Summary of human *Vibrio* isolates reported to CDC, 2002

Infection with toxigenic *Vibrio cholerae* O1 and O139, the causative agents of cholera, has been a reportable disease in the United States for many years. In addition, since 1988, CDC has maintained a database of reported *Vibrio* isolates from humans in order to obtain reliable information on illnesses associated with the range of *Vibrio spp*. This information has been used to educate consumers about the health risks of seafood, as well as to help determine host, food, and environmental risk factors.

This reporting system was initiated by the Food and Drug Administration (FDA), CDC and the Gulf Coast states (Alabama, Florida, Louisiana, Mississippi, and Texas). In recent years, many other states have also reported *Vibrio* isolates (Figure 1). However, only the cholera agents are nationally notifiable; thus the true number of *Vibrio* isolates is greater than reported. Participating health officials collect clinical data, information about underlying illness, history of seafood consumption and exposure to seawater in the seven days before illness, and conduct tracebacks of implicated oysters. CDC serotypes all *V. parahaemolyticus* and *V. cholerae* isolates received from state health departments and confirms toxin production in *V. cholerae*.

This report summarizes human *Vibrio* isolates reported to CDC in 2002 using the "Reporting Form for Cholera and Other *Vibrio* Illnesses". Results are presented in two categories: *V. cholerae* isolates that produce cholera toxin (referred to as toxigenic *Vibrio cholerae*), and all other *Vibrio* isolates, including those *V. cholerae* isolates that do not produce cholera toxin. Results from non-cholera *Vibrios* are presented separately for Gulf Coast states versus other states to be consistent with previous reports. Additionally, results are presented by anatomic site of isolation. It is important to note that isolation of some *Vibrio spp.* from a patient with illness does not necessarily indicate causation. While many *Vibrio* spp. are well-recognized pathogens, the status of *V. damsela, V. furnissii, V. metschnikovii*, and *V. cincinnatiensis* as enteric pathogens is less clear.

Isolates of toxigenic *Vibrio cholerae*

In 2002, toxigenic *V. cholerae* O1 was identified from two patients in two states (Table 1). One patient acquired the infection in the Philippines, while the other acquired the infection in Thailand. Neither of the patients was hospitalized, and neither died. No isolates of toxigenic *V. cholerae* O139 were identified.

Other *Vibrio* isolates (excluding toxigenic *V. cholerae*)

In 2002, 466 other *Vibrio* isolates from 452 patients were reported to the Cholera and Other *Vibrios* Surveillance System. Among patients for whom information was available, 180 (45%) of 397 were hospitalized and 45 (11%) of 409 died. *V. parahaemolyticus* was isolated from 156 (35%) patients, and was the most frequently reported *Vibrio* species. *V. vulnificus* was isolated from 43% of patients who were hospitalized. *V. vulnificus* infections are often severe; it was also isolated from 73% of patients who died.

Geographic Location

In 2002, we received 174 (39%) reports of *Vibrio* illness from Gulf Coast states, 107 (24%) from Pacific Coast states, 123 (28%) from Atlantic Coast states (excluding Florida), and 44 (10%) from inland states (Figure 1). The most frequently isolated

*Vibrio*s from Gulf Coast states were *V. vulnificus* (28%), *V. parahaemolyticus* (20%), and non-toxigenic *V. cholerae* (19%). The most frequently isolated *Vibrio*s from non-Gulf Coast states were *V. parahaemolyticus* (42%), non-toxigenic *V. cholerae* (16%), and *V. vulnificus* (14%).

Anatomic Site of Isolation

Among the 466 *Vibrio* isolates from all states, 230 (50%) were from stool, 87 (19%) from blood, and 92 (20%) from wounds. In addition, 21 (5%) isolates were obtained from the ear, and 36 (8%) were from the eye, gallbladder, urine, or other site. *V. parahaemolyticus* was the species most frequently isolated from stool (121 [53%] of 230 samples); *V. vulnificus* was the species most frequently isolated from blood (59 [68%] of 87 samples) and from wounds (29 [32%] of 92 samples).

Seasonality

The number of patients from whom *Vibrio* species was isolated had a clear seasonal peak during the summer months (Figure 2). The greatest frequency occurred in August for Gulf Coast states and in July for non-Gulf Coast states.

Exposures

A new wound-associated *Vibrio* illness was reported by 85 (18%). Of those, 84% reported water activities such as swimming and boating, 29% reported handling seafood, and 26% reported contact with marine wildlife. Excluding patients from whom *Vibrio* was isolated from a wound, and among the 262 for whom a food history was available, 216 (82%) reported eating seafood in the 7 days before illness onset. Among the 111 who reported eating a single seafood item (Table 4), 57% ate oysters (83% of whom consumed them raw), 12% ate shrimp, and 9% ate fish. International travel in the 7 days before illness onset was reported by 40 (9%) of patients.

