

PREVENTION OF *VIBRIO VULNIFICUS* INFECTIONS

INTRODUCTION

Vibrio vulnificus is the most virulent of the noncholera vibrios, with cases commonly reported during warm-weather months of April through November. In healthy hosts, it causes severe cellulitis and ulcer formation after contamination of a superficial wound by seawater. In persons with chronic liver disease or conditions leading to immunocompromise, *V. vulnificus* can result in sepsis and metastatic cutaneous lesions within 36 hours after symptom onset.

Despite preventive regulations enacted in California in 1991, *V. vulnificus* infections remain an important cause of death resulting from foodborne illness. Eleven cases of *V. vulnificus* infection, 7 resulting in death, were reported to the three public health jurisdictions of Los Angeles County (LAC) from May 1993 through October 1995. The following summarizes a study to assess California guidelines and education efforts with regard to prevention of *V. vulnificus* infections in LAC and to evaluate compliance with state regulations mandating posting of warning signs concerning risks of eating raw oysters.[†]

METHODS

Epidemiologic information for the 11 cases of *V. vulnificus* infections reported in May 1993 through October 1995 was reviewed. *V. vulnificus* infection is 1 of 60 reportable diseases in California; each case is investigated by a public health nurse who collects information using a case questionnaire regarding underlying disease, intake of alcoholic beverages, previous seawater swimming, fishing, or crabbing exposures, raw oyster ingestion, and the chronological and clinical description of the infections. Surviving patients and families and friends of deceased patients were contacted to obtain information regarding patients' primary language, ability to read and understand English, access to medical care, and whether patients were warned about health hazards associated with eating raw shellfish.

A restaurant questionnaire for environmental health inspectors was designed for routine, random, 22-district, countywide restaurant sanitation inspection visits in September and October 1995. The restaurants surveyed made up a convenience sample. Inspectors generally targeted restaurants catering to Hispanics and/or known to serve raw oysters. The Hispanic population in LAC favors consuming raw shellfish. They were requested to record whether restaurants served raw shellfish obtained from the Gulf Coast and, if so, whether and how many warning signs were posted and the precise location of these signs. Inspectors subjectively determined if signs were readily visible to customers and if warnings were included on menus or posted on tables or at the bar. Finally, because 40% of the LAC population is of Hispanic origin, inspectors noted the language(s) in which signs were written. Data were analyzed using version 6 of Epi Info software.

RESULTS

During May 1993 through October 1995, 11 cases of *V. vulnificus* infections were reported in LAC. Ten patients (91%) were primarily Spanish speaking; 50% could read or understand English. All either had known liver disease (associated with alcohol use or viral hepatitis or of unspecified etiology) or were at risk for liver disease because of history of excessive alcohol use as assessed by criteria used in the case questionnaire. Additional conditions were diabetes mellitus, renal failure, and bladder cancer. Nine patients were men who drank alcohol regularly. Median age was 52 years (range, 34-72 years). Seven patients died (case-fatality ratio=64%). All were septicemic; in two the organism was isolated from a lower extremity wound as well. Median duration of hospitalization was six days (range, 1-33 days).

All 11 cases occurred during April through November, and 9 occurred during May through October. All patients had eaten raw oysters 24 to 48 hours before symptom onset. No other known source of exposure to *V. vulnificus* (eg, ingestion of other raw shellfish or skin exposure to seawater or shellfish) was identified. Information available on 10 cases showed that 4 patients had obtained the shellfish from a retail store, and 6 had eaten the seafood at a restaurant. Information on 10 cases showed that 7 ate oysters harvested from Louisiana, and 3 had oysters from Galveston Bay, Texas. Oysters associated with 1 case could not be traced.

In all 11 cases, either the patients or a family or a friend of the deceased was contacted by telephone. The patient was interviewed in 4 cases, and a family member or friend supplied information in 7 other cases. Eight of 11 cases apparently were not warned about risks associated with raw oyster ingestion. For only one case was it reported that the individual knew about risks of raw oyster ingestion. Six cases did not have medical insurance, 4 were insured, and insurance coverage information was unavailable for 1 case. Of 4 cases with medical insurance, 1 was warned about the risks by his internist, but misunderstood the preventive health message. He believed that he could detect bad oysters by physical appearance or smell.

During September and October 1995, 103 restaurants served raw oysters from the Gulf Coasts. Warning signs were present in 73 (71%). Most common posting locations, in descending order of frequency, were behind the cash register (50%), at the counter (32%), on the walls of the dining area (21%) and at the take-out window (12%). Of 103 establishments surveyed, more than 50% had no warning sign or a poorly visible sign. Only 7 (10%) of 73 establishments had a warning on the menu. No warning was placed directly on dining tables. Fifty (68%) of 73 establishments had warning signs or notations written in both English and Spanish.

CONCLUSIONS AND RECOMMENDATIONS

Data from this study show possibly serious limitations to current regulatory and educational strategies to prevent *V. vulnificus* infections in LAC. Efforts to prevent *V. vulnificus* infections could focus on improving the preventive message and its dissemination to the population at risk. Current multimedia technology and culturally appropriate methods could be used. The message to consumer could be improved by stating that *V. vulnificus* cannot be detected through taste, smell,

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or appearance.

The 1991 California regulations could be more clearly defined, stating whether and how many warning signs should be posted, directing placement of warning labels on menus or tables, and requiring labels be written in several languages. However, the restaurant survey demonstrated that compliance with an educational campaign required by state government was inadequate.

Expanding educational efforts to primary care physicians and insurers is possible. However, it may be unrealistic to believe clinicians will consistently remember to take time to educate high-risk patients.

Nine of 11 cases regularly drank alcohol. Established educational, prevention-oriented messages have warned people with liver disease not to drink alcohol. Apparently, this population with liver disease either does not perceive its risk or is unwilling or unable to change lifestyle habits. Therefore, additional educational messages to this population aimed at changing eating habits may go unheeded. Because at-risk persons may not be willing to listen to and act on preventive measures, restricting sale of raw oysters harvested from warm waters to colder months (November-April) could be considered by health officials.

In summary, education initiatives failed to prevent 11 cases of *V. vulnificus* infection, including 7 deaths, in LAC. Modifications of the educational strategies might increase their effectiveness: expanded education of physicians and of persons with known high-risk conditions, Hispanic mass media approaches, and a “warning label” next to raw oyster menu items would help disseminate prevention messages and might reduce morbidity and mortality associated with *V. vulnificus*. As an example of these types of approaches, the LAC Department of Health Services distributed an information brochure about raw seafood hazards to gastroenterologists, endocrinologists, infectious disease specialists, and emergency department physicians in LAC in 1996.

We conclude that effectiveness of current preventive strategies is probably insufficient to prevent *V. vulnificus* infections and that enhanced preventive efforts are warranted.

[†] Adapted from: Mouzin E, Mascola L, Tormey MP, Dassey DE. Prevention of *Vibrio vulnificus* infections. Assessment of regulatory educational strategies. *JAMA* 1997;278:576-8.