

## SHIGELLOSIS

### Bioterrorism Agent Profiles for Health Care Workers

**Causative Agent:** *Shigella* are gram-negative, nonmotile, nonsporeforming, rod-shaped bacteria that are comprised of four species or serogroups which are further divided into serotypes and subtypes. Shigellosis is caused when virulent *Shigella* organisms attach to and penetrate epithelial cells of the intestinal mucosa. After invasion, they multiply intracellularly, and spread to contiguous epithelial cells resulting in tissue destruction. Some strains produce enterotoxin and Shiga toxin.

**Routes of Exposure:** Fecal-oral transmission through direct and indirect person-to-person contact is the main route of exposure. Ingesting contaminated foods and beverages can also spread infection.

**Infective Dose & Infectivity:** *Shigella* bacteria are highly infectious. The ingestion of very few organisms (10-100) is sufficient to cause infection. Though all people are believed to be susceptible to some degree, infants, the elderly, and the infirm are most likely to experience severe symptoms of disease.

**Incubation Period:** The incubation is usually between 1 and 3 days, but can range from 12 to 96 hours for most strains. Some strains have incubation periods of up to one week.

**Clinical Effects:** The illness is characterized by diarrhea accompanied by fever, nausea, toxemia, vomiting, cramps, and tenesmus. Though cases may also present with watery diarrhea, typical stools contain blood, mucus, or pus, which is the result of mucosal ulcerations and confluent colonic crypt microabscesses caused by the invasive organisms. Bacteremia is uncommon. Mild and asymptomatic infections can occur. Illness is usually self-limited, lasting an average of 4-7 days. Severe complications can include toxic megacolon, the hemolytic uremic syndrome, and Reiter syndrome. Convulsions, which could be the result of rapid temperature elevation or metabolic alterations, may occur in young children.

**Lethality:** Although the mortality rate for some strains of *Shigella* may be as high as 10-20%, it is generally quite low. Two-thirds of the cases, and most of the deaths are in children under 10 years old.

**Transmissibility:** *Shigella* infection is caused by fecal-oral transmission. Individuals primarily responsible for transmission are those who do not practice proper hand washing techniques, especially after defecating. Infection may be spread to others directly through physical contact or indirectly through contaminated food and beverages. Unsanitary food handling is the most common cause of contamination. Flies can also transfer organisms from latrines to uncovered food items.

**Primary Contamination & Methods of Dissemination:** In a terrorist attack, *Shigella* would most likely be disseminated through the intentional contamination of food or water supplies.

**Secondary Contamination & Persistence of organism:** Secondary transmission can result from exposure to the stool of infected individuals. Diarrheal fluids are highly infectious. In households, secondary attack rates can be as high as 40%. Following illness, stool typically remains infectious for 4 weeks, though the bacteria can persist for months or longer in asymptomatic carriers. Antimicrobial treatment can reduce the period of infectivity to a few days.

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**Decontamination & Isolation:**

*Patients* – No decontamination necessary. Patients can be treated with standard precautions, with contact precautions for diapered or incontinent patients. Hand washing is of particular importance.

*Equipment & other objects* – 0.5% hypochlorite solution (one part household bleach and nine parts water), EPA approved disinfectants, and/or soap and water can be used for environmental decontamination.

**Laboratory Testing:** Diagnosis is made by isolation of *Shigella* from feces or rectal swabs. Prompt laboratory processing of specimens and use of appropriate media increase the likelihood of *Shigella* isolation. Infection is usually associated with the presence of copious numbers of fecal leukocytes detected by microscopic examination of stool mucus stained with methylene blue or gram stain. .

**Therapeutic Treatment:** Fluid and electrolyte replacement is important when diarrhea is watery or there are signs of dehydration. Antibacterial therapy shortens the duration and severity of illness and the duration of *Shigella* excretion.

Multidrug resistance is common; the choice of empiric antibiotics is best determined by local susceptibility patterns. Usually effective antibiotics include fluoroquinolones, third generation cephalosporins, and trimethoprim-sulfamethoxazole. Antimotility agents such as loperamide are not approved for children under 2 years old. Their use is generally discouraged in bacterial infections as these drugs may prolong the illness. Nevertheless, if they are administered in an attempt to alleviate the severe cramps that often accompany shigellosis, they should never be given without concomitant antimicrobial therapy.

**Prophylactic Treatment:** Prophylactic administration of antibiotics is not recommended.

**Differential Diagnosis:** *Salmonella*, *E. coli* O157:H7, *Campylobacter*, *Yersinia enterocolitica*, and bacterial food poisoning may show similar signs and symptoms.

**References:**

Chin J. Control of Communicable Diseases Manual, Seventeenth Edition, American Public Health Association; 2000.

