Diagnosing and Treating Deadly *Vibrio vulnificus* Infection

Author: Tori L. Stivers, BSA, MS, Peachtree City, Ga
Section Editor: Reneé Semonin-Holleran, RN, PhD, CEN, CCRN, CFRN, CTRN, FAEN

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Although *Vibrio vulnificus* bacterial infection is relatively uncommon, it can be life-threatening in patients with chronic health conditions or who are immunocompromised. These people are usually taken to emergency departments for treatment because the progressing infection quickly becomes severe. Rapid diagnosis and administration of appropriate antibiotics are imperative, because death can occur in as few as 1 or 2 days after exposure to the bacteria.

V. vulnificus Bacteria

The 2 main modes of infection by *V. vulnificus* bacteria are (1) consumption of raw or undercooked shellfish, primarily oysters, and (2) exposure of open wounds or sores (preexisting or obtained while fishing, boating, wading, swimming, or handling raw seafood) to seawater. On average, 90 cases are reported per year in the United States; 66% come from consumption of seafood and 34% from wound infections.[1] The mortality rate in shellfish consumption cases is approximately 53%, but it is even higher (67%) in patients with liver disease in whom *V. vulnificus* septicemia develops.[2] According to the Centers for Disease Control and Prevention, the mortality rate resulting from wound infections is 29%.[1]

Tori L. Stivers is Seafood Specialist, University of Georgia Marine Extension Service, Georgia Sea Grant, Peachtree City, Ga.

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For correspondence, write: Tori L. Stivers, University of Georgia Marine Extension Service, 313 Dividend Dr, Suite 102, Peachtree City, GA 30269-1990; E-mail: tstivers@uga.edu.

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V. vulnificus bacteria thrive in warm seawater. Therefore peak US infection season is April through November. The rate of infections drops sharply in cold-weather months, but they may still occur. Although most reported cases involve immunocompromised residents of the Gulf of Mexico and South Atlantic coastal states, inland residents who travel to the coast may return home infected. In addition, oysters harvested from the Gulf of Mexico are shipped all over the country. Although the highest concentrations of *V. vulnificus* in the United States are found in the coastal waters of the Gulf of Mexico, the bacteria have been detected in lower concentrations in every coastal region of the United States, including Alaska, during all seasons of the year. Internationally, *V. vulnificus* bacteria have been detected in the Baltic Sea, Germany, in seafood from the Adriatic Sea near Croatia, and in waters and/or shellfish from the Spanish Mediterranean Sea, French coast, and Ionian Sea, Italy.[3-7]

Signs and Symptoms of Infection

Although people who are not immunocompromised may experience gastroenteritis from consuming *V. vulnificus* bacteria or cellulitis from wound exposure, the infection is usually not severe. However, patients with one or more of the conditions summarized in the Table are at high risk for primary septicemia. In these patients consuming raw or undercooked shellfish may produce gastroenteritis, fever, chills, leg pain, a sharp drop in blood pressure, and intractable shock. In more than 70% of patients, hemorrhagic bullae develop on the trunk or extremities, which may erode into necrotic ulcers.[8] Wound infections usually begin with pain and swelling around the site, progressing to cellulitis, but may also include other symptoms listed previously. An immunocompromised patient with a history of raw or undercooked shellfish consumption or exposure to seawater in the last 7 days (especially April through November) who presents with any of these symptoms should be immediately evaluated or treated for *V. vulnificus* infection.

Management

V. vulnificus infection can be diagnosed through routine blood, wound, or stool culture. Because this marine

TABLE
Health conditions that place a patient at high risk of *V. vulnificus* septicemia

Liver disorders including cirrhosis, cancer, or hepatitis
Diabetes
Hemochromatosis or other blood disorders
Alcoholism
Cancer
HIV/AIDS
Gastric disorders or use of prescribed antacids
Chronic renal disease
Immunocompromised state

bacterium is difficult to isolate without special growth medium (thiosulfate–citrate–bile salts–sucrose agar), laboratory personnel should be alerted that *V. vulnificus* is suspected.

Supportive care and immediate administration of antibiotics improve the chance of survival, so treatment should not await laboratory confirmation. Antibiotic recommendations include doxycycline (100 mg by mouth or intravenously twice a day for 7-14 days) in conjunction with a third-generation cephalosporin (e.g., 1-2 g of ceftazidime intravenously or intramuscularly every 8 hours).[9] Many patients also need aggressive supportive therapy in a critical care setting.[10] Necrotic tissue should be surgically debrided, and severe cases might require a fasciotomy or limb amputation.[9]

Prevention and Education

V. vulnificus is a naturally occurring marine bacterium in seawater and is not the result of pollution. Because bivalve molluscan shellfish (oysters, clams, mussels) feed by filtering plankton from seawater, they may contain *Vibrio* bacteria. Thorough cooking of shellfish kills the bacteria. However, some people consider raw oysters and clams delicacies. Patients who are immunocompromised should be warned about their risk of serious infection and encouraged to eat cooked seafood and avoid raw shellfish. They should also be made aware of potential infection from wounds exposed to seawater.

Educational resources are available to learn more about diagnosing, treating, and preventing *V. vulnificus* infections. The Interstate Shellfish Sanitation Conference (ISSC) offers a free online course to licensed nurses, which is available at *www.issc.org/ceu/nursesjen*. This nursing continuing education has been approved by the Society of Gastroenterology Nurses and Associates, Inc. (SGNA) for a total of 1.0 contact hours by the SGNA Continuing Education Peer Review Group. SGNA is an accredited approver of continuing education by the American Nurses Credentialing Center's Commission on Accreditation. The ISSC (*www.issc.org*, 1-800-416-4772) planned and implemented the course with support from the National Sea Grant Program. The ISSC is a national nonprofit organization that includes states, federal agencies, the shellfish industry, and others interested in promoting safe shellfish and public health. Additional free *V. vulnificus* infection information and resources for medical professionals, food and health educators, consumers, and other target audiences are available from the Web site *www.SafeOysters.org*, which is published by the University of Georgia Marine Extension Service and California Sea Grant Extension Program and sponsored by the National Sea Grant Program.

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