

Office of Border Public Health

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Naegleria fowleri in Public Interactive Water Features and Fountains

Legionella Outbreaks

Chemical Exposure at a Waterpark



TEXAS
Health and Human
Services

Texas Department of State
Health Services

Naegleria fowleri

Commonly referred to as the “brain-eating amoeba” (or “brain-eating ameba”), is a free-living microscopic ameba. It can cause a rare and devastating infection of the brain called **Primary Amebic Meningoencephalitis (PAM)**. The amoeba is commonly found in warm freshwater such as lakes, rivers, and hot springs, and in soil.

Naegleria fowleri usually infects people when contaminated water enters the body through the nose. Once the amoeba enters the nose, it travels to the brain where it causes PAM, which is usually fatal. Infection typically occurs when people go swimming or diving in warm freshwater places, like lakes and rivers.

In very rare instances, *Naegleria* infections may also occur when contaminated water from other sources such as inadequately chlorinated water in a swimming pool or heated and contaminated tap water enters the nose. One **cannot** get infected from **swallowing** water contaminated with *Naegleria*.



Lake Jackson, Texas

- **In the summer of 2020, a 6-year-old boy contracted PAM and passed away.**
- Investigations by the CDC, DSHS, Brazoria County, and the City of Lake Jackson determined that the route of exposure was most likely from a municipal spray/splash pad.
- Following extensive investigations of the city water supply, viable *Naegleria fowleri* was detected in several locations throughout the city prompting a boil water notice.

Lake Jackson, Texas

- Becky Coonrad, RS, from Region 5 assisted in the investigation by taking samples at several locations for analysis by the CDC.
- The samples taken from **several** locations including the home outside hose bib, the splash pad storage tank and the fire hydrant downstream from the splash pad.
- All samples were positive with the highest concentration found in the splash pad storage tank.



Lake Jackson, Texas

- The spray/splash pad was a single water use aquatic attraction. The water was delivered from the municipal supply to the spray/splash pad for use and then was discharged to waste.
- There was no water filtration or sanitization system at the spray/splash pad because the water was not reused.
- There was no backflow preventer installed on the water supply to the spray/splash pad.
- The City of LJ initiated chlorine burn protocols to disinfect the entire city water supply and established a protocol for routine maintenance of the water distribution system.
- The spray/splash pad has been removed and replaced by a park.

Lake Jackson, Texas



Arlington, Texas

- **In the summer of 2021, a 3-year-old boy contracted PAM and passed away.**
- Investigations by the CDC, DSHS, Tarrant County Health, and the City of Arlington determined that the route of exposure was from a spray/splash pad.
- Following the reports of the child's contracting PAM, the City of Arlington treated the spray/splash pad with high levels of sanitizer for an extended period of time.
- Viable *Naegleria fowleri* was detected at the spray/splash pad in biofilm in the nozzles and in the piping and in the water storage tank even after treating the spray/splash pad with high levels of sanitizer (chlorine).
- The spray/splash pad used potable water that was obtained from several sources. The water was reused, so it was filtered and sanitized between uses at the spray/splash pad.

Arlington, Texas

- The filtration and sanitization system was automated and electronically monitored by an Oxidation Reduction Potential (ORP) system.
- No records were maintained to indicate the ORP meter levels were monitored, that routine tests for sanitizer level or and pH were performed, or that a maintenance plan for the spray/splash pad was in place or in use. It was not clear if the operators understood the function of some of the equipment of this spray/splash pad.
- I was unable to determine if a supplemental method of disinfection or treatment designed to protect users from contracting Cryptosporidiosis, required by the State Interactive Water Feature and Fountain regulations, was in use.
- *Naegleria fowleri* is inactivated within a few minutes by levels of chlorine (1 – 2 ppm) typically found in pools/spas and spray/splash pads. *Cryptosporidium parvum* must be exposed to high levels of chlorine (20 – 30 ppm) for 10 or more hours to be inactivated.
- The presence of biofilm allowed the parasite to sequester in the biofilm and be unaffected by normal and elevated levels of sanitizer.

Contributing Conditions

- Both *Naegleria fowleri* and *Cryptosporidium parvum* are organisms that thrive in warm water.
- Spray/splash pads are low-volume, and this allows the water to warm during use and maintain that temperature overnight in the storage tank and piping.
- *Naegleria fowleri* and *Cryptosporidium parvum* sequester in biofilm which protects the parasites from environmental stressors.
- Use of normal levels of sanitizer in aquatic venues will inactivate *Naegleria fowleri*.
- Due to the unique nature of spray/splash pads, a maintenance plan consisting of routine and thorough cleaning and disinfection of spray/splash pad circulation equipment, storage tanks, deck area, and nozzles of the spray equipment should be developed and implemented.
- Storm water must be diverted away from the circulation system and not be allowed to mingle with water in the circulation system or to stand in passive drainage systems.
- Routine water quality should be tested on a daily basis, whether single use or recirculated, and monitored, and results recorded in logs.

