



The Big Six

by Melissa Vaccaro, MS, CHO

One of the duties of the Person in Charge (PIC) is to ensure that employees understand and report important health information in order to protect the health of consumers and employees. This is never a pleasant subject. Both employees and the PIC are often hesitant to discuss illness or symptoms of illnesses. “*Oh, and by the way, I have had diarrhea for three days now*” is not something that just pops up during the course of the day.

Both the PIC and the employee (or conditional employee who has been made an employment offer) have a respon-

sibility to report when these un-pleasantries happen. The employee has the duty to report illness, exposure to certain illnesses, or certain symptoms of illness to the PIC. The PIC has a duty to contact the regulatory agency should a food employee exhibit certain symptoms or be diagnosed with one of the ‘Big Six’ diseases.

REPORTABLE SYMPTOMS

The symptoms listed in the Food Code cover the common symptoms experienced by persons suffering from the pathogens identified by the CDC as transmissible through



UNDERSTANDING THE BIG SIX PATHOGENS



food by infected food employees. A food employee suffering from any of the symptoms listed presents an increased risk of transmitting foodborne illness.

- Vomiting
- Diarrhea
- Jaundice
- Sore throat with fever
- A lesion containing pus on the hands, wrists, or exposed portions of the arms

PATHOGENS TRANSMITTED

There are numerous pathogens that may cause foodborne illness, but there are six that the Centers for Disease Control and Prevention (CDC) bring to the forefront of conversation when it comes to food safety.

THE BIG SIX PATHOGENS

So why does the FDA Food Code and the CDC single out these six pathogens?

The CDC has designated the six organisms listed in the Food Code as having high infectivity (able to invade at low doses) by contamination of food by infected food employees. These organisms are also virulent (able to produce severe disease).

Following is a summary of the Big Six. (*Sources: 19th Edition of Control of Communicable Diseases Manual, the CDC website, and the FDA Bad Bug Book, 2nd Edition.*)

NOROVIRUS

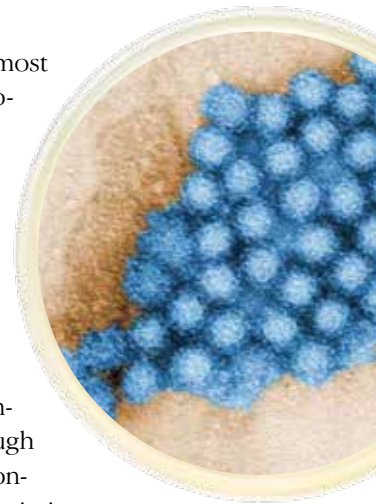
Noroviruses are recognized as the most common cause of epidemic and sporadic gastroenteritis across all age groups worldwide. Noroviruses are the leading cause of foodborne illness in the United States.

Transmission

Transmission occurs primarily through the fecal-oral route, including direct person-to-person contact and indirect transmission through contaminated food, water, or environmental surfaces. Vomitus-oral transmission can also occur through aerosolization followed by direct ingestion or environmental contamination.

Food handler contact with raw or other ready-to-eat foods is the most common means of transmission. Norovirus contamination of produce and shellfish can also occur during production. Secondary household transmission is common.

Noroviruses are environmentally stable, able to survive both freezing and heating (although not thorough cook-



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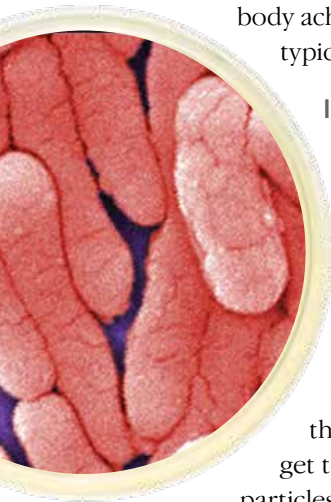
ing), are resistant to many common chemical disinfectants, and can persist on surfaces for up to two weeks. Proper hand hygiene and exclusion of food employees exhibiting symptoms of norovirus disease (i.e., diarrhea or vomiting) are critical for norovirus control.

Incubation Period

In volunteer studies, the range is 10 to 50 hours.

Symptoms and Complications

Symptoms include acute-onset of vomiting, watery non-bloody diarrhea, abdominal cramps, and nausea, or a combination of these issues. Low grade fever and body aches may also be associated. Symptoms typically last 24 to 72 hours.