Laboratory

The state public health laboratory confirmed the submitting laboratory's identification for 160 (55%) of the 291 *Vibrio* isolates for which laboratory confirmation information was reported. Seventy-five isolates of *V. parahaemolyticus* from 75 patients were submitted to CDC for serotyping. Of the 72 viable isolates, 15 (21%) from eight states were serotype O3:K6 (Arizona, Connecticut, Georgia, Massachusetts, New Hampshire, New York, Oregon, Rhode Island), and nine (13%) isolates from five states were O1:K56 (Colorado, Georgia, Minnesota, New York, Oregon); seven (10%) from three states were serotype O4:K12 (New York, Oregon, Tennessee), and the remaining 40 isolates from 11 states were one of 28 other serotypes.

Table 1: Isolates of toxigenic *V. cholerae* 2002

State	Age	Sex	Onset	Suspected Exposure	Isolate	Serotype
WA	15	F	7/6/2002	Travel in Philippines	*V. cholerae* O1[1]	Ogawa
MD	50	F	8/15/2002	Travel in Thailand	*V. cholerae* O1[1]	Inaba

[1] Resistant to furazolidone.

Table 2. Number of *Vibrio* isolates (excluding toxigenic *V. cholerae*) by species and isolation site, and complications of infection, in patients from Gulf Coast states, 2002

Vibrio Species	Patients		Complications[1] Hospitalized		Complications[1] Deaths		Isolates		Site of Isolation Stool	Blood	Wound	Other[2]
	N	(%)	n/N	(%)	n/N	(%)	N	(%)				
V. alginolyticus	25	(14)	6/23	(26)	1/23	(4)	26	(14)	2	1	16	7
V. cholerae (non-toxigenic)[3, 4]	32	(19)	14/30	(47)	1/31	(3)	32	(18)	21	6	4	1
V. damsela	1	(1)	1/1	(100)	0/0	(0)	1	(0)	0	0	1	0
V. fluvialis	12	(7)	3/9	(33)	0/10	(0)	12	(7)	7	2	1	2
V. furnissi	1	(1)	0/1	(0)	0/1	(0)	1	(0)	1	0	0	0
V. hollisae	5	(3)	2/5	(40)	0/5	(0)	5	(3)	4	0	0	1
V. mimicus[4]	4	(2)	2/4	(50)	0/4	(0)	4	(2)	3	1	0	0
V. parahaemolyticus[4]	37	(20)	17/33	(52)	2/33	(6)	38	(21)	18	7	10	3
V. vulnificus[4]	47	(28)	40/45	(89)	11/42	(26)	49	(28)	1	28	19	1
Species not identified	7	(4)	5/6	(83)	1/6	(14)	8	(4)	3	2	2	1
Multiple species[4]	3	(1)	2/3	(67)	0/3	(0)	6	(2)	2	0	4	0
Total	**174**	**(100)**	**92/160**	**(58)**	**16/158**	**(10)**	**182**	**(100)**	**62**	**47**	**57**	**16**

[1] Denominators indicate patients for whom information is known.
[2] Includes cyst, ear, gall bladder, intravenous catheter (peripherally inserted central catheters or PICC line), skin culture from groin, sputum, urine, and unknown source.
[3] Non-toxigenic *V. cholerae.* Includes non-toxigenic *V. cholerae* O1 (2 isolates) and other non-toxigenic *V. cholerae* [non-O1 non-O139] (30 isolates).
[4] *V. cholerae* non-O1, non-O139 and *V. mimicus* were isolated from the stool of one patient. *V. parahaemolyticus* and *V. vulnificus* were isolated from the wound of two patients.

Table 3. Number of *Vibrio* isolates (excluding toxigenic *V. cholerae*) by species and isolation site, and complications of infection in patients from non-Gulf Coast states, 2002