Legionella

- March 2019 – 3 Cases of Legionnaire’s disease at YMCA in McLennan County. LHA
- April 2019 – Hidden Valley Ranch in Mission (Palmview) – Patient indicated only exposure from community hot tub
- January 28, 2021 – Male contracted Legionnaire’s disease and died. Exposure was at an apartment complex in San Antonio. LHA
- April 2021 – Hidden Valley Ranch in Mission (Palmview) - Patient used humidifier and hot tub.

Legionella

- Summer 2021 – Outbreak of Legionnaire’s Disease in individuals attending local and state fairs and livestock show at numerous locations in US. Linked to display of spas at these events. LHA – East Texas
- October 2021 – Two individuals contracted Legionnaire’s Disease at a YMCA in McLennan County. Case 1 used main pool and showers; Case 2 used main pool, therapy pool, and hot tub. LHA
- November 2021 – 3 Cases of Legionnaire’s disease associated with a hospital. Two deceased after diagnosis. *Legionnella* found in ICU water system. Region 8 investigated.
- November 2021 – Hidden Valley Ranch, Mission (Palmview) – Exposure to potting soil and used community hot tub for 1 -2 hours.

CDC Recommendations

- <https://www.cdc.gov/healthywater/swimming/aquatics-professionals/operating-public-hot-tubs.html>
- *Legionella* is another organism that is found in biofilm in water systems that do not dry completely when circulation is shut off. For instance, in nozzles, in pipe bends or slumps, on the underside of skimmer lids, on storage tank lids and walls.

Chemical Incident – Katy, Texas

- In the summer of 2021 A large privately owned water park in Katy, Texas had a release of a large volume of co-mingled liquid chlorine and acid in a large spray attraction.
- As a result of the concentrated acid/chlorine mixing together directly, a toxic noxious gas, chlorine gas, was released.
- More than 65 individuals were hospitalized with burns and difficulty breathing while others were treated onsite by water park EMS personnel and Katy EMS.
- Most of those sent to the hospital were treated and released the same day. There were no fatalities.
- The incident was caused by an improperly installed chemical dispensing unit. It was triggered by a loss of pressure in the chemical and water delivery systems and by an incorrectly installed check valve that failed to activate.
- The waterpark has since had all the chemical delivery systems at the waterpark checked for other possible incorrectly installed systems and have made all corrections necessary to prevent another similar event.

Chemical Incident – Katy, Texas

- The local health department, in the course of a normal inspection, did not identify the improperly installed check valve and monitor. Most inspectors performing routine safety checks would not be looking at individual chemical dispensing equipment as it requires specific expertise in individual systems.
- The owner/operator did not install the chemical dispensing equipment and monitors. It had been installed by a contractor during construction of the waterpark.
- The owner/operator did not recognize the improperly installed check valve and monitor prior to this incident.
- A third-party, familiar with the specific system in use, inspected the water and chemical dispensing system that failed and found the original installation error.
- The waterpark has since had all the chemical delivery systems at the waterpark checked for other possible incorrectly installed systems and have made all corrections necessary to prevent another system failure.

Jurisdiction

- **Health and Safety Code (HSC) 121.024** Duties of a Health Authority (c)(5) include “aiding the department in the enforcement of the following in the health authority’s jurisdiction:
 - (A) proper rules, requirements, and ordinances;
 - (B) sanitation laws; . . .”

Jurisdiction

- **HSC 341.011(12)** defines “**nuisance**” as “an object, place, or condition that is a possible and probable medium of disease transmission to or between humans.”
- **HSC 341.012(b)**: “(b) A local health authority who receives information and proof that a public health nuisance exists in the local health authority’s jurisdiction shall issue a written notice ordering the abatement of the nuisance to any person responsible for the nuisance. The local health authority shall at the same time send a copy of the notice to the local municipal, county, or district attorney.”

Jurisdiction

HSC 341.064(n) A county or municipality may:

- (1) require that the owner or operator of a public swimming pool or of an artificial swimming lagoon within the jurisdiction of the county or municipality obtain a permit for operation of the public swimming pool or artificial swimming lagoon;
- (2) inspect a public swimming pool or an artificial swimming lagoon within the jurisdiction of the county or municipality for compliance with this section. . . .

Jurisdiction

HSC 341.064(o) A county or municipality may by order close, for the period specified in the order, a public swimming pool or an artificial swimming lagoon within the jurisdiction of the county or municipality if the operation of the public swimming pool or artificial swimming lagoon violates this section or a permitting or inspection requirement imposed by the county or municipality under Subsection (n).

Jurisdiction

- **HSC 121.007(c):** The department may require a regional director to perform the duties of a health authority. The regional director may perform those duties, as authorized by the department, in a jurisdiction in the region in which the health authority fails to perform duties prescribed under Section 121.024. The regional director shall perform the duties of a health authority in a jurisdiction in the region in which there is not a health authority.

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