<u>Chapter-3</u> <u>DAC/MPH</u> <u>Foodborne Diseases:</u>

Over 200 diseases are caused by eating food contaminated with bacteria, viruses, parasites or chemical substances such as heavy metals.

Every year, nearly one in 10 people around the world fall ill after eating contaminated food, leading to over 420 000 deaths.

Children are disproportionately affected, with 125000 deaths every year in people under 5 years of age.

The majority of these consequence are caused by diarrhoeal diseases. Other serious consequences of foodborne diseases include kidney and liver failure, brain and neural disorders, reactive arthritis, cancer, and death.

Foodborne diseases are caused by contamination of food and occur at any stage of the food production, delivery and consumption chain. They can result from several forms of environmental contamination including pollution in water, soil or air, as well as unsafe food storage and processing.

Foodborne diseases are closely linked to poverty in low- and middle-income countries but are a growing public health issue around the world. Growing cities, climate change, migration and growing international travel compound these issues and expose people to new hazards.

[Ref. https://www.who.int/health-topics/foodborne-diseases#tab=tab_2].

What is Foodborne disease?

The World Health Organization (WHO) says- the foodborne illnesses are resulted from the contaminated food by microorganisms or chemicals."

"The contamination of food may occur at any stage in the process from food production to consumption ('farm to fork') and can result from environmental contamination, including pollution of water, soil or air."

Bacteria, viruses, parasites, fungi, and other poisons, for example, may have contaminated the food that caused an illness.



Symptoms of Foodborne Illness:

Gastrointestinal symptoms are the most common symptoms of foodborne diseases. However, a foodborne illness may have immunological or neurological symptoms. Patients may also have gynecological and many other types of symptoms.

In fact, some contaminated foodstuffs can cause multiple organ failure and even cancer.

The most common symptoms of foodborne illnesses are-

- Common symptoms of foodborne illness are diarrhea and/or vomiting, typically lasting 1 to 7 days. Other symptoms might include abdominal cramps, nausea, fever, joint/back aches, and fatigue.
- What some people call the "stomach flu" may actually be a foodborne illness caused by a pathogen (i.e., virus, bacteria, or parasite) in contaminated food or drink.
- The incubation period (the time between exposure to the pathogen and onset of symptoms) can range from several hours to 1 week



Most Common Foods Responsible for Food Poisoning

Food poisoning is especially serious and potentially life-threatening for young children, pregnant women and their fetuses, older adults, and people with weakened immune systems. These individuals should take extra precautions by avoiding the following foods:

- Raw or rare meat and poultry
- Raw or undercooked fish or shellfish, including oysters, clams, mussels and scallops
- Raw or undercooked eggs or foods that may contain them, such as cookie dough and homemade ice cream
- Raw sprouts, such as alfalfa, bean, clover and radish sprouts
- Unpasteurized juices and ciders
- Unpasteurized milk and milk products
- Soft cheeses, such as feta, Brie and Camembert; blue-veined cheese; and unpasteurized cheese
- Refrigerated pates and meat spreads
- Uncooked hot dogs, luncheon meats and deli meats



Symptoms and Sources of Common Food Poisoning Germs

Some germs make you sick within a few hours after you swallow them. Others may take a few days to make you sick. This list provides the symptoms, when symptoms begin, and common food sources for germs that cause food poisoning. The germs are listed in order of how quickly symptoms begin.

Contaminant	Onset of symptoms	Foods affected and means of transmission
Campylobacter	2 to 5 days	Meat and poultry. Contamination occurs during processing if animal feces contact meat surfaces. Other sources include unpasteurized milk and contaminated water.
Clostridium botulinum	12 to 72 hours	Home-canned foods with low acidity, improperly canned commercial foods, smoked or salted fish, potatoes baked in aluminum foil, and other foods kept at warm temperatures for too long.
Clostridium perfringens	8 to 16 hours	Meats, stews and gravies. Commonly spread when serving dishes don't keep food hot enough or food is chilled too slowly.