Vibrio Species	Patients		Complications[1] Hospitalized		Complications[1] Deaths		Isolates		Site of Isolation Stool	Blood	Wound	Other[2]
	n	(%)	n/N	(%)	n/N	(%)	n	(%)				
V. alginolyticus	31	(11)	6/30	(20)	0/30	(0)	31	(11)	2	0	14	15
V. cholerae (non-toxigenic)[3]	43	(16)	8/34	(24)	2/36	(6)	43	(15)	25	3	2	13
V. damsela[4]	2	(1)	0/2	(0)	0/2	(0)	2	(1)	0	0	2	0
V. fluvialis	24	(9)	11/19	(58)	0/23	(0)	24	(8)	22	1	0	1
V. hollisae	4	(1)	3/4	(75)	0/4	(0)	4	(1)	4	0	0	0
V. metchnikovii	1	(0)	0/1	(0)	0/1	(0)	1	(0)	1	0	0	0
V. mimicus	3	(1)	0/2	(0)	1/3	(33)	3	(1)	2	1	0	0
V. parahaemolyticus[4]	119	(42)	19/98	(19)	3/103	(3)	119	(42)	105	2	3	9
V. vulnificus[4,5]	42	(14)	38/41	(93)	22/40	(55)	46	(16)	3	31	10	2
Species not identified	7	(3)	3/6	(50)	1/7	(14)	7	(2)	4	2	0	1
Multiple species[4]	2	(1)	0/0	(0)	0/2	(0)	4	(1)	0	0	4	0
Total	**278**	**(100)**	**88/237**	**(37)**	**29/251**	**(12)**	**284**	**(100)**	**168**	**40**	**35**	**41**

[1] Denominators indicate patients for whom information is known.
[2] Includes appendix, cellulitis, ear, gall bladder, peritoneal fluid, sputum, urine, vesicle fluid, and unknown source.
[3] Non-toxigenic *V. cholerae*. Includes non-toxigenic *V. cholerae* O1 (3 isolates) and other non-toxigenic *V. cholerae* non-O1 non-O139 (22 isolates).
[4] *V. damsela,* and *V.vulnificus* were isolated from the wound of one patient; *V. parahaemolyticus* and *V. vulnificus* were isolated from the wound of one patient.
[5] *V. vulnificus* was isolated from blood and wound for four patients.

Table 4. Seafood exposure among patients with foodborne *Vibrio* infection who reported eating a single seafood item in the seven days before illness onset, 2002

	Mollusks			Crustaceans						
	Oysters	**Clams**	**Mussels**	**Shrimp**	**Lobster**	**Crab**	**Crayfish**	**Other Shellfish[1]**	**Finfish[2]**	**Total**
Ate (%)	63 (53%)	8 (7%)	1 (1%)	14 (12%)	1 (1%)	8 (7%)	4 (3%)	5 (4%)	16 (13%)	120 (100%)
% Ate raw	93%	67%	0%	15%	0%	43%	0%	80%	0%	55%

[1] Other shellfish reported: conch, scallops
[2] Fin fish reported: catfish, cod, drum, shark, tilapia, trigger fish

Figure 1. Number of patients with *Vibrio* isolates (excluding toxigenic *V. cholerae*) of *Vibrio* illness by state, 2002 (N=452 patients)

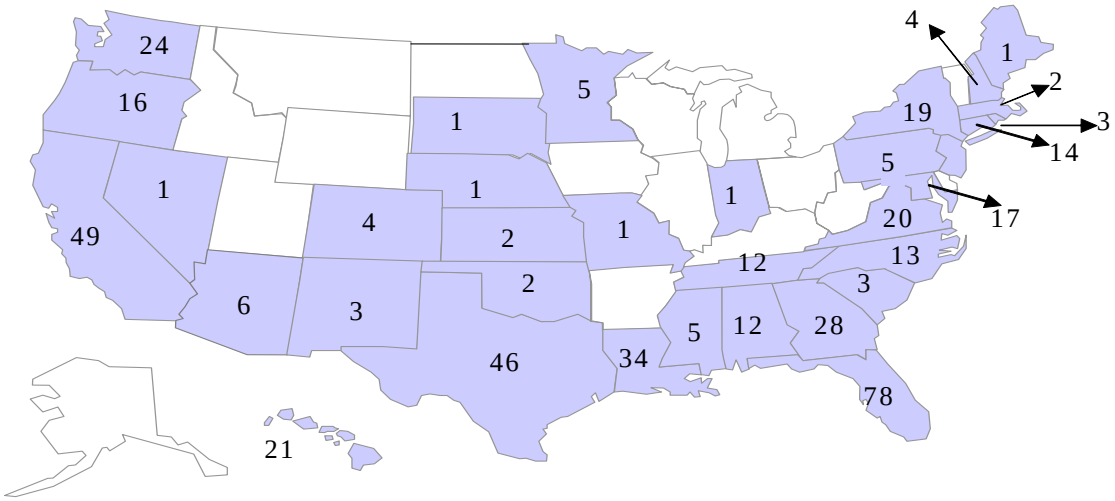

Figure 2. Number of patients with *Vibrio* isolates (excluding toxigenic *V. cholerae*), by month, Gulf Coast states vs. other states, 2002 (N=447*)

*Onset date missing or unknown for 5 patients