Candida auris: an Emerging Hospital Infection

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Objectives

- **Candidemia**: most common healthcare-associated fungal infection
- **Candida auris**: an emerging healthcare pathogen
Candidemia is one of the most common HAIs in the U.S.

- Bloodstream infection caused by *Candida* spp.
- #1 organism in hospital-associated bloodstream infections
- Incidence is approximately 10-14 per 100,000; varies by geographic location and patient population
- Mortality 30-50%
Who gets candidemia?

- Risk factors include:
  - Prolonged ICU stay
  - Central lines
  - Broad spectrum antibiotic use
  - Diabetics
  - Surgical patients

- Usually auto-inoculation of host flora (gut)
- Outbreaks rare, but reported with *C. parapsilosis*
Candidemia surveillance through the Emerging Infections Program (EIP)

http://www.cdc.gov/ncezid/dpei/eip/index.html
Surveillance reveals changing species epidemiology

- C. albicans: 54% in 1992-1993, 37% currently
- C. glabrata: 11% in 1992-1993, 27% currently
- C. parapsilosis: 8% in 1992-1993, 9% currently
- C. tropicalis: 1% in 1992-1993, 6% currently
- Other: 2% in 1992-1993, 6% currently
A new *Candida* species: First report of *C. auris* from Japan in 2009

**ORIGINAL ARTICLE**

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

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- Discovered during the course of a study to analyze antifungal yeast diversity in humans

Rapid emergence since 2009

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First report of *Candida auris* in America: Clinical and microbiological aspects of 18 episodes of candidemia

Belinda Calvo, Analy S.A. Melo, Armando Perozo-Mena, Martin Hernandez, Elaine Cristina Francisco, Ferry Hagen, Jacques F. Meis, Arnaldo Lopes Colombo

Candida auris Candidemia in Kuwait, 2014
Maha Emaa, Suhalil Ahmad, Zaaidin Khan, Lena Joseph, Imn Al-Quraini, Prashant Purohit, Ritu Bhatnagar

Candida auris—Associated Candidemia, South Africa
To the Editor: We noted the report by Chevalley et al. (1) and report *Candida auris* as a causative agent of candidemia in South Africa.
Cryptococcus neoformans
Rhodotorula glutinis

Candida rugosa
Candida krusei
Candida lusitaniae
Candida auris
Candida haemulonii
Candida duobushaemulonii
Candida pseudohaemulonii

Saccharomyces cerevisiae
Candida glabrata
Candida bracarensis
Candida nivariensis
Candida catenulata
Candida pelliculosa

Candida albicans
Candida dubliniensis
Candida tropicalis
Candida metapsilosis
Candida parapsilosis
Candida orthopsilosis
Candida famata
Candida fermentati
Candida guilliermondii

C. auris is closely related to other Candida species known for antifungal resistance
WGS of 47 isolates from 4 world regions

Strains were:
- Very different across regions
- Highly related within regions

40,000-140,000 SNPs across regions

India/Pakistan
<60 SNPs

South Africa
<70 SNPs

Japan
<16 SNPs

Venezuela
Antifungal susceptibility revealed significant resistance

- There are 3 major classes of antifungal drugs:
  - **Azoles** (fluconazole, voriconazole, itraconazole, posaconazole)
  - **Echinocandins** (micafungin, anidulafungin, caspofungin)
  - **Polyenes** (amphotericin B and its lipid formulations)

- In these international isolates:
  - 93% resistant to fluconazole; 54% resistant to voriconazole
  - 35% resistant to amphotericin B
  - 7% resistant to echinocandins
  - **41% MDR** isolates and **4% resistant to all three** major antifungal classes
Early epidemiological characteristics

- Patients of all age ranges
- Similar risk factors as for other *Candida* spp.
  - Diabetes
  - Antibiotic use
  - Recent surgery
  - Presence of a central venous catheter
- May occur in conjunction with other *Candida* spp
- Patients on antifungal treatment when *C. auris* isolated
- Median time from admission to infections: 19 days
- Mortality ~60%; up to 100% in Venezuelan NICU infants
An adult critical care unit in a tertiary care hospital in the UK
- >50 cases with invasive infection or colonization (20% with candidemia)
UK outbreak difficult to control despite intensive infection control efforts

- Efforts undertaken included:
  - Strict contact precautions
  - Cohorting of colonized patients
  - Regular patient screening in the ICU (for colonization)
    - Attempted decolonization (chlorhexidine)
  - Environmental decontamination
    - Cleaning room with bleach 3x day; terminal cleaning with higher dilution bleach and hydrogen peroxide

- BUT: evidence for transmission from environmental sources
  - Clinical areas surrounding colonized patients with extensive contamination
  - 3 month period of no cases; then series of new cases
  - 258 healthcare workers screened: only 1 positive by nares swab
Candida auris: a serious global health threat

- Multi-drug resistance
- Nosocomial transmission
- Difficulty in identification
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 heterogeneous. Further molecular and epidemiologic studies are needed to understand the emergence and disseminate of this important pathogen.
Public Health England also released an alert.
PAHO also released an alert in Latin America, prompted by cases in Colombia
So, is it in the United States?