Infectivity

Noroviruses are highly contagious, and it is thought that an inoculum of as few as 18 viral particles may be sufficient to infect an individual. Shedding of the virus can continue for three weeks after recovery. Peak viral loads may be as high as 100 billion viral particles/g feces. That means that it takes very few virus particles to get the disease, but you shed a lot of virus particles while ill.

NON-TYPHOIDAL SALMONELLA

This disease is caused by serotypes other than *S. Typhi* and *S. Paratyphi A*. The 2013 Food Code now requires food employees to report a diagnosis of non-typhoidal *Salmonella* (NTS). Nontyphoidal *Salmonella* (NTS) *enterica* are bacteria that cause a diarrheal illness called salmonellosis. NTS are among the most common and important causes of enteric disease. An estimated 1.2 million cases occur annually in the United States. Most infections are thought to be acquired through consumption of contaminated food. According to studies, NTS are estimated to cause more than one million domestically acquired foodborne illnesses in the United States each year and are the leading cause of hospitalizations and deaths due to foodborne illness in the United States.

Transmission

Salmonella lives in the intestines of animals or humans. It can be found in water, food, soil, or surfaces that have been contaminated with the feces of infected animals or humans. People can become infected with *Salmonella* by:

- Eating foods contaminated with the bacteria.
- Contacting farm animals or pets, animal feces, or animal environments.
- Touching contaminated surfaces or objects and then touching one's mouth or putting a contaminated object into one's mouth.
- Drinking contaminated water.

Incubation Period

Symptoms often begin 12 to 72 hours after being exposed to the bacteria, although it can take up to a week or more for symptoms to develop in some people.

Symptoms

Symptoms of salmonellosis include diarrhea, abdominal cramps, and fever. The illness usually lasts 4 to 7 days. Persons with NTS infections usually recover without treatment.

Infectivity

The minimum infectious dose of NTS for humans is generally described as 100 to 1,000 organisms. However, doses of fewer than 10 organisms have caused illness in multiple outbreaks. Shedding of the bacteria can occur 4 to 5 weeks after the onset of the illness, even if symptoms of the illness are gone.

SALMONELLA TYPHI

Salmonella enterica subspecies *enterica* serovar Typhi (commonly *S. Typhi*) causes a systemic bacterial disease, with humans as the only host. This disease is relatively rare in the United States, with fewer than 500 sporadic cases occurring annually in the U.S.

Incubation Period

Generally 1 to 3 weeks, but may be as long as 2 months after exposure.



Symptoms

Symptoms include high fever, from 103° to 104°F; lethargy; gastrointestinal symptoms, including abdominal pains and diarrhea or constipation; headache; achiness; loss of appetite. A rash of flat, rose-colored spots sometimes occurs.



Infectivity

The minimal infectious dose is estimated to be less than 1,000 bacterial cells. An individual infected with *S. Typhi* is contagious as long as the bacilli appear in the excreta, usually from the first week throughout the recovery; variable thereafter.

SHIGA TOXIN-PRODUCING ESCHERICHIA COLI

E. coli O157:H7 is the most commonly identified serotype of Shiga toxin-producing *Escherichia coli* (STEC) as a cause of foodborne illness in the United States. *E. coli* O157:H7 is a zoonotic disease derived from cattle and other ruminants. However, *E. coli* O157:H7 also readily transmits from person-to-person, so contaminated raw ingredients and ill food employees both can be sources of foodborne disease. The Food Code definition of STEC covers all *E. coli* identified in clinical laboratories that produce Shiga toxins.

Incubation Period

Symptoms usually begin 3 to 4 days after exposure, but the time may range from 1 to 9 days.

Symptoms

Hemorrhagic colitis is characterized by severe cramping (abdominal pain), nausea or vomiting, and diarrhea that initially is watery, but becomes grossly bloody. In some cases, the diarrhea may be extreme, appearing to consist entirely of blood and occurring every 15 to 30 minutes. Fever typically is low grade or absent. Infections from EHEC may range from asymptomatic to mild diarrhea to



severe, life threatening complications (e.g., hemorrhagic colitis, hemolytic uremic syndrome).

Infectivity

The infective dose of *E. coli* O157:H7 is estimated to be very low, in the range of 10 to 100 cells. Children under 5 years old are most frequently diagnosed with infection and are at greatest risk of developing hemolytic uremic syndrome (HUS). The elderly also experience a greater risk of complications. The duration of excretion of STEC in the stool is typically 1 week or less in adults, but can be up to 3 weeks or longer in one-third of infected children.

