Detailed Campylobacter

DETAILED INFORMATION FOR CAMPYLOBACTER FACT SHEET

Campylobacter is the leading cause of bacterial diarrheal illness and is found everywhere! The *Campylobacter* organism is a bacterium that can cause disease in humans and animals with one species – *Campylobacter jejuni* – being responsible for most of the human illness cases. *Campylobacter's* growth characteristics allow it to grow best in the intestines of warm blooded birds and mammals. It is not carried by healthy individuals in the United States or Europe, but is often isolated from healthy cattle, chickens, birds, and flies, and is sometimes present in non-chlorinated water sources such as streams and ponds. Its presence in these waters is caused by fecal material moving through the environment. *Campylobacter jejuni* is often abbreviated *C. jejuni*.

http://www.about-campylobacter.com/

WHAT IS CAMPYLOBACTERIOSIS?

Campylobacteriosis is an infectious disease caused by *C. jejuni*. It is also referred to as *Campylobacter* enteritis or gastroenteritis. Most cases of *C. jejuni* are sporadic (appearing singly or at widely scattered places) or involve small family groups although some common-source outbreaks involving many people have been recorded. It is believed that consuming less than 500 *C. jejuni* bacteria can cause illness.

WHAT ARE THE SYMPTOMS AND THE INCUBATION TIME?

Although they may appear anytime from 2-10 days after exposure, *C. jejuni* symptoms usually begin to show within an average of 2-5 days. Most people who become ill with campylobacteriosis will show symptoms including fever, headache and muscle pain, followed by diarrhea, abdominal pain and cramping, nausea and vomiting. Enteritis (inflammation of the intestinal tract, especially the small intestine) is also seen with *Campylobacter* infections. Most children infected with *Campylobacter* will have diarrhea, abdominal pain and fever and will feel quite sick. In some cases, the abdominal cramping may be more severe than the diarrhea. In these cases, campylobacteriosis is often mistaken for appendicitis or for a problem with the pancreas.

Despite the presence of all the other symptoms, diarrhea is the most common and prominent symptom of campylobacteriosis. The diarrhea may start off watery and then gradually become bloody and contain mucus. Like many other foodborne and waterborne pathogen infections, some infected persons will remain asymptomatic (not showing any symptoms) even though they are infected. On the other hand, there are some people who will develop severe complications upon being exposed to the *Campylobacter* bacteria. Some of the complications include arthritis, septicemia (a bacterial blood infection), urinary tract infections and rarely, feverish convulsions or meningitis (inflammation of the membranes that cover the brain and spinal cord). Infection with *Campylobacter* has also been associated with the development of Guillain-Barré Syndrome, the leading cause of acute paralysis (rapid onset, followed by a short but severe course of loss of sensation over a region of the body) in the United States. These cases will be discussed below in the 'Am I at severe risk for disease?' section.

HOW LONG DO THE SYMPTOMS LAST?

Most *Campylobacter* infections are self-limiting and are not treated with antibiotics, although they may shorten the illness. In some cases, full recovery may take 2-5 days, while other infections need 7-10 days to resolve. Severe cases may persist for up to three weeks,

and long-term consequences may result. It is important to note that relapses of illness are not uncommon and will occur in about 25% of campylobacteriosis cases. In the case that a long-term complication, such as Guillain-Barré, does develop, the onset of symptoms is usually a couple of weeks after the onset of diarrheal illness and the disease itself lasts for weeks to months with intensive care treatment being required. Although full recovery is common, neurological effects may persist even after the disease has resolved.

HOW IS IT DIAGNOSED?

Many different pathogens can cause diarrhea and the other symptoms associated with campylobacteriosis, therefore diagnosis based on symptoms alone is not sufficient to identify the specific infection. Doctors can look for bacterial causes of diarrhea by asking a laboratory to test a sample of feces from someone they expect is infected with *Campylobacter*.

WHO IS AT RISK?

Anyone is at risk and may become ill from *Campylobacter*; however, those who are immunocompromised, such as cancer and AIDS patients, are believed to be more predisposed to health complications. Children under the age of five and young adults aged 15-29 are the age groups most frequently infected, although the elderly could also be more susceptible because of weakened immune systems. In industrialized countries, illness is more common in children younger than 2 years old, while in developing countries, older children and young adults have the highest incidence of infection. Anyone in regular contact with cattle, poultry, sheep, house pets (kittens and dogs) may also be at increased risk since these animals are known to be reservoirs for the bacteria. Being a reservoir means they could be carrying the organism while not showing any signs or symptoms and still be able to spread the disease causing agent. In 2015, there were 9080 reported cases of Campylobacteriosis across Canada in people of all ages.