Center for Food Safety and Applied Nutrition. Foodborne Pathogenic Microorganisms and Natural Toxins Handbook, U.S. Food and Drug Administration  
<http://vm.cfsan.fda.gov/~mow/intro.html>

For more information call (602) 364-3289

## Frequently Asked Questions About Shigellosis

### What is shigellosis?

Shigellosis is an infectious disease caused by a group of bacteria called *Shigella*. Most people who are infected with *Shigella* develop diarrhea, fever, and stomach cramps starting a day or two after they are exposed to the bacterium. The diarrhea is often bloody. Shigellosis usually resolves in 5 to 7 days. In some persons, especially young children and the elderly, the diarrhea can be so severe that the patient needs to be hospitalized. A severe infection with high fever may also be associated with seizures in children less than 2 years old. Some persons who are infected may have no symptoms at all, but may still pass the *Shigella* bacteria to others.

### What sort of germ is *Shigella*?

The *Shigella* germ is actually a family of bacteria that can cause diarrhea in humans. They are microscopic living creatures that pass from person to person. There are several different kinds of *Shigella* bacteria: *Shigella sonnei*, also known as "Group D" *Shigella*, accounts for over two-thirds of the shigellosis in the United States. A second type, *Shigella flexneri*, or "group B" *Shigella*, accounts for almost all of the rest. Other types of *Shigella* are rare in this country, though they continue to be important causes of disease in the developing world. One type found in the developing world, *Shigella dysenteriae* type 1, causes deadly epidemics there.

### How can *Shigella* infections be diagnosed?

Many different kinds of diseases can cause diarrhea and bloody diarrhea, and the treatment depends on which germ is causing the diarrhea. Determining that *Shigella* is the cause of the illness depends on laboratory tests that identify *Shigella* in the stools of an infected person. These tests are sometimes not performed unless the laboratory is instructed specifically to look for the organism. The laboratory can also do special tests to tell which type of *Shigella* the person has and which antibiotics, if any, would be best to treat it.

### How can *Shigella* infections be treated?

Shigellosis can usually be treated with antibiotics. Appropriate treatment kills the *Shigella* bacteria that might be present in the patient's stools, and shortens the illness. Unfortunately, some *Shigella* bacteria have become resistant to antibiotics. Using antibiotics to treat shigellosis may contribute to make the germs more resistant in the future. Persons with mild infections will usually recover quickly without antibiotic treatment. Therefore, when many persons in a community are affected by shigellosis, antibiotics are sometimes used to treat only the more severe cases. Antidiarrheal agents such as loperamide (Imodium) or diphenoxylate with atropine (Lomotil) are likely to make the illness worse and should be avoided.

**Are there long term consequences to a *Shigella* infection?**

Persons with diarrhea usually recover completely, although it may be several months before their bowel habits are entirely normal. About 3% of persons who are infected with one type of *Shigella*, *Shigella flexneri*, will later develop pains in their joints, irritation of the eyes, and painful urination. This is called Reiter's syndrome. It can last for months or years, and can lead to chronic arthritis which is difficult to treat. Reiter's syndrome is caused by a reaction to *Shigella* infection that happens only in people who are genetically predisposed to it.

Once someone has had shigellosis, they are not likely to get infected with that specific type again for at least several years. However, they can still get infected with other types of *Shigella*.

**How do people catch *Shigella*?**

The *Shigella* bacteria pass from one infected person to another. *Shigella* are present in the diarrheal stools of infected persons while they are sick and for a week or two afterwards. Most *Shigella* infections are the result of the bacterium passing from stools or soiled fingers of one person to the mouth of another person. This happens when basic hygiene and handwashing habits are inadequate. It is particularly likely to occur among toddlers who are not fully toilet-trained. Family members and playmates of such children are at high risk of becoming infected.

*Shigella* infections may be acquired from eating contaminated food. Contaminated food may look and smell normal. Food may become contaminated by infected food handlers do not wash their hands after using the bathroom. Vegetables can become contaminated if they are harvested from a field with sewage in it. Flies can breed in infected feces and then contaminate food. *Shigella* infections can also be acquired by drinking or swimming in contaminated water. Water may become contaminated if sewage runs into it, or if someone with shigellosis swims in it.

**What can a person do to prevent this illness?**

There is no vaccine to prevent shigellosis. However, the spread of *Shigella* from an infected person to other persons can be stopped by frequent and careful handwashing with soap. Frequent and careful handwashing is important among all age groups. Frequent, supervised handwashing of all children should be followed in day care centers and in homes with children who are not completely toilet-trained (including children in diapers). When possible, young children with a *Shigella* infection who are still in diapers should not be in contact with uninfected children.

If a child in diapers has shigellosis, everyone who changes the child's diapers should be sure the diapers are disposed of properly in a closed-lid garbage can, and should wash his or her hands carefully with soap and warm water immediately after changing the diapers. After use, the diaper changing area should be wiped down with a disinfectant such as household bleach, Lysol or bactericidal wipes.

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