SHIGELLA SPP.

Shigella spp. causes an acute bacterial disease, known as shigellosis, and primarily occurs in humans, but also occurs in other primates such as monkeys and chimpanzees. An estimated 300,000 cases of shigellosis occur annually in the U.S. *Shigella* spp. are highly infectious and highly virulent.



Transmission

Outbreaks occur in overcrowding conditions where personal hygiene is poor, including institutions such as prisons, mental health facilities, day care centers, and refugee camps. Water and RTE foods contaminated by feces, frequently from food employees' hands, are common causes of disease transmission.

Incubation Period

The incubation time is 8 to 50 hours.

Symptoms

Abdominal pain, diarrhea, fever, nausea, and sometimes vomiting, toxemia, and cramps can occur. The stools typically contain blood, pus, or mucus resulting from mucosal ulcerations. The illness is usually self-limited, with an average duration of 5 to 7 days. Infections are also associated

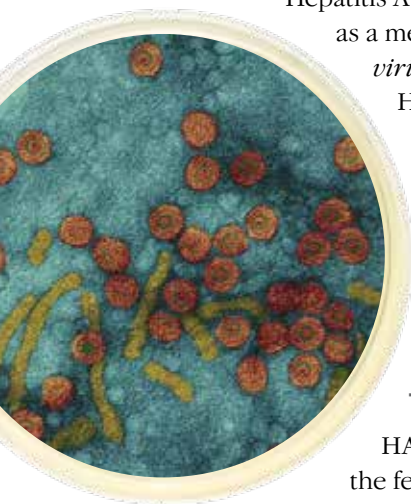
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with rectal bleeding, drastic dehydration, and convulsions in young children.

Infectivity

The infectious dose for humans is low, with as few as 10 bacterial cells, depending on age and condition of the host.

HEPATITIS A VIRUS



Hepatitis A virus (HAV) has been classified as a member of the family *Picornaviridae*. The exact pathogenesis of HAV infection is not understood, but the virus appears to invade from the intestinal tract and is subsequently transported to the liver. The hepatocytes are the site of viral replication and the virus is thought to be shed via the bile.

Transmission

HAV is most commonly spread by the fecal-oral route through person-to-person contact. Although numerous means of transmission can take place, a common source of outbreaks can occur through ingestion of water or food that has fecal contamination.

HAV Immunization

Immune globulin (IG) can be used to provide passive pre-exposure against hepatitis A. Hepatitis A vaccination of food employees has been advocated, but has not been shown to be cost-effective and generally is not recommended in the United States, although it may be appropriate in some communities.

Incubation Period

Incubation averages 28 to 30 days (range 15 to 50 days).

Symptoms

Illness usually begins with symptoms such as nausea/vomiting, diarrhea, abdominal pain, fever, headache, and/or fatigue. Jaundice, dark urine or light colored stools might be present at onset, or follow illness symptoms within a few days. Jaundice generally occurs 5 to 7 days after the onset of gastrointestinal symptoms. The disease varies in severity from a mild illness to a fulminant hepatitis, ranging from 1 to 2 weeks to several months in duration.

Infectivity

The infective dose of HAV is presumed to be low (10 to 100 viral particles), although the exact dose is unknown. The viral particles are excreted in the feces of ill people (symptomatic and asymptomatic) at high densities (106 to 108/gm) and have been demonstrated to be excreted at these levels for up to 36 days post-infection.

CONCLUSION

Keep your residents safe by monitoring employee illness. Discuss with staff reportable symptoms. **E**



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Avoid Survey Deficiencies and Make Sanitation Training Stick ACE Session Provides Employee Training Strategies



Despite in-service training, we still often see sanitation deficiencies throughout the foodservice department. How can CDMs make sanitation information stick with employees while breaking the stereotype that it's complicated to understand? A session at ANFP's Annual Conference & Expo (ACE) this summer will address these challenges. ACE is August 2-5 in Orlando, Fla., at the Hyatt Regency Grand Cypress. This session takes place on the final day of the meeting. Learn quick and easy teaching methods that will assist employees in retaining important food safety protocols and sanitation best practices in the workplace at ACE this summer!

Registration for ACE is open at www.ANFPonline.org Click "Events"