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Preventing Foodborne Illness: *Campylobacteriosis*[1]

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This is one in a series of facts sheets discussing common foodborne pathogens of interest to food handlers, processors and retailers.

What causes a foodborne illness?

Campylobacteriosis is caused by bacteria in the genus *Campylobacter*. There are approximately sixteen species associated with *Campylobacter*, but the most commonly isolated are *C. jejuni, C. coli*, and *C. upsaliensis*. Because these organisms are microaerophilic, they require little to no oxygen; this property is partly responsible for the relatively recent detection of the genus. With respect to growth temperatures, *Campylobacter* are generally mesophilic, with a growth range from about 25° to 45°C and optimal growth at 37°C or 42°C for the thermophilic species. The most prevalent species associated with human illness is *C. jejuni.* The Centers for Disease Control and Prevention estimated that 2.5 million cases per year of diarrheal disease in the United States were linked to this bacterium. It is believed that it affects more individuals than *Shigella* and *Salmonella* together; therefore making it an organism of great public health significance.

What is *Campylobacter*?

Campylobacter are Gram-negative rods that are spirally curved and motile. These organisms are transmitted by the oral route and are normally found in wild birds, poultry, pigs, cattle, domesticated animals, unpasteurized milk and contaminated water. They are transmitted to humans from animals or animal by-products found in such things as undercooked meats and contaminated ice.

What are the symptoms of campylobacteriosis?

The symptoms associated with this disease are usually flu-like: fever, nausea, abdominal cramping, vomiting, enteritis, diarrhea and malaise. Because most people normally recover from this infection on their own, treatment is not usually necessary. However, antibiotics can be used. Symptoms begin 2-5 days after ingestion of the bacteria and the illness duration is normally 7-10 days. Recurrence of this disease can occur up to three months after pathogen ingestion.

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Some individuals may develop Guillain-Barré (GB) syndrome, a nerve disorder that causes muscle weakness and paralysis of the limbs about 2-4 weeks after infection. GB symptoms can last several weeks to many years. The most severe cases may develop into respiratory failure and require hospitalization. About 5– 10% of GB patients die and significant numbers (15 – 20%) are left with permanent nerve damage.

Who is at Risk?

Campylobacteriosis can affect everyone, but the most vulnerable are the very young (under 5 years) and the elderly. This infection is also associated with the immuno-compromised and found to effect males more commonly than females. Those working in hospitals, nursing homes, nursery schools and food preparation locations are more susceptible to infections than the rest of the population.

What foods have been commonly associated with *Campylobacter*?

The most common sources of *Campylobacter* infections are poultry, birds, cattle, pigs, sheep, ostriches, shellfish, dogs, cats, unpasteurized milk, contaminated water and ice. Fruits and vegetables are also a source of infection due to washing with contaminated water. However, infection is mostly caused by consumption of undercooked or raw meats, specifically poultry.

What sanitation methods are used to prevent campylobacteriosis?

When storing meats associated with *Campylobacter*, freezing temperatures are best because the number of bacteria is reduced on raw meat. Prevent cross contamination by using separate cutting boards for meat and fruits/vegetables. Plastic bags should be used to wrap the fresh meat to prevent blood from dripping on other food surfaces.

According to the 2001 Food Code, the internal temperature for cooking poultry should be 165°F (74°C) or above for a minimum of 15 seconds (3-401.11(A)(3)). All other meats should be prepared at 145°F (63°C) or above for 15 seconds (3-401.11(A)(2)). Also, avoiding unpasteurized milk and untreated surface water will help prevent infection.

Because diarrhea is associated with people infected with *Campylobacter,* hand washing must be carefully executed and thorough. It is important to wash hands before, during and after: handling raw foods, smoking, cleaning, using the restroom, and touching soiled equipment or clothing. The following is the proper technique for hand washing:

- Wet your hands with warm water.
- Apply soap and wash your hands for 20 seconds.
- Rinse and dry with a single-use paper towel.
- Use the paper towel to shut off the water.

Good Practices for Food Product Receiving, Handling, Processing and Storage

The FDA defines Current Good Manufacturing Practices for food (cGMPs) in 21 CRF, Part 110. These cGMPs outline minimally required general sanitation requirements in FDA inspected food handling and processing facilities. It is recommended that more specific and stringent standard operating procedures (SOPs) be developed for individual facilities. In addition, the sanitation recommendations for food service and retail food facilities outlined in the FDA Food Code (FDA, 1999 and 2001) have been adopted into many state and local regulations. As there may be some variation in Food Code adoption, it is important that each facility check with the appropriate state and/or local regulatory authority. The Florida statues can be found at http://www.flsenate.gov/statutes/, Title 33: Chapter 509.

