



Seafood Health Facts: Making Smart choices

Balancing the Benefits and Risks of Seafood Consumption

Resources for Healthcare Providers and Consumers

Microbes and Foodborne Illness [1]

Overview

Food-borne illness is a potential concern for many different foods including seafood. The most recent review of foodborne disease outbreaks in the U.S. in 2007 indicated that a food vehicle was identified in only 43% of the reported outbreaks and only half of these were linked to a single food ingredient. Of those linked to a single commodity in 2007, finfish, poultry, and beef were associated with the most outbreaks. The commodities associated with the higher number of illnesses were poultry, beef, and leafy vegetables.

An analysis of the seafood associated foodborne illnesses reported to the U.S. Foodborne Disease Outbreak Surveillance System from 1973 to 2006 was published in 2010 in the journal *Clinical Microbiology Reviews* (see [To see the abstract for this publication click here](#) [2]). This report characterized illnesses caused by bacteria, viruses and parasites in seafood. During this 33 year period, there were 188 outbreaks, 4,020 illnesses, 161 hospitalizations and 11 deaths reported that were caused by bacterial, viral or parasitic agents in which seafood was identified as the single food vehicle. Approximately three fourths of these outbreaks and two thirds of the reported illnesses were caused by bacterial agents, one fifth of the outbreaks and about one third of the total illnesses were caused by viruses and less than 5% of the outbreaks and subsequent illnesses were caused by parasites.

Pathogens may be present at low levels when fish or shellfish are harvested, and others may be introduced during handling and processing or by unsanitary practices. To control bacterial pathogens it is important to keep seafood cold (as close to 32°F as possible) at all times to limit the potential for pathogens to grow and multiply in the product. Viruses cannot grow in food, but can cause illness if they are present in food when it is eaten. Proper cooking of raw seafood to an internal temperature of at least 145°F for at least 15 seconds will significantly reduce or eliminate any bacterial, viral or parasitic organisms that may be present.

Bacteria in food may cause illness in humans by infection or intoxication. Examples of some of the types of bacteria that may be found in seafood that cause foodborne illness by infection are *Vibrio*, *Salmonella*, *Shigella*, and *Listeria*. From 1973 to 2006, *Vibrio* species accounted for 38% of the outbreaks associated with seafood and 54% of the illnesses. *Salmonella* and *Shigella* each were associated with about 10% of the reported illnesses, and *Listeria monocytogenes* approximately 1%. Foodborne intoxications occur when patients consume pre-formed toxins that are produced by certain types of bacteria when they grow and multiply in the food. *Clostridium botulinum* can produce a potent neurotoxin during growth under anaerobic conditions (absence of oxygen) usually associated with vacuum packed, improperly canned, or fermented products. *C. botulinum* toxin was associated with almost a fourth of the seafood related outbreaks from 1973 to 2006 and caused 152 illnesses and 38% of all hospitalizations. Bacteria such as *Staphylococcus aureus* can produce enterotoxins that cause foodborne illness, but less than 5% of the seafood associated outbreaks and illnesses were associated with this pathogen over the past three decades. Preventing the growth of these bacterial pathogens is important to prevent infection or intoxication when seafood is eaten.

For viral agents, norovirus, associated with both bivalve mollusks and finfish, caused 16% of all seafood related outbreaks and almost 30% of the illnesses reported from 1973 to 2006. Hepatitis A, primarily associated with bivalve mollusks from polluted waters, caused 5% or less of all seafood related outbreaks and illnesses.

Preventing Foodborne Illness

Keeping seafood cold at temperatures below 40°F will help prevent the growth of pathogenic bacteria, and adequate cooking will destroy any pathogens that may be present. Proper sanitation and hygiene are also key

elements of food safety. Bad food handling practices and sanitation may lead to cross contamination during food preparation causing foodborne illness. Cross contamination involves transferring harmful bacteria from one food to another, from cutting boards, utensils, or your hands. To prevent cross contamination when storing or cooking seafood, keep raw seafood and their juices away from already cooked or ready-to-eat foods. It is also essential to wash your hands after touching raw food or non-food surfaces or other dirty objects, and after using the toilet.

The US Food and Drug Administration believes that **prevention** is the best way to avoid foodborne illness. Consumers can prevent foodborne illnesses at home by using safe food handling practices including:

- washing hands, utensils, and cooking surfaces often,
- cooking seafood to a minimum of 145°F for 15 seconds,
- keeping raw and cooked seafood separate to avoid cross-contamination, and
- storing seafood in the refrigerator below 40°F or in the freezer below 0°F.

Higher Risk Consumers

Some consumers have an increased chance of getting a type of foodborne illness called **listeriosis** caused by exposure to *Listeria*. High risk individuals include those who may have a compromised or weak immune system because of health conditions such as liver disease, cancer, chemotherapy patients, HIV infection, stomach or intestinal problems (low stomach acidity), and certain groups such as the elderly, pregnant women and young children. These groups should avoid certain types of seafood and other foods to reduce the chance of getting listeriosis. High risk consumers should avoid refrigerated types of smoked seafood such as salmon, trout, whitefish, cod, tuna, or mackerel. These products can be labeled as “nova-style,” “lox,” “kippered,” “smoked,” or “jerky” and are found in the refrigerated section of grocery stores and delicatessens. There is no concern of getting listeriosis if these products are cooked in a dish such as a casserole or if they are canned or shelf-stable (do not require refrigeration).

