Candida auris: A globally emerging multidrug-resistant yeast

Snigdha Vallabhaneni MD, MPH
Medical Epidemiologist
Mycotic Diseases Branch
Centers for Disease Control and Prevention
First report from Japan in 2009

*Candida auris* sp. nov., a novel ascomycetous yeast isolated from the external ear canal of an inpatient in a Japanese hospital

Kazuo Satoh\(^1\), Koichi Makimura\(^1\), Yayoi Hasumi\(^1\), Yayoi Nishiyama\(^1\), Katsuhisa Uchida\(^1\) and Hideyo Yamaguchi\(^1\)

\(^1\)Teikyo University Institute of Medical Mycology, 359 Otsuka, Hachioji, Tokyo 192-0395, \(^2\)Japan Health Sciences Foundation, 13-4 Nihonbashi-Kodenmacho, Chuo-ku, Tokyo 103-0001 and \(^3\)Genome Research Center, Graduate School of Medicine and Faculty of Medicine, Teikyo University, Otsuka 359, Hachioji, Tokyo 192-0395, Japan

South Korea 2009 and 2011

- 2009 report on 15 ear infection in patients at 5 hospitals
  - Isolates from 2004–2006
- 2011 report of 3 *C. auris* blood stream infections in 1 hospital
  - Isolates from 1996 and 2009
  - First report of invasive *C. auris* infection

Kim N et al, CID 2009; Lee W et al, JCM 2011
India 2011

- 2011 report of 12 BSIs from 2 Delhi hospitals
  - Isolates collected 2009–2011

- 2015 report of ICU associated candidemia in India: *C. auris* in 19 Indian ICUs
  - Isolates collected 2011–2012

Chowdhary A et al, EID 2013
C. auris basics

- Causes invasive infections, predominantly fungemia
- Multidrug resistant
  - 93% resistant to fluconazole; 54% resistant to voriconazole
  - 35% resistant to amphotericin B
  - 7% resistant to echinocandins
  - 4% resistant to azoles, amphotericin B, AND echinocandins
- Requires molecular methods to distinguish from other Candida species
  - Phenotypically similar to C. haemulonii

Global emergence during 2009–2015
WGS suggests simultaneous, independent emergence

India/Pakistan

South Africa

Venezuela

Japan
**C. auris epidemiology**

- Patients of all age ranges (NICU infants → elderly)
- Similar risk factors as for other *Candida* spp.
  - Diabetes
  - Antibiotic use
  - Recent surgery
  - Presence of a central venous catheter
- Sometimes occurs in conjunction with other *Candida* spp
- Many patients on antifungal treatment when *C. auris* isolated
- Median time from admission to infections: 17 days
- Mortality ~60%;
  - 100% in Venezuela in NICU infants
UK 2015-2016 outbreak

- An adult critical care unit in the UK with 40 patients either colonized or infected with *C. auris*
  - ~20% of these patients had candidemia
- Outbreak difficult to control despite intensive IC efforts:
  - regular patient screening
  - environmental decontamination
  - ward closure
Why are we concerned about *C. auris*?

- **Multi-drug resistant**
  - Some isolates resistant to all three major antifungal classes

- **Can be misidentified**
  - Usually misidentified as other *Candida* spp or *Saccharomyces*, when using biochemical methods (API strips or VITEK-2)
  - MALDI-TOF can detect *C. auris*
    - Not all MALDI-TOF manufacturers include *C. auris* in their reference database

- **Has caused outbreaks in healthcare settings**
  - Unlike other *Candida* spp., seems to colonize healthcare environments
  - Major infection control challenges
CDC issued a clinical alert to healthcare facilities – June 2016

Clinical Alert to U.S. Healthcare Facilities

Global Emergence of Invasive Infections Caused by the Multidrug-Resistant Yeast *Candida auris*

**Summary:** The Centers for Disease Control and Prevention (CDC) has received reports from international healthcare facilities that *Candida auris*, an emerging multidrug-resistant (MDR) yeast, is causing invasive healthcare-associated infections with high mortality. Some strains of *C. auris* have elevated minimum inhibitory concentrations (MICs) to the three major classes of antifungals, severely limiting treatment options. *C. auris* requires specialized methods for identification and could be misidentified as another yeast when relying on traditional biochemical methods. CDC is aware of one isolate of *C. auris* that was detected in the United States in 2013 as part of ongoing surveillance. Experience outside the United States suggests that *C. auris* has high potential to cause outbreaks in healthcare facilities. Given the occurrence of *C. auris* in nine countries on four continents since 2009, CDC is alerting U.S. healthcare facilities to be on the lookout for *C. auris* in patients.

**Background**

*Candida auris* is an emerging multidrug-resistant (MDR) yeast that can cause invasive infections and is associated with high mortality. It was first described in 2009 after being isolated from external ear discharge of a patient in Japan. Since the 2009 report, *C. auris* infections, specifically fungemia, have been reported from South Korea, India, South Africa, and Kuwait. Although published reports are not available, *C. auris* has also been identified in Colombia, Venezuela, Pakistan, and the United Kingdom.

It is unknown why *C. auris* has recently emerged in so many different locations. Molecular typing of strains performed by CDC suggests isolates are highly related within a country and have high diversity between countries. The application of molecular tools to *C. auris* has provided some insight into infection and transmission.
Public Health England released an alert in June/July 2016

Research and analysis

Candida auris identified in England

Published 1 July 2016
Public Health Agency of Canada also released an alert in July 2016

**PHAC Communication Re: Emerging global HAI-AMR issue – *Candida auris***

PHAC has recently learned of a public health alert from US CDC in relation to the global emergence of invasive infections caused by the Multidrug-Resistant yeast organism, *Candida auris*. 
Infection Control Recommendations

- Report to CDC and state and local health departments
- Standard and Contact Precautions
- Single room
- Daily and terminal cleans to reduce environmental burden of organisms with EPA registered disinfectant

*UK guidelines recommend “screening patients at risk for candidemia”*
Action Steps

- Case finding domestically
  - Clinical alert, highlighting in SHEA newsletter and other avenues
  - IP surveillance
  - Antibiotic resistance laboratory network
- Developed preliminary plan for outbreak response in the US
- Working with EPA and FDA to understand what works for disinfection
- International partnerships to study unanswered questions while maintaining vigilance for infection in the U.S.
Questions

• Why is this species emerging now?
  --has it been here all along and we just misidentified it?
  --why is it emerging in so many places simultaneously?
• What are risk factors for this infection?
• Why do some infections lead to outbreaks while others are sporadic cases?
• How do we control the spread of this infection?