

FACT SHEET

Zoonotic Disease

Brought to you by the PHTA Recreational Water Quality Committee (RWQC)

I. INTRODUCTION

Because residential swimming pools are seldom completely enclosed, it is common for domesticated animals and wildlife to enter the pool. Animals carry pathogens that can be spread to people and animals through the water. Disease spread in this way are called zoonotic diseases. According to the U.S. Centers for Disease Control and Prevention (CDC), Zoonotic Diseases (also known as zoonoses) are caused by infections that spread between animals and people.

II. SUMMARY OF CHARACTERISTICS

- Animals are carriers of pathogens that can cause illness in humans.
- Illnesses caused by pathogens spread by animals are called zoonotic diseases or zoonoses (plural form).
- The animals that spread zoonotic diseases include both domestic animals and wildlife.
- Fecal matter from animals may spread infectious germs in the pool area and should be disposed of with care.
- There is little evidence that zoonotic diseases are spread in properly disinfected swimming pool or spa water.

III. GENERAL DESCRIPTION

Zoonotic diseases are human illnesses that come from animals. Because swimming pools provide a reliable source of water, it is not surprising that wildlife are occasional visitors. Depending on the region, raccoons, opossums, frogs, toads, snakes, birds, earth worms, slugs, insects, alligators and iguanas are just a few of the animals encountered. Many of these animals naturally carry pathogens that might, given the correct dose and portal of entry, cause disease in humans. A review of CDC reports dating back to the 1970's does not indicate that animals are source of diseases in disinfected swimming pools or spas (Hlavsa, et al, 2018) except for roundworm found in raccoon feces. <https://www.cdc.gov/healthywater/swimming/residential/animals/raccoons-and-pools.html>

In moist climates, frogs, toads and earthworms are frequently encountered. In many areas, frog and toad egg clusters and their tadpoles are common in poorly chlorinated early spring pools. There are not records of these animals causing diseases in pools.

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Animal Diseases and Parasites that Can and Cannot Be Spread in Pool and Spa Water (Zoonotic disease reference)		
Pathogen	Can Be Spread in Pools	Cannot Be Spread in Pools
Bacteria	<i>E. coli</i> (including O157:H7) <i>Salmonella</i>	Brucellosis Kennel cough (<i>Bordetella</i>) Leprosy <i>Staphylococcus</i> (including MRSA)
Fungi		Ring worm
Parasites	<i>Cryptosporidium</i> <i>Giardia</i> Round worm	Heart worm Hook worm Scabies Tape worm
Viruses		Bovine Spongiform Encephalopathy (BSE or Mad Cow Disease) Canine Parvo Distemper (Morbillivirus) Feline Parvo Influenza (all types) Middle Eastern Respiratory Syndrome virus (MERS) Rabies West Nile Virus

Ducks and geese may use the pool for temporary refuge, especially during spring and fall migrations. Nearly all birds carry considerable amounts of Salmonella. Geese produce large amounts of droppings both in the water and on surrounding surfaces. Salmonella is killed by 1.0 ppm of free chlorine in 1 minute. Mice and small rodents are occasionally found in skimmer baskets. Rodents carry multiple varieties of Salmonella. In the semi-arid areas of the southwest US, a number of rodents including rock squirrels, wood rats, ground squirrels, prairie dogs, chipmunks, mice, voles, and rabbits carry the bacterium *Yersinia pestis* (plague or Black Death). Salmonella causes gastroenteritis in humans. This disease is spread by bites from infected fleas. In Louisiana and eastern Texas, armadillos are occasionally observed visiting swimming pools. Some populations of armadillos carry *Mycobacterium leprae* (leprosy). Notwithstanding these potential exposures, there are no references in scientific literature of animals causing disease outbreaks in pools or spas, except for roundworm from raccoon feces.

