Waterborne Pathogens and Workers Health

WHAT ARE WATERBORNE PATHOGENS?

Waterborne pathogens are infectious microorganisms which are commonly transmitted through contaminated water and include various bacteria, viruses, protozoa and helminths. A few waterborne pathogens are environmental organisms. However, most are introduced into water environments through faecal contamination e.g. from discharges of inadequately treated municipal wastewater, sewage overflows, malfunctioning septic systems, leaking sewer lines, and defecation in or near water bodies, as well as from agricultural or storm water runoff.



WHY ARE WATERBORNE PATHOGENS IMPORTANT?

Waterborne pathogens are a major cause of severe illnesses such as diarrhoea, gastrointestinal diseases, and systematic illnesses. According to the World Health Organisation, diarrhoeal disease alone accounts for an estimated 1.5 million deaths annually. About 58% of that burden is a result of unsafe water supply, sanitation and hygiene.

WHO IS AT RISK OF INFECTION FROM WATERBORNE PATHOGENS?

Workers at risk of infection from waterborne pathogens include healthcare workers, wastewater treatment workers, emergence rescue workers e.g. during floods/storms, agricultural workers, plumbers, sewer line maintenance workers, marine workers, emergency response workers, police as well as fire fighters. Exposure can be through ingestion, inhalation or wounds/cuts, with increased risks of serious illness and death among immuno-compromised individuals.



The Waterborne Pathogens Unit, NIOH

Research done by the Waterborne Pathogens Unit deals with the relationship between the microbial quality of water and worker health. Our research focus areas include health risks associated with reclaimed water and wastewater treatment plants, large building water safety, efficacy of water disinfection and treatment methods.

Services offered:

- Testing of bacterial indicator organisms & waterborne pathogens
- Assistance with environmental sampling for potable and reclaimed water, biofilms
- Walk though assessments
- Consultations.

WATERBORNE PATHOGENS OF CONCERN

PATHOGEN	WATER SOURCE	DISEASE	SYMPTOMS
Vibrio cholera	Vibrio cholera can persist for short to long periods in faecally contaminated water systems and is highly sensitive to disinfection processes.	Cholera	Symptoms include profuse watery diarrhoea, nausea, vomiting, leading to severe dehydration.
Escherichia coli	Escherichia coli (<i>E.coli</i>) are normal inhabitants of humans and animal intestines. The presence of <i>E.coli</i> in water indicates recent sewage or animal waste contamination.	Intestinal infection	<i>E.coli</i> O157:H7 can cause severe watery or bloody diarrhoea, and abdominal cramps if ingested.
salmonella typhi	<i>Salmonella typhi</i> lives only in humans but persists in water for weeks and is transmitted through ingestion of contaminated water.	Typhoid fever	Sudden onset of sustained fever, severe headache, nausea, loss of appetite.
Campylobacter jejuni	<i>Campylobacter jejuni</i> persists in unchlorinated or inadequately chlorinated surface water supplies, and storage reservoirs contaminated with wild bird faeces.	Campylobacteriosis	Abdominal pain, diarrhoea (with or without blood) fever, nausea and vomiting.
Shigellardysenteriae	<i>Shigella dysenteriae</i> can be found in contaminated water.	Shigellosis	Severe diarrhoea often with blood and mucus, abdominal cramps, fever and, in severe cases, vomiting and convulsions.
Legionella pneumophilla	<i>Legionella</i> naturally inhabit fresh water environments, but thrives in hot water distribution systems, spas, humidifiers, showers and air-conditioning cooling devices.	Legionnaire's disease and Pontiac fever	Legionnaire's disease: pneumonia, fever, anorexia. Pontiac fever: mild flu-like symptoms.
Entamoeba histolytica	<i>Entamoeba histolytica</i> is a parasite that multiplies in water and resists disinfection and desiccation by forming cysts.	Amoebiasis (amoebic dysentery)	Bloody diarrhoea, vomiting, nausea, abdominal cramps and weight loss.
Giardia lamblia	<i>Giardia lamblia</i> is the most common intestinal parasite found in contaminated water. Persistence in water distribution systems is moderate.	Giardiasis ('beaver fever')	Abdominal cramps, diarrhoea, greasy stools that tend to float, nausea and fatigue.
Cryptosporidium parvum	<i>Cryptosporidium parvum</i> can persist for long periods in water supplies, and is resistant to chlorine disinfection.	Cryptosporidiosis	Acute watery diarrhoea sometimes including nausea, vomiting and fever.
Hepatifis A virus	Hepatitis A virus (HAV) is an enteric virus transmitted through ingestion of contaminated water.	Acute, short term liver infection	Mild to severe and can include fatigue, nausea, fever, vomiting, diarrhoea, jaundice, dark urine, and loss of appetite.

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