

# H<sub>2</sub>O Health: Lowering Waterborne Disease Related Risk

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## ABSTRACT

The lack of fresh water is wreaking havoc on the population of the world's least developed countries. Waterborne illnesses account for 4.1 % of total disability-adjusted life years (DALYs), with a death rate of 1.8 million people per year, according to the WHO. Many microorganisms and chemicals have the potential to cause waterborne illnesses in people, and they may be sources of water pollution. Some infections are only active and cause disease when they are in contact with the host. The goal of this article is to determine what causes waterborne illnesses and how to prevent them. We've included the most recent scientific data on waterborne illnesses in one overview. Water pollution can be caused by natural or man-made factors, and it can be deliberate or unintentional. Humans get affected most commonly as a result of unintentionally swallowing or coming into touch with polluted water. Individual hygiene and sanitation are the most important strategies to avoid water-borne illnesses, according to a review of the scientific literature. Waterborne illnesses may be avoided with a cleanliness strategy.

**Keywords:** Waterborne Diseases; Cleanliness; Prevention; Contamination

## Introduction

Waterborne illnesses are frequently transmitted by pathogens such as viruses, bacteria, and parasites. Individuals can be affected by directly consuming bacteria-infested water or by cooking or swimming in contaminated water. Waterborne illnesses, particularly diarrhoea, are more common in developed nations (Messner, et al. [1]). Although industrialized nations are not excluded from the list, the prevalence in developing countries is 5 to 6 times greater (WHO [2]). Waterborne illnesses have become less common, although they are still a major source of gastrointestinal problems (Patz, et al. [3]) It should be highlighted that waterborne illness management relates to cleanliness and the preservation of cleanliness and hygiene, but individuals should also be aware of new environmental changes. The World Health Organization forecasts a 5.1-11.6 % increase in HCAI in industrialised nations (WHO [4]). Long-term hospitalizations, long-term injuries, a rise in germs and antimicrobials, increased health-care expenditures, high costs for patients and their families, and needless deaths are all side consequences of HCAI. Due to specific exposure situations, crucial water must be taken among the various causes of illness (Anaissie, et al. [5]).

Drinking water serves a variety of purposes in the health-care setting, including cleaning, air conditioning, ice manufacturing, patient bathing, physiotherapy, and dishwashing, as well as cleaning and repairing medical equipment (Williams, et al. [6]). Biofilm, stagnation, corrosion, and systemic dispersion all contribute to the presence of various bacteria in drinking water (Borella, et al. [6,7]). Aerobic gram-negative basil and non-tuberculosis mycobacteria are among the bacteria linked to nosocomial infections induced by water; other studies also include fungal and viral infections (Anaissie, et al. [5,8-10]). Patients with problems, such as the elderly or cancer, leukaemia, degenerative illness, diabetes, and transplant, are at risk of developing severe disease when exposed to water (Sheffer, et al. [11-14]).

## Infectious Disease's Global Impact

Waterborne illnesses are regarded as one of the most serious public health risks. Water contamination is caused by over 100 viruses, bacteria, and other diseases (Patz, et al. [3]). Despite the fact that there are few researches on the prevalence of watery diarrhoea, the illness is widespread. Rotavirus is responsible for around 35% of all diarrhoea in children. Each year, the rotavirus kills more than half a million children (Table 1).

**Table 1:** Pathogens that Cause Aquatic Illnesses.

Group	Pathogen	Diseases Caused
Viruses	Enteroviruses (polio, echo, coxsackie) Hepatitis A and E Human Caliciviruses Norwalk viruses, Sapporo, Rotavirus Astroviruses Adenovirus Reovirus	Infectious hepatitis symptoms include meningitis, paralysis, rash, fever, myocarditis, respiratory illness, and diarrhoea. diarrhea/gastroenteritis Diarrhea Types 40 and 41 diarrhoea, eye infections, and respiratory illness respiratory and gastrointestinal infections
Bacteria	<i>Salmonella</i> <i>Shigella</i> , <i>Yersinia enterocolitica</i> <i>Campylobacter</i> <i>Escherichia coli</i> O157:H7 and other certain strains <i>Legionella pneumophila</i>	diarrhoea and typhoid Diarrhea Diarrhea is the most common cause of foodborne outbreaks. In tiny children, diarrhoea can cause hemolytic uremia. Other respiratory diseases, such as pneumonia
Protozoa	<i>Naegleria</i> <i>Entamoeba histolytica</i> <i>Giardia lamblia</i> <i>Cryptosporidium parvum</i> <i>Cyclospora</i> <i>Microsporidia</i> includes <i>Enterocytozoon spp.</i> , <i>Encephalitozoon spp.</i> , <i>Septata spp.</i> , <i>Pleistophora spp.</i> , <i>Nosema spp.</i>	meningoencephalitis Amoebic dysentery diarrhoea diarrhoea, both chronic and acute, can be deadly in immunocompromised people. Diarrhea, wasting, pulmonary, ophthalmic, muscular, and renal illness are all symptoms of chronic diarrhoea.
Cyanobacteria Helminths	Microcystis, Anabaena, Aphanizomenon <i>Ascaris lumbricoides</i> <i>Trichuris trichiura</i> <i>Taenia saginata</i> <i>Schistosoma mansoni</i>	The microcystin toxin produced by these organisms is linked to diarrhoea and liver damage. Ascariasis trichuriasis-whipworm beef tapeworm schistosomiasis

## Pathogenic Microorganisms

Waterborne illnesses are frequently caused by non-communicable disorders. 8 pathogens found in water as describe by Straub and Chandler in 2003. (Straub, et al. [15]).

