The Long-Term Health Outcomes of Selected Foodborne Pathogens

Foodborne disease is a serious public health issue that, according to the Centers for Disease Control and Prevention (CDC), causes tens of millions of acute illnesses, hundreds of thousands of hospitalizations, and thousands of deaths each year in the United States. While the severity of acute foodborne disease varies greatly, depending on the pathogen and the vulnerability of the person infected, the impact of foodborne illness on children, as well as for the elderly and immune-suppressed (e.g., pregnant women, people undergoing chemotherapy, organ-transplant recipients, HIV/AIDS patients), is more likely to be serious and/or long-lasting.

Diarrhea and vomiting are common symptoms, and in most cases, last for only a few days. However, most foodborne pathogens can cause, in a small percentage of cases, serious acute and/or life-long complications, including: kidney failure; paralysis; seizures; hearing/visual impairments and mental retardation.

This report reviews much of what is currently known about the health outcomes for five foodborne pathogens.

Campylobacter infection, which is generally transmitted by food, afflicts millions of Americans annually and hospitalizes over ten thousand. *Campylobacter* is associated with Guillain-Barré syndrome (GBS), the most common cause of neuromuscular paralysis in the United States. GBS patients can become permanently disabled and paralyzed; many require hospital care, and about a third of them require care at rehabilitation facilities, long-term care hospitals, and/or nursing homes. *Campylobacter* also can trigger arthritis, heart infections, and blood infections.

E. coli O157:H7 infection poses great risk for children, especially those in the younger age groups. Children have the highest incidence rate and are at the greatest risk for developing serious complications. *E. coli* O157:H7 can develop into hemolytic uremic syndrome (HUS), the leading cause of acute kidney failure in children in the United States. HUS can lead to death, or in some cases to long-term or permanent health problems, including end-stage kidney disease, neurological complications, and insulin-dependent diabetes.

Listeria monocytogenes infects thousands of Americans every year, nearly all of them from contaminated food, and has been associated with infections of the brain and spinal cord, resulting in serious neurological dysfunctions or death. Most reported cases occur in children under the age of 4, and about 1 in 5 people afflicted die as a result of the infection. In pregnant women, listeriosis can cause miscarriage, premature birth or stillbirth. Listeriosis survivors often are left with serious neurological dysfunctions, including seizures, paralysis, and impaired ability to see, hear, swallow, or speak. Severe cases often result in partial to total impairment and can require life-long residential care with no possibility of work.

Salmonella, as well as other foodborne bacteria, can trigger reactive arthritis (ReA) in certain individuals. ReA causes painful and swollen joints and can greatly affect an individual's ability to work and quality of life. In recent years, antibiotic-resistant strains of *Salmonella* have emerged and their incidence appears to be increasing, particularly in children. Nearly half of all reported *Salmonella* cases occur in children.

Toxoplasma gondii infection can result in cognitive or visual disabilities, with 80% of infected fetuses/infants manifesting impairment by age 17. Impairments from acute fetal or newborn infection by *T. gondii* can include mild to severe mental retardation, moderate visual impairment, crossed-eyes, and in some cases blindness in one or both eyes.

The long-term health burden of foodborne disease is not well understood and there are few guidelines for long-term medical care. Additional research is needed to improve our knowledge about these diseases so that we can better understand the impact that foodborne illness is having on different populations, particularly young children.

Scientific investigations, including epidemiological studies, will play a critical role in improving our knowledge about foodborne disease and its long-term health consequences. Very few follow-up studies have been conducted to examine the long-term health outcomes associated with foodborne illness, and the studies that have been conducted have significant limitations, restricting the ability to generalize the results to all foodborne illnesses. As a result, it is difficult to accurately assess the connections between acute foodborne illness and the development of long-term health outcomes.

Systematic follow-up of foodborne illness cases will greatly enhance our ability to attribute long-term health problems to acute food borne illnesses. Population-based studies, improved public health surveillance, and increased data sharing will improve our knowledge about the sources, trends, and health outcomes associated with foodborne disease, but sustaining these efforts will require dedicated funding. To lower the health, social, and economic burdens of foodborne illness, associated with both its acute impact and its long-term consequences, the United States must support applied foodborne illness research, and begin focusing on the long-term health outcomes associated with foodborne disease.

FOODBORNE ILLNESS MUST BE RECOGNIZED AS A SERIOUS PUBLIC HEALTH ISSUE IF WE WANT TO MAKE MEANINGFUL PROGRESS IN REDUCING SICKNESS, INJURY AND DEATH ASSOCIATED WITH FOODBORNE DISEASE.