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Tools From the Centers for Disease Control and Prevention to Help Prevent Pathogen Transmission in Increased Risk Aquatic Venues

Editor's Note: The National Environmental Health Association (NEHA) strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, NEHA features this column on environmental health services from the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, authors from CDC's Water, Food, and Environmental Health Services Branch, as well as guest authors, will share tools, resources, and guidance for environmental health practitioners. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC.

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Swimming is an exceptional way to get the physical activity and health benefits needed for a healthy life. In the U.S., bathers enjoy recreational water experiences in pools, hot tubs, and splash pads hundreds of millions of times each year, and most experiences are healthy, safe, and enjoyable. Swimming and other recreational water activities, however, do have some risks such as fatal and nonfatal drowning, disease outbreaks, and injuries associated with pool chemicals. Public pools, hot tubs, and splash pads should be designed, constructed, operated, managed, and inspected to help minimize risk of illness and injury.

In 2021, the Centers for Disease Control and Prevention (CDC) received reports of children becoming infected with pathogens, including *Naegleria fowleri* and *Shigella*, while playing in aquatic venues that spray water on bathers. *N. fowleri* (commonly referred to as the “brain-eating amoeba”) causes primary amoebic meningoencephalitis (PAM), which is rare but almost always (>95%) fatal. *Shigella* bacteria cause shigellosis, which can result in diarrhea (sometimes bloody), fever, and stomach cramps. An additional case of PAM was reported in 2020 that was associated with a decorative fountain that the public had easy access to. Decorative fountains

that spray water and are primarily designed to be part of the landscape architecture can be mistaken for splash pads. They are not regulated like aquatic venues and environmental health practitioners might not be required to disinfect the water. The CDC Model Aquatic Health Code (MAHC; www.cdc.gov/mahc) and other tools can help prevent pathogen transmission in aquatic venues including pools, hot tubs, and splash pads.

Some aquatic venues are increased risk aquatic venues. Two types of increased risk aquatic venues—splash pads and wading pools (see sidebar)—are at increased risk for microbial contamination as they are intended for young children ≤5 years.

Management of water in increased risk aquatic venues is challenging. Splash pads—also known as water playgrounds, interactive fountains, and spray pads—and wading pools are intended for young children. Young children are more likely to experience acute gastrointestinal illnesses, such as shigellosis, and contaminate the water. Swim diapers also do not prevent feces, urine, or pathogens from getting into the water. The oxidation of organic or nitrogenous compounds (e.g., feces, urine) released or rinsed into the water also depletes the disinfectant concentration. Finally, young children typically ingest more recreational water than adults, putting them at increased risk for infection if pathogens are present.

Splash pads also have diverse features and plumbing that biofilm-associated organisms, such as *N. fowleri*, can grow, especially when adequate disinfectant residuals are not maintained. Maintaining adequate disinfectant

Quick Links

- Model Aquatic Health Code (MAHC) guidance based on the latest science and best practices to help ensure healthy and safe experiences in public pools, hot tubs, and water playgrounds: www.cdc.gov/mahc/index.html
- MAHC-based operation and management recommendations to help prevent pathogen transmission in splash pads: www.cdc.gov/healthywater/swimming/swimmers/splash-pad-operation-and-management.html
- Steps the public can take to help stop the spread of germs in splash pad water: www.cdc.gov/healthywater/swimming/swimmers/water-play-areas-interactive-fountains.html
- Tools, forms, trainings, and protocols for public health officials and aquatic staff using MAHC recommendations or otherwise strengthening their aquatic health and safety programs: www.cdc.gov/mahc/networks-tools-forms.html

concentration in splash pad water is particularly challenging because splash pads typically aerosolize the water, which depletes the disinfectant concentration. Young children also sit on splash pad jets, another potential source for fecal contamination. Because wading pools are shallow, the sun's UV light degrades much of the disinfectant in water, which makes it challenging to maintain adequate disinfectant concentration.

CDC has tools to help prevent pathogen transmission in aquatic venues. Public health officials can use the MAHC to strengthen their aquatic health and safety programs. The MAHC is a guidance document based on the latest science and best practices to help local, state, territorial, and tribal public health officials and the aquatics sector make aquatic experiences healthy and safe for everyone. MAHC guidance is intended to prevent illness and injury through the design, construction, operation, and management of public aquatic venues.

The MAHC calls for secondary treatment (e.g., UV light or ozone) of increased risk

aquatic venue water such as in splash pads and wading pools. Secondary treatment is not needed to inactivate *N. fowleri*, *Shigella*, and most pathogens that are sensitive to chlorine. Secondary treatment is needed, however, to inactivate chlorine-tolerant *Cryptosporidium*, the leading cause of outbreaks associated with pools and splash pads.

The first known PAM case associated with a splash pad in the U.S. was identified in 2021. CDC has tools to help jurisdictions prevent illness caused by *N. fowleri*, *Shigella*, and other pathogens associated with increased risk aquatic venues, such as splash pads and wading pools.

Visit the CDC Healthy Swimming website at www.cdc.gov/healthywater/swimming for tools, steps, and recommendations to prevent pathogen transmission in aquatic venues. Check out the Quick Links sidebar for resources from the MAHC, operation and management recommendations, tools to strengthen aquatic health and safety programs, and more. 🐼

Model Aquatic Health Code Definitions for Increased Risk Aquatic Venues

Splash Pad: Any indoor or outdoor installation that includes sprayed, jetted, or other water sources contacting bathers and not incorporating standing or captured water as part of the bather activity area.

Wading Pool: Any pool used exclusively for wading where the depth does not exceed 2 ft (0.6 m).

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