

The emergence of a dangerous fungus, *Candida auris*, in US health care systems

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On April 21, Nevada's congressional delegation wrote an urgent letter to Director Dr. Rochelle Walensky of the Centers for Disease Control and Prevention (CDC) asking for help from the federal government to assist in fighting off a potentially lethal fungus known as *Candida auris* (*C. auris*) that has caused the largest outbreak in the country at southern Nevada hospitals and long-term care facilities, according to the *Las Vegas Review-Journal*.

The multi-drug-resistant fungus has been called an urgent threat by the CDC, but, according to the letter, the public health agency 'has yet to develop a comprehensive plan to prevent further spread of *C. auris* in Nevada and the more than 27 states now reporting infections.'

Last week, Dr. Teena Chopra, epidemiologist and infectious disease physician at Wayne State University School of Medicine, told the *Detroit Free Press*, "Just like the rest of the nation, we are struggling with a multi-facility outbreak of *C. auris* in Southeast Michigan. This invasive candida infection can cause very high morbidity and mortality, particularly in patients who are at very high risk, like long-term care facility patients, those in nursing homes, older adults."

Dr. Chopra then added, "Currently, we don't have many treatment options for this fungus, so it is a big challenge, and that's why CDC has labeled it as an urgent threat to the community."

In October 2022, the World Health Organization (WHO) drafted its first-ever list of fungal priority pathogens with *C. auris* added as one of 19 that can cause invasive disease and threaten public health. In particular, *C. auris* is among the four in the "critical priority group," the highest level of concern.

As the WHO report notes, "Cases of invasive fungal disease (IFD) are rising as the at-risk population continues to expand. This is due to many factors, including advancements in modern medicine and accessibility to therapies and interventions that impair the immune system, such as chemotherapies and immunotherapy for cancer, and solid organ transplantation. New groups at risk of IFD are

constantly being identified. Examples include patients with chronic obstructive pulmonary disease, liver or kidney disease, viral respiratory tract infections ..."

They added, "The coronavirus disease (COVID-19) pandemic has been associated with an increase in the incidence of comorbid invasive fungal infections. Three groups of COVID-19 associated fungal infections; aspergillosis; Mucormycosis; and candidemia, were frequently reported, often with devastating consequences. Finally, there is evidence to suggest that both the incidence and geographic range of fungal infections are expanding globally due to climate change."

However, surveillance data and the distribution of fungal pathogens and their resistance pattern have been poorly studied. Only a few countries across the world maintain an adequate fungal surveillance program and have the necessary laboratory equipment to monitor them. Funding for addressing these pathogens is woefully lacking.

According to the CDC's *C. auris* tracker, in the last 12 months there were 2,377 clinical cases and 5,574 screening cases across 27 states and the District of Columbia. Screened cases imply the fungus was found colonizing the skin without making people ill.

Although the number of cases appears small overall, that needs to be placed in perspective. From 2013 to 2016, the CDC had documented only 63 clinical cases and 14 screening cases. In total, there have been 5,654 clinical cases and 13,163 screening cases since 2013. The last 12 months account for over 40 percent of all cases. This has become a matter of considerable urgency from the standpoint of public health.

In this regard, Nevada leads in *C. auris* cases with 384 reported last year, which includes infections that have spread into the blood stream, going into the heart or brain. California (359), Florida (349), New York (326) and Illinois (276) round out the top five states with the highest number of clinical cases in the last 12 months.

The Nevada Department of Health and Human Services has reported that of a total of 527 clinical cases identified in

southern Nevada thus far, 103 people died, many with complicated medical conditions that predisposed them to systemic fungal infection. Once the disease becomes systemic in a patient, it has a fatality rate between 30 and 60 percent.

Additionally, once such a case is identified, the treating facility must undergo a rigorous disinfection protocol to rid the environment of the fungus, due to its ability to survive on surfaces for prolonged periods and withstand most commonly used disinfectants. This means stopping the day-to-day operation of the health system to sterilize the facility, which is costly and disruptive to patient care.

According to the *Las Vegas Review-Journal*, “The cases were identified in at least 35 general acute-care hospitals, long-term-care hospitals and skilled nursing facilities in southern Nevada. The fungus can spread from surfaces such as bed rails and medical equipment, where it can linger for long periods of time, invisible to the eye. It can also spread by colonized people who don’t know they have it.”

Though healthy people tend not to become ill if they are colonized or exposed, those suffering from debilitating chronic health conditions who require prolonged hospitalizations, need for central lines that access their blood vessels, or have been on lengthy courses of antibiotics and anti-fungal medications previously, are at higher risk of acquiring *C. auris* infection.

The first *C. auris* infection in southern Nevada was identified in August 2021. The letter to the CDC underscores the impact of COVID-19 pandemic on exacerbating this difficult to treat fungal infection. The congressional representatives wrote, “The COVID-19 pandemic created an environment for *C. auris* to spread rapidly alongside COVID-19, as patients were increasingly exposed to *C. auris* when seeking care for COVID-19 at health care facilities, including hospitals, or while patients were isolated in congregate care settings, such as long-term care facilities.”

The letter also admits that screening procedures and decontamination efforts had been neglected during this period at these facilities. Unless efforts are put in place to actively monitor for *C. auris* colonization and begin work to eradicate the difficult-to-treat fungus from health care settings, the risk associated with the spread of the fungus and the disease it causes will compound rapidly. As with COVID, wastewater data indicates the fungus is spreading within communities.

Alarming, genomic sequencing has demonstrated that the fungus is mutating, making it more resistant to the available anti-fungal medications used in clinical settings. *C. auris* species of fungus are considered resistant (90 percent) to a class of commonly used anti-fungal treatments called azoles. A second treatment, polyenes such as Amphotericin

B, have considerable side effects on the patient, such as fevers and rigors, as well as potentially impairing kidney function and causing electrolyte abnormalities. Resistance has been noted in about 8 percent of cases.

Echinocandins are the newest class of anti-fungal medications that have been around for the last two decades. Caspofungin was the first drug in this class to get FDA approval in 2002. It has a much-improved toxicity profile compared to previous anti-fungal medications but is an expensive alternative. However, what has genomic scientists and researchers concerned is that among the Nevada outbreaks, 2 to 3 percent of cases of *C. auris* have shown resistance to echinocandins.

The fungus was first detected in 2009, isolated from the external ear canal of an inpatient in a Japanese hospital. Since then, it has now been detected in 41 countries. At present there are four known distinct geographic clades that include South Asian, East Asian, South African, and South American. There is a possible fifth clade being investigated that may have originated from Iran.

The transmission of the fungus occurs from person to person with a predilection for the skin around the groin and axilla (armpit). It can colonize the person within as short as a few days to weeks after exposure. Invasive infections can occur days to months after colonization. The fungus can persist for months or indefinitely. For these reasons, identifying patients who are colonized is critical before any invasive procedures are performed.

The use of Far-UVC at around 222 nanometers has shown promise in treating such scenarios. In a study published in August 2022 in the journal *Mycoses*, the authors write, “Our results are in agreement with the data from Narita et al., where the fungicidal effect of 222 nm UVC against *Candida albicans* is comparable with 254 nm UVC. A devastating effect could be demonstrated from 24 mJ/cm² compared to control.” They showed a reduction level of 70 percent for this level of irradiation. At 40 mJ/cm² the colony growth of the *Candida* species fell by more than 98 percent.

Such technology can be used to disinfect rooms and surfaces throughout health care settings and poses, if appropriately mounted and maintained, no harm to patients and staff.



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