In certain regions of the United States, the most problematic wild animals visiting pools are reptiles. Reptiles, like birds, carry numerous varieties of Salmonella. When Hurricane Andrew struck south Florida in 1992, iguanas were released into the wild and have become a major issue. In some regions, iguanas have become a pest for swimming pool owners. As noted with goose droppings above, after disposal of fecal material and proper chlorination there is no evidence at this time that the Salmonella shed by iguanas presents a human health hazard. Refer to references below for information on possible solutions for controlling iguanas. The greatest hazard from reptiles in pools is from alligators; however, this health threat is not from zoonotic disease.

Many mammals including cats, dogs, cattle, deer, and beavers are known carriers of *Giardia*. *Giardia* is the most common human parasite both in the US and the world. Between 2 and 4% of the US human population is infected by *Giardia* at any one time. Between 2000 and 2014, there was one outbreak of *Giardia* in pools that infected 21 people (Hlavsa et al, 2018). The single pool involved was not properly chlorinated. This one outbreak was 0.067% of the total *Giardia* infections reported in 2011-2012 (Painter et al, 2015). There is no evidence that *Giardia* is transmitted in swimming pools with ≥ 1.0 ppm of free chlorine.

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Untreated and abandoned pools are major sources of mosquitoes. Mosquitoes carry a number of viruses including West Nile and Eastern Equine Encephalitis. By technical definition these diseases are spread by bites, so they are classified as “vector-borne” instead of “zoonotic” diseases. Regardless of the technical classification, mosquitoes from untreated and abandoned pools present the greatest human health threat of all diseases transmitted by animals.

IV. APPLICATION

Once the animal is safely removed, all fecal matter should be removed or it will be the source of considerable chlorine demand. The simplest method is usually netting or scooping the material using proper personal protection equipment such as gloves and masks and flushing it down the toilet. After the fecal material is removed, test the water for free chlorine and pH. Chlorinate to ≥ 4.0 ppm and adjust the pH to 7.2 to 7.8. Make certain the filter and pump are operating normally so the entire pool is adequately treated. After the treatment is complete, chemically clean the filter or change the filter medium. Apart from Cryptosporidium, all the pathogens listed above are killed by >1.0 ppm of free chlorine for a few minutes. Make sure to clean and sanitize whatever equipment used to remove or dispose of an animal and/or its feces with a dilute solution of chlorine before they are used again.

If the water is cloudy, it is likely that superchlorination, a filter aid or water replacement will be required. It is often quicker and less expensive to drain and refill heavily fouled pools. This is especially true if the intruding animal is large, i.e., cattle. Power washing the pool after draining should be considered. Because cattle are known carriers of E. coli, Giardia and Cryptosporidium care should be used to avoid ingestion of splattered water during the cleaning process.

Decomposed animals, such as those discovered at spring opening, can be major sources of both odiferous compounds as well as substantial chlorine demand. At a minimum, multiple superchlorination treatments are suggested. Local pest control companies are often able to assist homeowners with disposal.

V. PRECAUTIONS

- If wild animals are observed in the pool, call the local animal control department for assistance.
- Wear waterproof gloves (nitrile or butyl) while removing fecal material.
- Nets and gloves used to remove fecal material should be disinfected before use. After washing and rinsing contaminated items, soak them in a solution of 1.5 cup of household bleach in 5 gallons of tap water for 10 minutes. Rinse with tap water and air dry before storing them.
- Dead animals should be disposed of per local ordinance. Contact the local department of animal control or trash disposal company for specific directions.

VI. REFERENCES

1. Hlavsa, et al. 2018. Outbreaks Associated with Treated Recreational Water — United States, 2000–2014. MMWR. May 18, 2018 / 67(19); 547–551
2. Zoonotic Disease. <https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html>
3. CDC Diseases and Conditions. https://www.cdc.gov/az/a.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Faz%2Findex.html
4. Painter JE, Gargano JW, Collier SA, Yoder JS. 2015. Giardiasis surveillance — United States, 2011–2012. Morbidity Mortality Weekly Report. .64(SS03):15–25.