AM I AT SEVERE RISK FOR DISEASE?

Complications from campylobacteriosis are relatively rare, as the disease is self-limited and usually resolves without the help of antibiotics. However, long-term consequences are a possibility. In addition to its associated symptoms, *Campylobacter* may also cause appendicitis, peritonitis (abdominal cavity infection), meningitis (central nervous system infection), carditis (heart inflammation), cholecystitis (gallbladder inflammation), urinary tract infection and septicemia (blood infection). In addition, though rarely, infections have been also associated with reactive arthritis called Reiter's Syndrome, and Guillain-Barré Syndrome. These two syndromes are discussed below. Fatalities are rare in healthy individuals and usually occur in cancer patients or those that are immunocompromised. The estimated case/fatality ratio for all *C. jejuni* infections is 1/1000 cases.

REITER'S SYNDROME

Reiter's syndrome, also referred to as reactive arthritis, commonly affects large weight-bearing joints such as the knees and the lower back. It produces pain, swelling, redness and heat in the joints it affects and causes inflammation of the urinary tract (urethritis) and redness of the eyes (conjunctivitis). It has also been shown to cause ulcerations (development of local defects or cavities) of the skin and mouth and bring about a rash.

WHAT IS GUILLAIN-BARRÉ SYNDROME?

Guillain-Barré Syndrome (GBS) can affect anybody, although it is a rare syndrome – about 1 in 1000 patients infected with campylobacteriosis will develop this complication following their infection. GBS is an inflammatory disorder in which the body's immune system attacks part of the peripheral nervous system (the nerves outside the brain and spinal cord). It usually occurs a few days to weeks after the campylobacteriosis symptoms have occurred, and reaches its peak of infectivity (associated with people reaching the stage of greatest weakness) within the first 2 weeks after symptoms appear. By the third week of the illness, 90% of all patients are at their weakest.

The first symptoms to appear include varying degrees of weakness or tingling sensations in the legs, with these sensations commonly spreading to the arms and the upper body. The severity of the symptoms can increase until certain muscles are no longer functional and in the most severe cases, total paralysis sets in. This syndrome often requires intensive care. The most severe cases are life threatening because it may interfere with breathing, blood pressure and heart rate. The muscles used for eye movement, speaking, chewing and swallowing may also become weak or paralyzed. Most people who do develop this

complication, even those who experience the most severe cases, will recover after long-term rehabilitation, although some may continue to have a certain degree of weakness. It is estimated that permanent injury remains in about 15%-20% of people with GBS. These people are usually bedridden or wheelchair bound.

HOW DOES CAMPYLOBACTER SPREAD?

Campylobacteriosis is considered to be a zoonosis (a disease of animals that can be transmitted to humans), with the bacteria rarely causing illness in animals. C. jejuni is commonly present in the gastrointestinal tract of healthy cattle, pigs, chickens, turkeys, ducks and geese, as well as household pets, such as cats, dogs and birds, and direct animal exposure can lead to infection. The bacteria may also spread through contaminated food including meats and unpasteurized milk, or water from contaminated sources, including streams and rivers near where animals graze. In fact, most cases of campylobacteriosis are associated with handling raw poultry or eating raw/undercooked poultry meat. A very small number of Campylobacter organisms (fewer than 500) can cause illness in humans, so even one drop of juice from raw chicken meat has the capability of infecting someone.

Cross contamination (the spreading of bacteria from something that is contaminated with bacteria to something that is not) is a major factor in how *C. jejuni* is spread. One example of this is cutting poultry on a cutting board and then using the unwashed board and utensils to prepare other foods that will be eaten raw or lightly cooked (i.e. salad, potatoes, etc...).

Poultry is the most common food implicated in the spreading of Campylobacter with up to 70% of sporadic cases of campylobacteriosis being associated with eating chicken. Other implicated foods include: mushrooms, hamburgers, cheese, pork, shellfish and eggs. Unpasteurized (raw) milk and milk products and contaminated drinking water are also well-noted causes of campylobacteriosis. These sources are commonly associated with the larger *Campylobacter* outbreaks, when a number of people become ill at one time.

The organism, though not usually spread from person to person, can be spread via the fecal-oral route. This can happen if the infected person is producing a large volume of diarrhea. Newborns can pick up the *Campylobacter* bacteria from their mothers or from infection in the nursery. Other sources may include children prior to being toilet-trained (especially in day care settings) and intimate contact with other infected individuals.