## Mode of Transmission of Pathogen Causing Waterborne Diseases

A drain hole that sprays polluted water is the most frequent mode of delivery. People's reliance on agriculture or aquaculture, as well as the demand for polluted wastewater treatment, can lead to food contamination. 10 Water-borne illnesses can be spread by the use of polluted water in the home, including bathing. 11 The human immune system is infected, as seen in Figure 1.

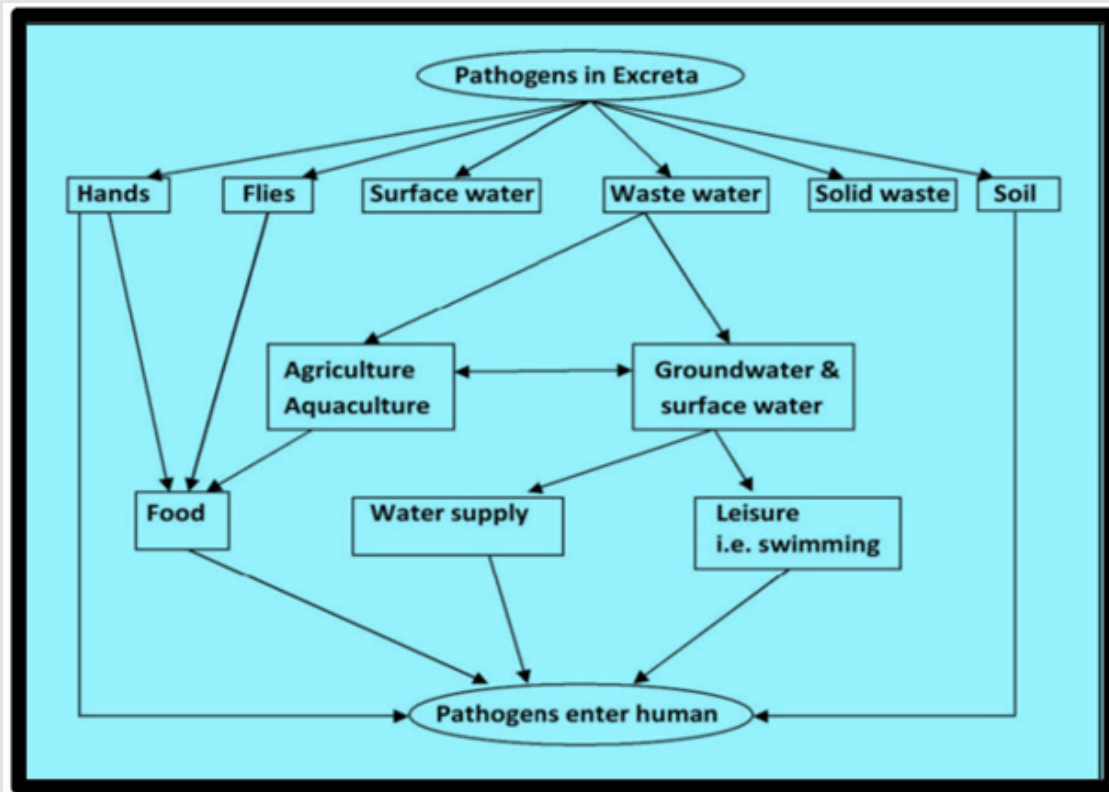


Figure 1: Mechanism of Transmission of Waterborne Pathogens.

## Preventive and Control Measures

The execution of comprehensive management methods is an essential component in reducing microbial contamination in the environment and ensuring the safety of high-risk patients. Evidence of effectiveness and reduction in HCAI water levels stated in guidelines published in various research has been found to be effective (Anaisie, et al. [5,9,11,16-18]). Because there is insufficient water disinfection to reduce the risk of illness, it is necessary to devise a comprehensive preventive strategy (WHO [19]; Decker & Palmore [10]). The most important and simple steps to reduce the risk of HCAI from water include:

1. I waterborne illness education for caregivers and family members.
2. Providing clean drinking water to patients;
3. Identifying other water-supply equipment and machines that require water.
4. Providing regular cleaning and maintenance programmes for showers, bathrooms, and showers; and

5. Installing disinfection systems. Although international standards for preventing Legionnaires' disease have been established, there are significant signs that they have not been followed. The following suggestions, in our opinion, should be followed for Legionella environmental pollution control and preventive measures to avoid legionnaires' disease:

- a) Assemble a team of all interested professionals, including engineers, professionals, nurses, doctors, microbiologists, and public health doctors.
- b) Examine the environment in which microorganisms can be found and identify key elements in the water distribution system.
- c) Strategies to define risk in terms of the number of patients exposed, the patient's medical state, and isolated legionellae infection and
- d) Decision-making following a thorough cost-benefit analysis.

