centers for Disease Control and Prevention (CDC). Cholera and Other Vibrio Illness Surveillance Overview. Atlanta, Georgia: US Department of Health and Human Services, CDC, 2012.**