Contaminant	Onset of symptoms	Foods affected and means of transmission
Escherichia coli (E. coli)	1 to 8 days	Beef contaminated with feces during slaughter. Spread mainly by undercooked ground beef. Other sources include unpasteurized milk and apple cider, alfalfa sprouts, and contaminated water.
Giardia lamblia	1 to 2 weeks	Raw, ready-to-eat produce and contaminated water. Can be spread by an infected food handler.
Hepatitis A	28 days	Raw, ready-to-eat produce and shellfish from contaminated water. Can be spread by an infected food handler.
Listeria	9 to 48 hours	Hot dogs, luncheon meats, unpasteurized milk and cheeses, and unwashed raw produce. Can be spread through contaminated soil and water.
Noroviruses (Norwalk-like viruses)	12 to 48 hours	Raw, ready-to-eat produce and shellfish from contaminated water. Can be spread by an infected food handler.
Rotavirus	1 to 3 days	Raw, ready-to-eat produce. Can be spread by an infected food handler.
Salmonella	1 to 3 days	Raw or contaminated meat, poultry, milk, or egg yolks. Survives inadequate cooking. Can be spread by knives, cutting surfaces or an infected food handler.
Shigella	24 to 48 hours	Seafood and raw, ready-to-eat produce. Can be spread by an infected food handler.
Staphylococcus aureus	1 to 6 hours	Meats and prepared salads, cream sauces, and cream-filled pastries. Can be spread by hand contact, coughing and sneezing.
Vibrio vulnificus	1 to 7 days	Raw oysters and raw or undercooked mussels, clams, and whole scallops. Can be spread through contaminated seawater.

Risk factors

Whether we become ill after eating contaminated food severity depends on the organism, the amount of exposure, age and health. High-risk groups include:

- **Older adults.** As we get older, our immune system may not respond as quickly and as effectively to infectious organisms as when we were younger.
- **Pregnant women.** During pregnancy, changes in metabolism and circulation may increase the risk of food poisoning. This reaction may be more severe during pregnancy. Rarely, baby may get sick, too.
- Infants and young children. Their immune systems haven't fully developed.
- **People with chronic disease.** Having a chronic condition such as diabetes, liver disease or AIDS or receiving chemotherapy or radiation therapy for cancer reduces our immune response.

Complications of Foodborne Diseases

The most common serious complication of food poisoning is **dehydration** — a severe loss of water and essential salts and minerals. If you're a healthy adult and drink enough to replace fluids you lose from vomiting and diarrhea, dehydration shouldn't be a problem.

Infants, older adults and people with suppressed immune systems or chronic illnesses may become severely dehydrated when they lose more fluids than they can replace. In that case, they may need to be hospitalized and receive intravenous fluids. In extreme cases, dehydration can be fatal.

Some types of food poisoning have potentially serious complications for certain people. These include:

 Listeria infection. Complications of a listeria food poisoning may be most severe for an unborn baby. Early in pregnancy, a listeria infection may lead to miscarriage. Later in pregnancy, a listeria infection may lead to stillbirth, premature birth or a potentially fatal infection in the baby after birth — even if the mother was only mildly ill. Infants who survive a listeria infection may experience long-term neurological damage and delayed development. • Escherichia coli (E. coli). Certain E. coli strains can cause a serious complication called hemolytic uremic syndrome. This syndrome damages the lining of the tiny blood vessels in the kidneys, sometimes leading to kidney failure. Older adults, children younger than 5 and people with weakened immune systems have a higher risk of developing this complication.

**[Note. Hemolytic uremic syndrome (HUS) is a rare but serious disease that causes destruction of red blood cells, which can then cause kidney failure.]

Prevention: To prevent food poisoning at home:

- Wash your hands, utensils and food surfaces often. Wash your hands well with warm, soapy water before and after handling or preparing food. Use hot, soapy water to wash utensils, cutting boards and other surfaces you use.
- Keep raw foods separate from ready-to-eat foods. When shopping, preparing food or storing food, keep raw meat, poultry, fish and shellfish away from other foods. This prevents cross-contamination.
- **Cook foods to a safe temperature.** The best way to tell if foods are cooked to a safe temperature is to use a food thermometer. You can kill harmful organisms in most foods by cooking them to the right temperature.

Cook beef to 71.1° C; steaks, roasts and chops, such as lamb, pork at least 62.8° C. Cook chicken and turkey to 73.9° C. Make sure fish and shellfish are cooked thoroughly.

- **Refrigerate or freeze perishable foods promptly** within two hours of purchasing or preparing them. If the room temperature is above 90 F (32.2 C), refrigerate perishable foods within one hour.
- **Defrost food safely.** Don't thaw food at room temperature. The safest way to thaw food is to defrost it in the refrigerator. If you microwave frozen food using the "defrost" or "50% power" setting, be sure to cook it immediately.
- **Throw it out when in doubt.** If you aren't sure if a food has been prepared, served or stored safely, discard it. Food left at room temperature too long may

contain bacteria or toxins that can't be destroyed by cooking.. Even if it looks and smells fine, it may not be safe to eat.



