New study makes case for Candida auris wastewater surveillance

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Las Vegas skyline. Credit: Josh Hawkins/UNLV

A rapid spike in cases of a potentially deadly, drug-resistant fungus has concerned public health officials across the nation. But a team of Southern Nevada researchers hope their new study applying wastewater

surveillance can help health officials get a step ahead of this emerging global public health threat.

Candida auris is a fungus that can cause serious infections, particularly in patients who are immunocompromised, have pre-existing health conditions, are in long-term healthcare settings, or are undergoing treatment with invasive medical devices such as a catheter. Infection prevention and control is challenging because the fungus can grow on both dry and moist surfaces such as furniture, door handles, clothing, and medical equipment in healthcare facilities. It's also shown resistance to many commonly used surface disinfectants and all three types of antifungal medicines. More than 1 in 3 patients with invasive C. auris infections—which can affect the blood, heart, or brain—die.

What's more, Nevada—one of six states with recently high burdens of C. auris—last year experienced outbreaks across multiple healthcare facilities and logged the most U.S. cases of the fungal infection. The Silver State experienced a 16-fold increase from just 24 cases in 2021 to 384 cases in 2022, according to the Centers for Disease Control and Prevention (CDC). Cases have also been reported in dozens of other countries.

What the researchers found

A research team led by Casey Barber, a UNLV School of Public Health doctoral student and Southern Nevada Water Authority (SNWA) graduate intern, recently published a study in the journal *Environmental Science & Technology* that analyzed 10 weeks' worth of wastewater samples from seven Southern Nevada sewersheds.

The scientists detected the genetic material of C. auris in at least one untreated sewage sample from each Southern Nevada wastewater treatment facility and nearly 80% of all untreated sewage samples in the

study. The sewersheds serving healthcare facilities involved in the outbreak also showed higher detection frequencies for the fungus. Researchers noted that no fungus was detected in untreated sewage samples from a wastewater treatment facility in Utah, an area with no known C. auris cases at the time. The fungus was not detected in the Las Vegas Wash, which contains treated wastewater effluent, nor in Lake Mead, indicating that there is no sign that C. auris poses a risk to drinking water.

"These results show that wastewater surveillance may help monitor the spread of C. auris and could serve as an early warning system for public health action," Barber said.

Other takeaways

The first human case of C. auris was reported in 2009, but it's become more prevalent in recent years. The fungus is often spread via contaminated surfaces or skin-to-skin contact with infected individuals, including with those who are asymptomatic.

Scientists called the Southern Nevada fungus flare-up—which erupted in August 2021 and has now affected over 30 healthcare facilities—one of the largest recent outbreaks of healthcare-associated C. auris in the U.S. The research team formally launched C. auris-specific monitoring and data collection in late June 2022, as part of a larger ongoing UNLV wastewater surveillance collaboration with SNWA.

In addition to implications for large-scale C. auris detection and prevention, researchers said the study is groundbreaking in its progress towards helping establish new procedures for sewage sample processing, preparation, and analysis to look for C. auris.

Wastewater surveillance, they said, may provide a more accurate

estimate of C. auris prevalence than traditional public health surveillance methods, in part because traditional methods may not accurately identify C. auris, leading to delays in targeted intervention measures. The team also anticipates that their previously established approach to monitoring COVID-19 levels in wastewater could be applied to watching for mutations and new strains of C. auris.

"Detection of Candida auris through wastewater surveillance has already prompted expanded screenings in Southern Nevada healthcare facilities in an effort to prevent larger outbreaks," said SNWA principal research microbiologist Daniel Gerrity. "This demonstrates how wastewater surveillance can be applied to emerging public health threats beyond COVID-19."

Other collaborators on the study included the University of Arizona's Yuma Center of Excellence for Desert Agriculture and the Utah Department of Health and Human Services.

More information: Casey Barber et al, Community-Scale Wastewater Surveillance of Candida auris during an Ongoing Outbreak in Southern Nevada, *Environmental Science & Technology* (2023). DOI: 10.1021/acs.est.2c07763

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