In addition to setting and adhering to strict sanitation requirements in the facility, a retail establishment should also develop SOPs for receiving and storage of food products and ingredients. If food processing is being done, appropriate controls and requirements should be established and strictly

adhered to. FDA Food Code outlines appropriate processing and cooking requirements for many food products processed in a retail facility. However, if certain high-risk food products (such as sushi, fresh juice, specialty meats and others) are processed in the retail establishment, rather than in a more traditional processing facility, additional controls and the issuance of a variance by the regulatory authority is required before processing can occur (Food Code 3-502.11). The growing retail practice of cooking/preparing/packaging foods traditionally processed in controlled plant environments raises safety concerns. Any processing of food at the retail level needs to be closely monitored.

As an establishment becomes cleaner, it becomes harder to detect foodborne pathogens. At this point testing becomes more limited in its ability to prevent foodborne illness. This is why programs that promote and monitor the use of barriers and/or hurdles are so important. When instituted properly, these activities will reduce the risk of a foodborne illness. Nothing can be done to completely eliminate bacterial contamination short of vacuum sealing, irradiating and storing all your food frozen. Since most consumers prefer a fresh product, programs should be implemented that reduce the probability of illness to a point that it is minuscule.

Receiving

Specifications for receiving can be found in section 3-202.11 of the 2001 Food Code (http://vm.cfsan.fda.gov:80/~dms.foodcode.html). The following guidelines cover the basic points that should be addressed:

- Potentially Hazardous Food (PHF) should be at a temperature of 5^{o}C or below when received, unless specified by law (e.g., milk, shellfish).
- Raw shell eggs should be received at an ambient air temperature of 7^{o}C or less.
- PHFs that are received hot should be at a temperature of 60^{o}C or above.
- PHFs should be received with no evidence of temperature abuse such as evidence of thawing.

Processing

One of the easiest ways to prevent foodborne campylobacteriosis is ensuring that foods are cooked thoroughly. It should be noted that certain foods that are typically served uncooked such as raw eggs (used in Caesar salads, homemade mayonnaise, raw cookie dough, etc.) and fresh vegetables will obviously not benefit from the cooking process. For these items, other factors such as sanitation, worker hygiene and proper storage take on much greater importance.

- When using raw eggs in your recipes, try to purchase a pasteurized egg product.
- Cook eggs, fish, meat, or foods containing these items to an internal temperature of 145^{o}F or above for a minimum of 15 seconds (2001 Food Code).
- Cook ground meat products to an internal temperature of 155^{o}F or above for a minimum of 15 seconds (2001 Food Code).
- Cook poultry to an internal temperature of 165^{o}F or above for a minimum of 15 seconds (2001 Food Code).
- Reheating previously cooked material to an internal temperature to 165^{o}F.

For recommendations that are more specific consult the 1999 or 2001 Food Code (http://www.cfsan.fda.gov/~dms/foodcode.html).

Storage

Once a product has been received and/or processed, it now will be displayed or stored. There are some general guidelines governing these practices as well.

- Frozen food should remain frozen until it is used.
- If frozen food is displayed in a refrigerated case and allowed to thaw, the food should remain at 5^{o}C or below.
- Frozen food should be thawed at a temperature of 5^{o}C or below or under running water at a temperature of 21^{o}C or below.

- Lastly, the product can be thawed as part of the cooking process.
- Product must be cooled adequately. Refer to sections 3-501.14 and 3-501.15 of the 1999 or 2001 Food Code (http://www.cfsan.fda.gov/~dms/foodcode.html).
- Cooked product should be maintained above 60^{o}C while displayed and stored at or under 5^{o}C.
- Properly label all stored product.

Personal Hygiene

Wash your hands! The major cause of foodborne illness in retail establishment comes from poor personal hygiene, particularly a lack of proper hand washing. Dirty hands can contaminate food. Although hands may look clean, the bacteria that cause illness are too small to be seen. Therefore, whenever you are preparing food and you come in contact with items that are not part of the assembly process, rewash your hands. The same is true even when wearing gloves. THERE IS NO FIVE SECOND RULE WHEN IT COMES TO FOOD SAFETY! Millions of bacteria and other germs can be transferred on contact. Here is a list of times when should you wash your hands:

- Before handling, preparing food or serving food.
- Before handling clean utensils or dishware.
- After using the restroom.
- After touching your face, cuts or sores.
- After smoking/eating/drinking.
- After handling raw meat - especially poultry.
- After touching unclean equipment, working surfaces, soiled clothing, soiled wiping cloths, etc.
- After collecting and taking out the garbage.

What is the Proper Procedure for Hand Washing?

- Wet your hands with warm water.
- Apply soap and wash your hands for 20 seconds.
- Rinse and dry with a single-use paper towel.
- Use the paper towel to shut off the water.

Resources:

2001 Food Code. Chapter 3; Part 3-4; Subpart 3-401 (2001).

http://ohioline.osu.edu/hyg-fact/5000/5565.html

http://www3.bc.sympatico.ca/me/patientsguide/foodbrn.htm

http://vm.cfsan.fda.gov/~mow/chap4.html

http://www.niaid.nih.gov/factsheets/foodbornedis.htm#D

http://www.cdc.gov/ncidod/dbmd/diseaseinfo/campylobacter_g.htm

http://www.state.nj.us/health/cd/f_campylob.htm