VIBRIO

Vibrio species are small, Gram-negative rods found in aquatic environments. Twelve species have been isolated from clinical specimens. With the exception of Vibrio cholerae, for which humans are the primary reservoir, vibrios are usually acquired by eating shellfish, especially raw oysters. This CD Summary focuses on the Vibrio sp. most frequently reported in Oregon and the role of reporting in the identification and closure of risky shellfish harvesting areas.

HISTORY

Vibrios have a rich history. Vibrio cholerae serogroup O1 has been the cause of 7 known pandemics of diarrheal misery and death. V. cholerae wreaks its havoc via cholera toxin, which activates adenylate cyclase in the intestinal mucosa, leading to a profuse, secretory, watery diarrhea.

Oregon commenced active surveillance for culture-confirmed infections by any Vibrio species in 1997, and we have seen some nontoxigenic Vibrio cholerae. But the real Vibrio story in our state lies with V. parahaemolyticus.

V. PARAHAEOMOLYTICUS

Thermostable direct hemolysin (tdh)-producing V. parahaemolyticus usually causes a relatively severe, but self-limited gastroenteritis characterized by watery diarrhea and abdominal cramps. Some cases experience fever, nausea, vomiting, headache and bloody or mucoid diarrhea. Self-reported duration of illness for Oregon cases ranged from 2–18 days (median, 7). The usual incubation period is 4–30 hours. The most susceptible are those with decreased stomach acidity, diabetes, peptic ulcers, immunocompromising conditions or liver disease. Wound infections by V. parahaemolyticus have been noted; bacteremia is rare.

98 cases of vibriosis have been reported in Oregon since 1997, and 82% were caused by V. parahaemolyticus. Seventy-one percent of V. parahaemolyticus cases were male, and 69% were 30–59 years of age. Most cases occurred in July and August (Figure). For cases for whom we have an exposure history, 80% had consumed raw oysters in the 7 days before illness. During 1997–2006, 7 V. parahaemolyticus outbreaks were logged in Oregon (Table).


<table>
<thead>
<tr>
<th>Year</th>
<th>Outbreaks</th>
<th>Outbreak Cases</th>
<th>Implicated Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>1</td>
<td>12</td>
<td>Raw oysters</td>
</tr>
<tr>
<td>1998</td>
<td>1</td>
<td>2</td>
<td>Raw oysters</td>
</tr>
<tr>
<td>2000</td>
<td>1</td>
<td>2</td>
<td>Raw oysters</td>
</tr>
<tr>
<td>2001</td>
<td>1</td>
<td>3</td>
<td>Raw oysters</td>
</tr>
<tr>
<td>2004</td>
<td>2</td>
<td>5</td>
<td>Raw oysters</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;BBQ&quot; oysters</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>14</td>
<td>Oysters</td>
</tr>
</tbody>
</table>
areas. A shellfish-harvesting area will be closed if total V. para-
haemolyticus counts exceed 5,000

colony-forming units (CFU) per gram of shellfish or if ≥5 patho-
genic (tdh+) CFU per 0.1 gram
are detected. In addition, if 2
confirmed illnesses are linked to
the same harvest area in the same
harvest period, the area will be
closed to harvest. Shellfish are
linked to harvesting areas
through the harvest tags kept by
restaurants. According to NSSP
guidelines, any growing area
associated with a previous clo-
csure in the past 5 years should
sample regularly. Oregon, Wash-
ington and British Columbia
monitor shellfish beds beyond
the minimum requirements and
increase sampling when coastal
temperatures rise. Despite these
control measures, cases continue
to occur; the human bioassay
may be more sensitive than the
sampling scheme.

OTHER VIBRIOS

Vibrio vulnificus, prevalent in
Gulf Coast waters, causes the
most serious vibriosis in the
U.S.—wound infections and sep-
sis in immunocompromised indi-
viduals, alcoholics, those with
chronic liver disease and hemo-
chromatosis. Septic patients often
have distinctive bullous skin
lesions. Other recognized patho-
gens include nontoxicogenic V.
cholerae, V. alginolyticus, V. mimic-
us, V. hollisae and V. fluvialis.

LABORATORY DIAGNOSIS

Use of the selective thiosulfate-
citrate-bile salt-sucrose (TCBS)
medium is recommended for stool
cultures. In most laboratories,
TCBS is not routinely used so a
special request for Vibrio isolation
is needed. Non-selective culture me-
dia like blood agar can grow Vibrio
species from wounds, and the
organism can also be recovered from
commercial blood-culture media.

TREATMENT

Rehydration is the mainstay of
treatment for severe diarrheal dis-
ease. Antibiotic treatment for V.
parahaemolyticus gastroenteritis is
not known to shorten the course.
However, when antibiotics are
necessary, doxycycline and fluoro-
quinolones are suggested. For V.
vulnificus and V. alginolyticus infec-
tions, a combination of doxycy-
cline and ceftazidime is
recommended.

CONCLUSION

With the onset of warmer
months and warmer coastal wa-
ters, expect Vibrio infections to
resurface. Ask the raw oyster
question when you see adult pa-
patients with a diarrheal illness.
When ordering cultures (and we
do recommend them), be sure to
ask specifically for the detection of
Vibrio, so that specimens will be
plated on TCBS medium. Prompt
reporting to the local health
department will start the pro-
cess of tracing the product and
will facilitate identification of
high-risk harvest areas. Advise
patients, particularly the immu-
nosuppressed and those with
liver disease, to eschew the con-
sumption of raw oysters. Even
if Vibrios are absent, raw oys-
ters can make you sick—think
norovirus.

REFERENCES

1 Farmer JJ III, Janda JM, Birkhead K.
Vibrio. In: Murray PR, Baron EJ, Jorgens-
en JH, Pfaller MA, Yolken RH. Manual of
Clinical Microbiology. 8th ed. Washington
2 Morris JG. Cholera and other types of
vibriosis: a story of human pandemics
and oysters on the half shell. Clin Infect
3 Heyman DL, ed. Control of Communicable
Diseases Manual, 18th ed. Washington DC:
American Public Health Association,
4 DePaola A, Hopkins LH, Peeler JT,
Wentz B, McPhearson RM. Incidence of
Vibrio parahaemolyticus in U.S. coastal
waters and oysters. Appl Environ Micro-
5 Daniels NA, MacKinnon L, Bishop R, et
al. Vibrio parahaemolyticus infections in
6 CDC. Outbreak of Vibrio parahaemolyticus
infections associated with eating raw
7 McLaughlin JB, DePaola A, Bopp CA, et
al. Outbreak of Vibrio parahaemolyticus
gastroenteritis associated with Alaskan
oysters. NEJM 2005; 353:1463–70.
8 US Food and Drug Administration
National Shellfish Sanitation Program.
Guide for the Control of Molluscan Shell-
fish. Available at www/cfsan.fda.gov/Value
=ear/nss2-44.html.
9 Gilbert DN, Moellerling RC, Eliopoulos
GM, Sande MA, eds. The Sanford Guide to
Antimicrobial Therapy 2006, 36th ed.
Sperryville, Va: Antimicrobial Therapy,