In the United States, *C. jejuni* infects between 2-4 million people per year and is responsible for 99% of all *Campylobacter* infections. *C. jejuni* is the second most common cause of diarrhea due to drinking contaminated water and worldwide it causes between 5%-10% of diarrhea illness in adults and has been responsible for epidemics of diarrhea in developing countries.

HOW CAN I PREVENT GETTING CAMPYLOBACTERIOSIS?

Infection control measures at all stages of food processing may help decrease the incidence of *Campylobacter* infections. There are some simple food-handling practices, as well as other simple precautionary actions that are effective for preventing *Campylobacter* infections. A list of these recommendations is given below:

- Thoroughly cook all poultry products. The meat should no longer be pink, any juices should run clear and the internal temperature should be 170°F (77°C) for white meat and 180°F (82°C) for dark meat. Also be sure that other meats and eggs are fully cooked. Children should not eat raw eggs, or foods containing them.
- Wash and peel all fruits and vegetables before eating them, especially if they'll be consumed raw.
- Do not consume unpasteurized milk or milk products.
- Wash hands thoroughly with soap and water before handling raw foods (meat) as well as after, especially before preparing other foods that may be consumed raw. Also, wash your hands after using the bathroom, after blowing your nose, and before preparing food. While washing focus on fingertips and nail creases and dry hands with disposable paper towel.
- Use separate cutting boards/counter surfaces and utensils for the preparation of raw meats and other foods. This will prevent cross contamination.
- Clean all surfaces and utensils used throughout food preparation after the preparation of raw meat is complete.
- Make sure children and other people with diarrhea frequently and carefully wash their hands with soap and water, especially after using the bathroom and before eating to reduce the risk of spreading the infection.
- Thoroughly wash your hands after contact with any animals or pets, especially if you've come into contact with the feces.

The prevention of infection requires control measures at all stages of the food chain, from agricultural production on the farm, to processing, manufacturing and preparation of foods in both commercial establishments and the domestic environment. With this in mind, other precautionary methods that can easily be carried out include:

- Choosing the coolest part of the vehicle to transport meat, poultry and other foods home from the grocery store. This is usually the trunk in the winter and in the car itself during the summer.
- Do not leave frozen meat on the counter to defrost! Meat and poultry should be defrosted in the refrigerator by placing the items on a low shelf in a pan lined with paper towels to avoid leakage onto other products. If defrosting in the refrigerator is not an option, then the meat should be defrosted in the microwave.
- Make sure your food is fully cooked and still hot when served.
- Foods should be stored below 5°C or above 60°C to prevent growth of bacteria, and reheated to an internal temperature of at least 75°C.
- Leftovers should be cooled rapidly, and not left out at room temperature for more than 2 hours. This also applies to food being left out during meal preparation.
- Protect food from insects, rodents and other animals.

It is also important to maintain sanitary water supplies. Drink water from a safe supply, and avoid ice (especially when traveling), unless it is made from water that is known to be safe. When hiking and camping, avoid drinking water from mountain streams and from sources that pass through lands where animals graze. Untreated water that comes directly from lakes or rivers may be fecally contaminated by animals or people. When the safety of drinking water is uncertain, the water should be boiled before consumption. If this is not possible, it should be disinfected with a reliable, slow-release disinfectant agent.

HOW DO I PREVENT SPREADING IT TO OTHERS?

Campylobacter is best prevented by proper food handling and cooking, maintaining sanitary water supplies and practicing good hygiene (i.e. consistently and properly washing your hands). If you are suffering from diarrhea, nausea, cramps or diarrhea, preparing food for others should be avoided. Professional food handlers who experience any of these above symptoms should report it to their employer immediately.

Bathrooms and toilets should be cleaned often to avoid the spread of bacteria, especially if someone has recently been ill with *Campylobacter*. Special attention should be paid to toilet seats and handles, taps and change tables.

Specific intervention methods on the farm have been shown to reduce the incidence of *Campylobacter* in poultry, and good hygienic slaughtering practices will reduce contamination of carcasses by feces, but will not guarantee the absence of *Campylobacter* from meat and meat products. Therefore, the best prevention of spreading bacteria to others is to practice hygienic food handling methods at all steps in the food processing and preparation procedure.

CAN I STILL WORK?

Food handlers, child care workers and health care workers with Campylobacter infection must not work until symptoms have stopped, and children with campylobacteriosis should not attend child care centres, kindergarten or school until parents are sure the accompanying symptoms have cleared.

WHAT IS THE TREATMENT FOR CAMPYLOBACTERIOSIS?