- **EIP Candidemia Surveillance Program**
  - No *C. auris*

- **SENTRY system (Private collection funded by pharma)**
  - >6000 North American isolates collected from the US since 2004
  - 1 *C. auris* isolate from 2013
New York: 42
(28 cases, 14 colonized)

New Jersey: 2

Maryland: 1 (resident of NJ)

Illinois: 6
(3 cases, 3 colonized)
*A case is defined as laboratory-confirmed *Candida auris* isolated from a clinical specimen obtained in the routine care of a patient in the U.S. since May 2013.

(17 additional patients have been identified as carrying *C. auris* via surveillance body site swabbing. Total U.S. patients = 51)
Epidemiologic characteristics

- Of 34 isolates:
  - 26 blood, 3 urine, 2 respiratory, 1 ear, 1 bile, 1 central catheter tip

- Age range 21-96 years, 56% male

- Multiple underlying medical conditions and indwelling devices
  - Tracheostomy tube, central venous catheter, gastrostomy tube

- Extensive healthcare exposure (acute care hospitals, nursing homes)
So is there any evidence for *transmission* in the U.S.?

- Some cases are epi-linked, but no specific room or healthcare worker overlaps
  - 2 case-patients received care at same hospital in NJ
  - 2 case-patients received care at same hospital and long-term acute care hospital in IL

- Internationally
  - Links to operating room
  - Healthcare workers sampled positive
Where is it coming from?

- Environmental sampling has shown presence on equipment and in patient rooms
  - Mobile equipment (e.g., transport stretchers)
  - Sinks in common areas
- Persistence
  - Environmental Samples positive for *C. auris* up to 6 months later and after terminal clean

[Diagram showing dates and rooms sampled with occupancy by *C. auris* patients]
Candida auris: what you should know

1. It is difficult to identify... so when should C. auris be suspected?

- An isolate is identified as:
  - Candida haemulonii
  - Candida famata
  - Candida sake
  - Saccharomyces cerevisiae
  - Rhodotorula glutinis, or
  - Candida spp after a validated method of Candida identification was attempted.

- Presence of resistance to one or more antifungal drugs

- If Candida species isolated from any body site in a patient with recent travel, especially if received healthcare, to countries reporting cases of C. auris

C. auris can be identified using MALDI-TOF and sequencing of the D1-D2 region.
**Candida auris: what you should know**

2. Treatment for invasive *C. auris* infection is same as IDSA guidelines.

- An echinocandin at standard dosing is the recommended treatment
- Careful monitoring of patient for treatment failure while on antifungal therapy
- All other guidance is similar to management of other types of Candida infection; refer to the 2016 IDSA Clinical Practice Guideline for the Management of Candidiasis
Candida auris: what you should know

3. Specific infection control practices are recommended.

- Standard and Contact Precautions
- Single room
- Daily and terminal cleaning of patient rooms with EPA-registered hospital grade disinfectants with a sporicidal claim
- On transfer to another facility, notification and level of precaution communicated

If you identify a case, please report it to state & local public health departments and CDC.
Because there are relatively few cases identified, we are hopeful we can halt or slow the spread in the U.S.

- Response plan has included:
  - Requested reporting of all cases to CDC and state/local health departments
  - Immediate contact of facilities for infection control recommendations
  - Investigation of all cases (including any epidemiologic links)
  - Microbiology record review for other cases and possible cases
  - Assess colonization of case-patient and contamination of environment
  - Point prevalence surveys of colonization in shared rooms/wards
  - Whole genome sequencing of all isolates received at CDC
Fungal infections pose a significant risk to our hospitalized patients

- Performing surveillance for candidemia has helped us better understand changing epidemiology and better ways to treat patients

- *Candida auris*, an emerging species, has posed new challenges and threats, including nosocomial transmission and multi-drug resistance and requires ongoing vigilance to prevent its spread