Diagnosis of Foodborne Diseases:

Medical History

During a medical history, healthcare provider will ask about your symptoms, including their duration and severity. They will also inquire about what you ate, as well as patterns of symptoms (e.g., whether or not everyone in your family got sick after eating a certain dish or after a family picnic).

Physical Examination

Healthcare provider will check blood pressure, heart rate, temperature, and weight. They will also press on abdomen and listen to bowel sounds to evaluate for diagnoses that may mimic that of food poisoning, like <u>appendicitis</u>.

Tests

In most cases, a healthcare provider will presume a diagnosis of food poisoning based on a medical history and physical examination alone. Additional tests may be ordered if your healthcare provider suspects a different diagnosis (for example, <u>appendicitis</u>) or a complication from food poisoning (for example, dehydration or <u>sepsis</u> from bacteria entering the bloodstream).

Examples of such tests include:

- A <u>basic metabolic panel</u> and a <u>urinalysis</u> to check for dehydration
- A complete blood count to check for severe infection or anemia
- A <u>computed tomography scan</u> to check for other diagnoses
- Stool tests may be ordered to look for and identify the cause of the infection.

Treatment

The key treatment for food poisoning is to stay hydrated, and this usually can be done effectively at home.

Hydration

To stay hydrated and replace the fluid you have lost, it's important to drink water that has salt and sugar in it.

You can breastfeed or use formula for babies and Pedialyte for children.

For adults or children, you can use an oral saline therapy, or you can make your own solution by adding 6 teaspoons of sugar and 0.5 teaspoons of salt to <u>1 liter of water</u>.

Avoid sports drinks like Gatorade, which cannot properly correct fluid and electrolyte losses because of their high sugar content. In fact, they may even worsen your diarrhea.

Medication

For the majority of cases of food poisoning, medications are not necessary.

<u>Antibiotics</u> are generally reserved for severe infections, such as shigellosis (*Shigella* infection). Another type of medication, called an **antiparasitic**, is used to treat food poisoning caused by parasites.

Anti-diarrheal agents, like <u>Imodium (Ioperamide)</u>, are generally advised only for adults (not children) who have mild symptoms, no fever, and non-bloody diarrhea.

In some instances, your healthcare provider may recommend an **anti-emetic** such as <u>Zofran (ondansetron)</u> to suppress vomiting and prevent dehydration. The **antacid** Pepto-Bismol (bismuth subsalicylate) may also be recommended to ease uncomplicated diarrhea. In severe cases of dehydration and/or in cases of food poisoning in high-risk individuals, such as the elderly, hospitalization for IV fluid delivery may be required.

Food Poisoning/Intoxication vs. Food Infection

Infections Intoxications/ Poisoning Bacterial / Viral / parasite toxins (natural / preformed bacterial / chemical) No invasion or multiplication Invade and or multiply in lining of intestine Incubation period- hours to days • Incubation period- minutes to hours S/s – Diarrhea, nausea, vomiting, S/s – Vomiting, nausea, diarrhea, abdominal cramps, fever diplopia, weakness, resp. failure, numbness, sensory/motor dysfunction Not communicable Communicable-spreads from Factors-inadequate cooking , improper person to person handling temperatures Factors-inadequate cooking, cross contamination, poor personal

Stomach Bug

hygiene, bare hand contact

•The illness is caused by a certain group of viruses that result in the inflammation of the stomach and intestines.

• Some viruses that cause the stomach bug are the norovirus, adenovirus, and rotavirus. The stomach bug is a colloquial term for viral gastroenteritis.

• Viral gastroenteritis can cause a range of symptoms, including weight loss, fatigue, diarrhea, cramps, nausea and vomiting, joint and muscle aches, headache, and general malaise.

• Symptoms are usually noticeable within 24 to 72 hours from the time of infection, and they persist for up to 10 days.

• When treating the stomach flu, hydration is the foremost priority.

• Consider mild foods to your diet for the next few days, including cereals, bananas, vegetables, bread, whole grains, yogurt, and apples.

• Avoid dairy, caffeine, spicy foods, and alcohol to prevent further inflammation.



	Stomach bug	Food poisoning
Cause	Viruses	Bacteria, Viruses or parasites
Incubation period	24-48 hours after exposure to virus	2-6 hours after eating contaminated food
Symptoms	 diarrhea or constipation fever vomiting stomach or intestinal cramps joint stiffness weight loss 	 diarrhea fever fatigue general malaise muscle aches sweating eye swelling difficulty breathing thirst
Prevention	 wash your hands talk to your doctor about the Rotavirus vaccine Stay home if you're sick 	 Keep your food preparation area and equipment clean fully cook meats and seafood refrigerate perishable foods