Most *Campylobacter* infections are self-limiting and are not treated with antibiotics or any other specific treatment. Those infected, especially children, should drink lots of water or electrolyte solutions while diarrheal symptoms persist to avoid dehydration. Signs of dehydration include: thirst, irritability, restlessness, lethargy (abnormal drowsiness), sunken eyes, dry mouth and tongue, dry skin and decreased urinary frequency. If taking fluids orally is not possible due to nausea, medical attention may be required so that fluids can be administered intravenously. Antidiarrheal medications may also be effective in reducing the intensity of some symptoms.

In some cases, campylobacteriosis is treated with antibiotics to reduce the length of time that infected individuals are sick and shed the bacteria in their feces. Antibiotics may also aid in preventing relapse. In more severe cases, antibiotics can shorten the duration and decrease the severity of symptoms if they are given early in the illness.

HOW PREVALENT IS CAMPYLOBACTER IN SURFACE/WELL WATER?

One of the most common sources of *Campylobacter* is contaminated water. Through contamination with feces, wild and domestic animals shed *Campylobacter* into lakes, rivers, streams and reservoirs, and so all water for human consumption must be properly treated.

Faults in municipal water supplies have caused outbreaks affecting up to 3,000 people in the USA and Sweden. In Britain, defective storage tanks have caused outbreaks affecting up to 250 people.

Campylobacter is common in the developing world, and travelers to foreign countries are also at risk of becoming infected with the bacteria.

Groundwater and water from rainwater tanks is usually drinkable, however, it is sometimes contaminated by human, bird or animal feces, usually from leaking septic tanks and wastewater drainage. Irrigation channels and local streams may also be contaminated by runoff washed from farmyards, pastures and drains, making them generally unsuitable as a source of drinking water unless the water is properly treated. In general, surface waters such as streams and lakes are more likely to contain disease-causing organisms than groundwater. Deep wells are safer than shallow wells. In fact, shallow dug wells are often as contaminated as lakes or streams.

HOW CAN I PROTECT MY WATER SUPPLY AND MAKE SURE IT IS SAFE TO DRINK?

Given below is a list of guidelines that, if followed, will reduce the likelihood of harmful microorganisms, such as *Campylobacter*, causing problems in you water supply.

- Collect and store your water so that fecal contamination from human and animal sources is minimized. If possible, store drinking water in an above-ground tank rather than in an underground tank.
- Ensure that surface runoff, irrigation water, leakage from sewer pipe and shallow underground seepage cannot enter your drinking water supply.
- Make sure that any deep well used as a source of drinking water is properly sealed and has an above ground well-head.
- Regularly clean your roof and gutter to remove leaves, animal or bird remains, dust and other debris. Install simple screens between your roof and the water tank.
- Seal your water tank so that insects, small animals, birds and sunlight can not enter (this will also help to minimize the growth of algae).
- Regularly maintain your water tank and clean out accumulated sludge from the floor.

- Ensure that your domestic drinking water plumbing is completely separate from all other plumbing or pipe systems on your property and that all pipe joints are properly sealed.
- Disinfect your water supply to kill any harmful microorganisms.

WHAT ARE SOME WAYS I CAN TREAT MY WATER TO ENSURE ITS SAFETY?

There are several methods you may use to disinfect water and make it safe to drink. The method you use will depend on the water you are trying to disinfect, and what you have available for water treatment. Some options are listed below.

- Boiling water meant for consumption is the best way to kill any bacteria that might be present. The water should be brought to a rolling boil for at least 1 minute, and for a longer time period (approximately 3 minutes) if at higher altitudes. Although this method is effective, it is not meant for water that is obviously heavily polluted.
- Disinfection is also an effective way to treat water. Chemical disinfectants for private water sources can be purchased, and the directions given on the package should be closely followed to ensure effective results.

HOW SHOULD I STORE MY WATER ONCE IT'S TREATED?

Water should be stored in clean, heavy, plastic containers such as 2 litre pop bottles or 5 gallon stackable mylar storage containers. Plastic milk containers should not be used because the plastic is very thin and is prone to leaking. Also, containers that are not food grade or that at one time served as storage for chemicals aren't appropriate for water storage.

If water is properly stored in a cool, dark, indoor room it is should keep for about two years. Water can store longer, but this shouldn't be counted on.

Did you know that our Operation Water Health program is available free of charge to teachers worldwide and provides the teachers with all of the lesson plans and information they need to teach students about what safe drinking water is, what unsafe drinking water is, and what health problems can be caused by unsafe drinking water? Please help us to keep our Operation Water Health program up-to-date! Please chip in $5 or donate $20 or more and receive an Official Donation Receipt for Income Tax Purposes.

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