## Personal Hygiene

The most essential aspect in avoiding waterborne illnesses is hygiene. To prevent the transmission of germs, complete preventive procedures include thorough bathing, washing, and drying.

## Make that the Water is Free of Contaminants

Have safe drinking water for cooking, cleaning, washing and handling veggies, and other necessities. The port prohibits animals from reaching the water in order to limit toilets.

## Drained Water Safety

Boiling, filtration, or disinfection are all options for rinsing drained water. To decrease the virus's capacity to spread illness, medical attention may be required.

## Conclusion

Standard methods for case management and implementation of existing prevention/management systems do not exist, according to a study of published water-related papers; all recommendations need to be reviewed and changed on a case-by-case basis. We recommend that children and patients be closely monitored for poor sanitation and personal hygiene, and that the device be cleaned with clean water, as polluted water does not appear to be unavoidable. Finally, doctors, nurses, microbiologists, nutritionists, and other professionals will compile the most up-to-date information on active waterborne diseases and combine a variety of programmes to prevent and control waste water exposure, thereby lowering disease-related risk and reaping the unavoidable health benefits for the patient and his family.

## References

- Anaissie EJ, Penzak SR, Dignani MC (2002) The hospital water supply as a source of nosocomial infections: a plea for action. *Arch Intern Med* 162: 1483-1492.
- Borella P, Guerrieri E, Marchesi I, Bondi, Messi P (2005) Water ecology of Legionella and protozoan: environmental and public health perspectives. *Biotechnol Annu Rev* 11: 355-380.
- Curtis LT (2008) Prevention of hospital-acquired infections: review of non-pharmacological interventions. *J Hosp Infect* 69: 204-219.
- Decker BK, Palmore TN (2013) The role of water in healthcare-associated infections. *Curr Opin Infect Dis* 26: 345-351.
- Exner M, Krame A, Lajoie L, Gebel J, Engelhart S, et al. (2005) Prevention and control of health care associated waterborne infections in health care facilities. *Am J Infect Control* 33(Suppl 1): S26-S40.
- Freije MR (2005) Formulating a risk reduction strategy for waterborne pathogens in hospital water systems. *Am J Infect Control* 33(Suppl 1): S50-S53.
- Gillespie TA, Johnson PR, Notman AW, Coia JE, Hanson MF (2000) Eradication of a resistant *Pseudomonas aeruginosa* strain after a cluster of infections in a hematology/oncology unit. *Clin Microbiol Infect* 6: 125-130.
- Lowe C, Willey B, OShaughnessy A, Lee W, Lum M, et al. (2012) Outbreak of extended-spectrum b-lactamase-producing *Klebsiella oxytoca* infections associated with contaminated hand washing sinks. *Emerg Infect Dis* 18: 1242-1247.
- Marchesi I, Marchegiano P, Bargellini A, Cencetti S, Frezza G, et al. (2011) Effectiveness of different methods to control Legionella in the water supply: ten-year experience in an Italian university hospital. *J Hosp Infect* 77: 47-51.
- Merlani GM, Francioli P (2003) Established and emerging waterborne nosocomial infections. *Curr Opin Infect Dis* 16: 343-347.
- Messner M, Shaw S, Regli S, Rotert K, Blank V, et al. (2006) An approach for developing a national estimate of waterborne disease due to drinking water and a national estimate model application. *J Water Health* 4: 201-240.
- Patz JA, Olson SH, Uejio CK, Gibbs HK (2008) Disease emergence from global climate and land use change. *Med Clin North Am* 92: 1473-1491.
- Sheffer PJ, Stout JE, Wagener MM, Muder RR (2005) Efficacy of new point-of-use water filter for preventing exposure to Legionella and waterborne bacteria. *Am J Infect Control* 33(Suppl 1): S20-S25.
- Straub TM, Chandler DP (2003) Towards a unified system for detecting waterborne pathogens. *J Microbiol Methods* 53: 185-197.
- (1993) WHO Guidelines for Drinking-water Quality. Volume 1: Recommendations. (2<sup>nd</sup> Edn.), World Health Organization Geneva.
- (2008) WHO Guidelines for Drinking-Water Quality Volume 1. Recommendations (3<sup>rd</sup> Edn.), Geneva, Switzerland: World Health Organization.
- (2011) WHO Report on the Burden of Endemic Healthcare-Associated Infection Worldwide. Geneva Switzerland: World Health Organization.
- Yapicioglu H, Gokmen TG, Yildizdas D, Koksall F, Ozlu F, et al. (2012) *Pseudomonas aeruginosa* infections due to electronic faucets in a neonatal intensive care unit. *J Paediatr Child Health* 48: 430-434.
- Williams MM, Armbruster CR, Arduino MJ (2013) Plumbing of hospital premises is a reservoir for opportunistically pathogenic microorganisms: a review. *Biofouling* 29: 147-162.

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