

Drug-resistant fungi are a threat to modern medicine

Analysis

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To prevent the outbreak of deadly infections such as Candida auris, hospital infection control must be taken seriously

By Isabel Frost and Ramanan Laxminarayan

Evolution in mammals is difficult to observe because of long generation times. But in the case of fungi, bacteria and parasites, evolution happens in a relative blink of eye and causes death and disability. As surely as night follows day, drug resistance is a natural consequence of the use of medications for infectious disease. The problem has reached epidemic proportions in recent years and has been highlighted as one of the most serious threats to modern medicine by the World Health Organization.

Focus on drug resistance has largely been on bacterial pathogens, but a recent article in the New York Times has shed light on the growing threat posed by infections caused by the *Candida auris* fungus that have become resistant to the drugs commonly used to treat it. The fungal species was first discovered in the ear of a Japanese patient and in the past decade it has spread across five continents. *C. auris* can cause life-threatening infections if it enters the blood of patients with a weak immune system. All microbes, including bacteria, viruses, fungi, and parasites, have the ability to develop resistance to the antimicrobials (antibiotics, antivirals, antifungals, anti-parasitics, etc.) used to treat the diseases they cause. When all the other microbes are suppressed, there are more resources available for the resistant microbes to grow and spread rapidly.

Drug resistance is particularly worrying in the case of antifungals because treatment options for fungal infections are more limited than for bacterial infections. *C. auris* is resistant to the drugs most commonly used to treat fungal infections. So patients are sicker for longer and survival rates are lower. In India, as many as half of

those who develop a blood stream infection with *C. auris* die, but since in many cases they were already critically ill, *C. auris* is not recorded as the ultimate cause of death. Unlike other fungi that rarely transmit between humans, *C. auris* can be passed from patient to patient in a hospital. This is because of its unusual ability to last for long periods of time on hospital surfaces, such as bed rails and door handles. The combination of being transmissible, hard to remove from hospital surfaces and difficult to treat, make it capable of causing deadly outbreaks.

C. auris is not commonly on clinicians' radar as it poses little threat to humans unless they are vulnerable to infection for some other reason, such as a recent surgery, for example, or a patient whose immune system has already been weakened by infection with HIV/AIDS. The occurrence of *C. auris* in India varies by hospital. In one hospital in north India, a third of Candida infections were due to *C. auris*, but in a hospital in the south, this figure was closer to 10%. A broader look across 27 Indian intensive care units found 5.3% of Candida cases were caused by *C. auris* (compared to 0.04% in the United Kingdom). Although data are limited, studies suggest that *C. auris* has spread widely across India though the majority of cases have been reported in public sector intensive care units in the north of India.

Receiving antimicrobial drugs, whether antibiotic or antifungal, is a risk factor for *C. auris* infection. Across India, antimicrobials are available over the counter without a prescription, meaning they are used even when they are not needed or the correct treatment regimens are not followed. This overuse increases the rate at which resistance emerges, and is causing these drugs to become ineffective. In hospitals and clinics, antimicrobials are also often used incorrectly as physicians may not have specific training, may perceive they are needed to satisfy paying patients, or may receive money from drug companies to encourage sales.

Patients who stay for longer in the hospital are more likely to be infected by *C. auris*. Invasive interventions, such as the placement of a catheter, provide an opportunity for disease-causing microbes, such as *C. auris*, to bypass the body's natural defences and can

lead to the life-threatening infections, particularly when hospital staff do not have time or training to ensure cleanliness is maintained. Health care cost constraints have led to overcrowding of patients in some hospitals and this facilitates the spread of infections, including those caused by *C. auris*. Access to clean water and sanitation facilities is essential to maintain hygiene and prevent infections spreading — many healthcare facilities in rural India are unable to provide access to these provisions.

As more people crowd into hospitals, whether because of the greater institutionalisation of births, wider availability of health insurance that covers hospital stays or just population ageing, the public health threat posed by hospital acquired infections is increasing. These are infections that patients acquire when they are hospitalised. In India, it is estimated that roughly one in 20 patients will acquire an infection while in hospital. And when these infections are drug-resistant, the risk of death and longer hospital stays goes up significantly.

There is no doubt that increasing access to essential health services, through interventions such as Ayushman Bharat, saves lives. However, for health services to serve their communities and prevent outbreaks of deadly resistant infections such as *C. auris*, failures in infection control must be addressed, antimicrobial use reduced and the emergence of *C. auris* monitored.

***Isabel Frost and Ramanan Laxminarayan are researchers at the Center for Disease Dynamics, Economics & Policy, a Washington DC-based public health research organisation
The views expressed are personal***