Furthermore, to reduce risks of illness from bacteria in food, the U.S. Department of Agriculture (USDA) advises that persons at risk do not eat the following foods:

- Raw fin fish and shellfish, including oysters, clams, mussels, and scallops.
- Raw or unpasteurized milk or cheese.
- Soft cheeses such as feta, Brie, Camembert, blue-veined, and Mexican-style cheese. (Hard cheeses, processed cheeses, cream cheese, cottage cheese, or yogurt need not be avoided.)
- Raw or lightly cooked egg or egg products including salad dressings, cookie or cake batter, sauces, and beverages such as egg nog. (Foods made from commercially pasteurized eggs are safe to eat.)
- Raw meat or poultry.
- Raw sprouts (alfalfa, clover and radish.)
- Unpasteurized or untreated fruit or vegetable juice (These juices will carry a warning label.)

Resources for More Information

Epidemiology of Seafood-Associated Infections in the U.S. Iwamoto, M., Ayers, T., Mahon, B.E. and D. Swerdlow, Centers for Disease Control. *Clinical Microbiology Reviews*, April 2010, 399-411. This peer reviewed journal article authored by scientists from the Enteric Diseases Epidemiology Branch of the CDC summarizes and analyzes the epidemiology of seafood associated illnesses in the U.S. from 1973 to 2006. Included is information on bacterial and viral pathogens and parasites associated with seafood. [To see the abstract for this publication click here](#) [2].

Diagnosis and Management of Foodborne Illnesses, A Primer for Physicians and Other healthcare Professionals - AMA, ANA-ANF, CDC, FDA, USDA. This site contains numerous leaflets on foodborne illness facts for doctors and healthcare providers. [To view this information click here](#) [3].

A-Z Index for Foodborne, Bacteria, and Mycotic Diseases - Centers for Disease Control. [To view this information click here](#) [4].

Foodborne Pathogenic Microorganisms and Natural Toxins Handbook (The “Bad Bug Book”) - Food and Drug Administration. [To view this information click here](#) [5].

Food Poisoning - FoodSafety.gov Contains a list and links to bacteria and viruses most frequently associated with food poisoning cases in the US. [To view this information click here](#) [6].

OutbreakNet, Foodborne Outbreak Online Database - CDC The Foodborne Outbreak Online Database has been designed to allow the public direct access to information on foodborne outbreaks reported to the CDC. [To view this information click here](#) [7].

Public Health Resources from State Health Departments. [To view this information click here](#) [8].

The **USDA Food Safety Research Information Center** provides the scientific community with food safety research information. [To view this information click here](#) [9].

SafeOysters.org is a web site sponsored by the University of Georgia and University of California Sea Grant programs. The web site contains *Vibrio vulnificus* information for physicians, health educators, consumer educators, fishermen and consumers on the risks, symptoms, treatment and more. [To view this information click here](#) [10].

Vibrio vulnificus Health Education Kit: How to Generate Awareness of *Vibrio vulnificus* in raw Oysters within the Hispanic Community. Also available in Spanish. This site includes a fact sheet, raw oyster consumption myths, and recipes. [To view this information click here](#) [11].

FightBAC.org is administered by the Partnership for Food Safety Education (PFSE), a not-for-profit organization that unites industry associations, professional societies in food science, nutrition and health, consumer groups, and the U.S. government to educate the public about safe food handling. [To view this information click here](#) [12].

Safe Food Handling Fact Sheets - US Department of Agriculture. [To view this information click here](#) [13].

The **USDA Food Safety Education** site offers numerous resources on educating consumers about the importance of safe food handling and how to reduce the risks associated with foodborne illness. [To view this information click here](#) [14].

“Microbiological and Parasitic Exposure and Health Effects” in Seafood Safety, Committee on Evaluation of the Safety of Fishery Products, Farid E. Ahmed, Editor, Food and Nutrition Board, Institute of Medicine, National Academy Press (1991). [To view this report click here](#) [15].



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Links

[1]

<https://www.seafoodhealthfacts.org/seafood-safety/general-information-healthcare-professionals/seafood-safety-topics/microbes-and>

[2] <http://cmr.asm.org/cgi/content/abstract/23/2/399>

- [3] <http://www.ama-assn.org/ama/pub/physician-resources/medical-science/food-borne-illnesses/diagnosis-management-foodborne.shtml>
- [4] <http://cdc.gov/nczved/divisions/dfbmd/diseases/index.html>
- [5] <http://www.fda.gov/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBugBook/default.htm>
- [6] <http://www.foodsafety.gov/poisoning/index.html>
- [7] <http://wwwn.cdc.gov/foodborneoutbreaks/Default.aspx>
- [8] <http://www.cdc.gov/mmwr/international/relres.html>
- [9] http://fsrio.nal.usda.gov/nal_display/index.php?info_center=1&tax_level=1&tax_subject=601
- [10] <http://safeoysters.org/>
- [11] <http://www.fda.gov/Food/ResourcesForYou/HealthEducators/ucm085164.htm>
- [12] <http://www.fightbac.org/>
- [13] http://www.fsis.usda.gov/fact_sheets/Safe_Food_Handling_Fact_Sheets/index.asp
- [14] http://www.fsis.usda.gov/Food_Safety_Education/index.asp
- [15] http://www.nap.edu/openbook.php?record_id=1612&page=30