

# Vibriosis



J. Michael Janda, PhD, D(ABMM)<sup>a</sup>, Anna E. Newton, MPH<sup>b</sup>,  
Cheryl A. Bopp, MS<sup>c,\*</sup>

## KEYWORDS

• Vibriosis • *Vibrio* • Cholera • Marine • Aquatic • *V vulnificus* • Seafood

## KEY POINTS

- *Vibrio* infections are increasing in the United States.
- Chief risk factors associated with vibriosis include consumption of raw or undercooked seafood or shellfish, and trauma associated with the marine environment.
- A detailed medical history is necessary in order to suspect vibriosis, and this includes direct or indirect aquatic exposures.
- Two life-threatening vibrio infections are cholera and necrotizing fasciitis; septicemia can occasionally be observed as a primary infection or secondary complication of serious disease as well.
- Specialized media are necessary to isolate vibrios in cases of diarrheal disease.

## HISTORY AND GENERAL EPIDEMIOLOGY

Vibriosis is the general name for a group of clinical conditions of varying severity typically associated with the genus *Vibrio*, whose members are facultatively anaerobic, cytochrome oxidase-positive, gram-negative bacilli, many of which require salt for growth. These illnesses can range from mild cases of gastroenteritis to life-threatening situations such as septicemia and invasive skin and soft tissue infections (SSTI). In the past, all of these infections were attributed to species residing in the genus *Vibrio*, which were linked together by common phenotypes, habitats, modes of transmission, and disease syndromes (eg, gastroenteritis). However, with the introduction of polyphasic taxonomy, phylogenetic analysis assessing multiple house-keeping genes, and DNA-DNA hybridization, it is now known that several of these

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<sup>a</sup> Department of Public Health, Alameda County Public Health Laboratory, 1000 Broadway, Suite 500, Oakland, CA 94607, USA; <sup>b</sup> Enteric Diseases Epidemiology Branch, Division of Foodborne, Waterborne and Environmental Diseases, Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30333, USA; <sup>c</sup> Enteric Diseases Laboratory Branch, Division of Foodborne, Waterborne and Environmental Diseases, Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30333, USA

\* Corresponding author.

E-mail address: [cherylbopp@gmail.com](mailto:cherylbopp@gmail.com)

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species traditionally thought to be *Vibrio* belong to genera distinct from core members including *Vibrio cholerae*. These taxa include *Grimontia (Vibrio) hollisae* and *Photobacterium (Vibrio) damsela*, which have already been reclassified to new or established genera, whereas still others, such as *Vibrio parahaemolyticus* and *Vibrio alginolyticus*, continue to reside in the genus *Vibrio* but merit consideration for transfer and reclassification to another genus based on phylogenetic evidence.<sup>1</sup>

Members of the genus *Vibrio*, which total more than 100 species, are predominantly associated with a variety of marine, estuarine, or other aquatic habitats.<sup>2</sup> The limited exception to this rule are the nonhalophilic, or non-salt-requiring, species *V cholerae* and *Vibrio mimicus*, which can be found in polluted to pristine freshwater environments. Most vibrios can exist in a variety of states in the marine environment, ranging from free-living forms to existing as commensals in association with various aquatic groups. Less than 15% of *Vibrio* species have been associated with human disease, with the remaining taxa designated as environmental species. **Table 1** lists the 13 Vibrionaceae species most frequently isolated from human infections in the United States. For some groups, fewer than 5 case reports have been published so knowledge regarding their disease spectrum is limited. In the case of cholera, which does not occur in the United States except for imported cases, the disease ranking mirrors global data accumulated by the World Health Organization.<sup>3</sup>

Surveillance data indicate that 97% of nonfoodborne vibrio infections (NFVI) originate from coastal regions of the United States, with the Gulf coast predominating (57%) followed by the Atlantic seaboard (24%).<sup>4,5</sup> Current estimates suggest that at least 8000 vibrio infections occur annually in the United States, with most (75%) illnesses being food associated.<sup>5</sup> However, modeling studies suggest that more than 50,000 domestically acquired foodborne vibrio infections may occur each year.<sup>4</sup> Epidemiologic data suggest that the incidence of foodborne vibriosis is increasing in the United States, with the latest figures reporting a 32% higher rate of 0.51 in 100,000 compared with 2010 to 2012 data.<sup>6</sup> Data from Florida also document the increasing incidence of vibrio infections (0.48 in 100,000) despite educational campaigns to reduce certain vibrio infections.<sup>7</sup>

Although the incidence of vibriosis varies by state (highest, Hawaii, 1.7; lowest, Oklahoma, 0.03) the 3 most common species involved in human illness in the United States are *V parahaemolyticus*, *Vibrio vulnificus*, and *V alginolyticus* (see **Table 1**) in decreasing order of frequency,<sup>4,5</sup> although some state-to-state variation exists as *V vulnificus* is the most common species reported in Florida.<sup>7</sup> Most of these vibrio infections involve cases of gastroenteritis or SSTI resulting from traumatized mucosal surfaces. **Table 2** lists frequency data of the most commonly isolated vibrios by anatomic site submitted to the US Centers for Disease Control and Prevention (CDC) from 2001 to 2009. Case fatality rates (CFRs) range from 8.2% to 4.7%, although some national studies of vibriosis report CFRs of greater than 30% in association with *V vulnificus* infection.<sup>4</sup> Florida has the highest CFR (10.0%), which is associated with the higher recovery rate of *V vulnificus* in culture in that state.<sup>7</sup>

## CLINICAL DIAGNOSIS

Although the overall incidence of vibriosis is low, the definitive diagnosis of such illnesses is critical because several species-associated disease syndromes, including cholera (toxigenic *V cholerae* O1) and necrotizing fasciitis (*V vulnificus*), are life-threatening events.<sup>7</sup> Current data suggest that various conditions associated with vibriosis are either misdiagnosed or not considered as part of the diagnosis during initial presentation with accompanying symptoms. These factors include that

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