

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

CE Earn Up to 8 CE Hours. See page 184.

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 (pre-existing 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.

The Gulf & South Atlantic Fisheries Foundation has reimbursed the author for travel expenses to provide educational *Vibrio vulnificus* infection exhibits at 3 health care professional meetings in 2007: American Association of Diabetes Educators, Emergency Nurses Association, and The Liver Meeting (American Association for the Study of Liver Diseases). Other than that, they do not provide funding for her salary or influence her job responsibilities. They are not aware that she submitted this article to the Journal and therefore have not influenced her writing in any way.

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.

J Emerg Nurs 2008;34:139-41.

0099-1767/\$34.00

Copyright © 2008 by the Emergency Nurses Association.

doi: 10.1016/j.jen.2007.11.012

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/ceulnursesjen. 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.

REFERENCES

1. Dechet AM, Koram N, Jain S, Painter J. Wound infections: an important cause of *Vibrio* morbidity and mortality—United States, 1997-2003. Poster 16. Presented at the Centers for Disease Control and Prevention 54th Epidemic Intelligence Service Conference; 2005 Apr 11-13; Atlanta, Ga.
2. Centers for Disease Control and Prevention (CDC). *Vibrio vulnificus* infections associated with raw oyster consumption—Florida, 1981-1992. *Morb Mortal Wkly Rep* 1993; 42:405-7. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/00020736.htm. Accessed October 23, 2007.
3. Frank C, Littmann M, Alpers K, Hallauer J. *Vibrio vulnificus* wound infections after contact with the Baltic Sea, Germany. *Euro Surveill* 2006;11:E060817.1. Available at: www.eurosurveillance.org/ew/2006/060817.asp#1. Accessed October 30, 2007.
4. Jaksic S, Uhitil S, Petrak T, Bazulic D, Gumhalter Karolyi L. Occurrence of *Vibrio* spp. in sea fish, shrimps and bivalve molluscs harvested from Adriatic sea. *Food Control* 2002;13:491-3.
5. Arias CR, Macián MC, Aznar R, Garay E, Pujalte MJ. Low incidence of *Vibrio vulnificus* among *Vibrio* isolates from sea water and shellfish of the western Mediterranean coast. *J Appl Microbiol* 1999;86:125-34.
6. Hervio-Heath D, Colwell RR, Derrien A, Robert-Pillot A, Fournier JM, Pommepuy M. Occurrence of pathogenic vibrios in coastal areas of France. *J Appl Microbiol* 2002;92:1123-35.
7. Cavallo RA, Stabili L. Presence of vibrios in seawater and *Mytilus galloprovincialis* (Lam.) from the Mar Piccolo of Taranto (Ionian Sea). *Water Res* 2002;36:3719-26.
8. US Food and Drug Administration Center for Food Safety and Applied Nutrition. Pathogenic bacteria: *Vibrio vulnificus*. In: The bad bug book: foodborne pathogenic microorganisms and

- natural toxins handbook. Available at: www.cfsan.fda.gov/~mow/chap10.html. Accessed October 22, 2007.
9. Centers for Disease Control and Prevention. *Vibrio vulnificus* general information. Available at: www.cdc.gov/ncidod/dbmd/diseaseinfo/vibriovulnificus_g.htm. Accessed October 17, 2007.
 10. Bross MH, Soch K, Morales R, Mitchell RB. *Vibrio vulnificus* infection: diagnosis and treatment. *Am Fam Physician* 2007;76: 539-44. Available at: www.aafp.org/afp/20070815/539.html. Accessed October 23, 2007.

Submit descriptions of procedures in emergency care and/or quick-reference charts suitable for placing in a reference file or notebook to:
René Semonin-Holleran, RN, PhD, CEN, CCRN, CFRN, CTRN, FAEN, Section Editor

Submit Clinical Notebook manuscripts online at <http://ees.elsevier.com/jen/>