



Candida auris: an Emerging Hospital Infection

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Atlanta Chapter Meeting

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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%

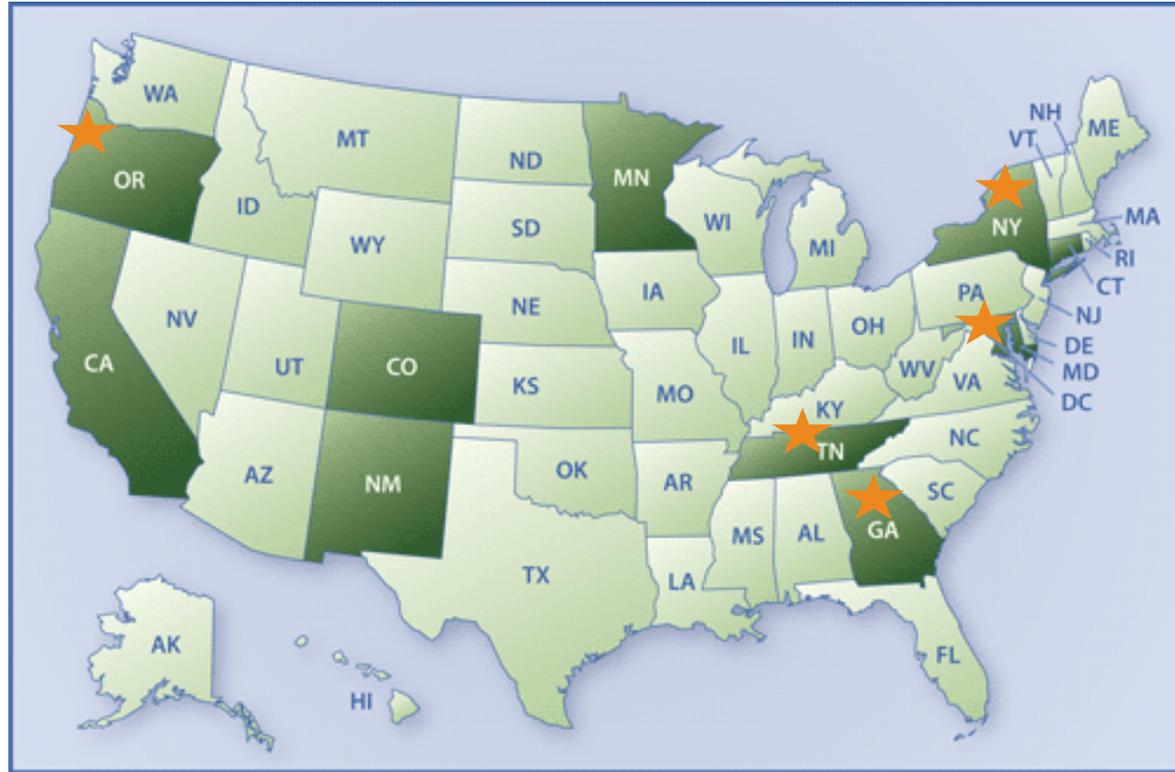


Who gets candidemia?

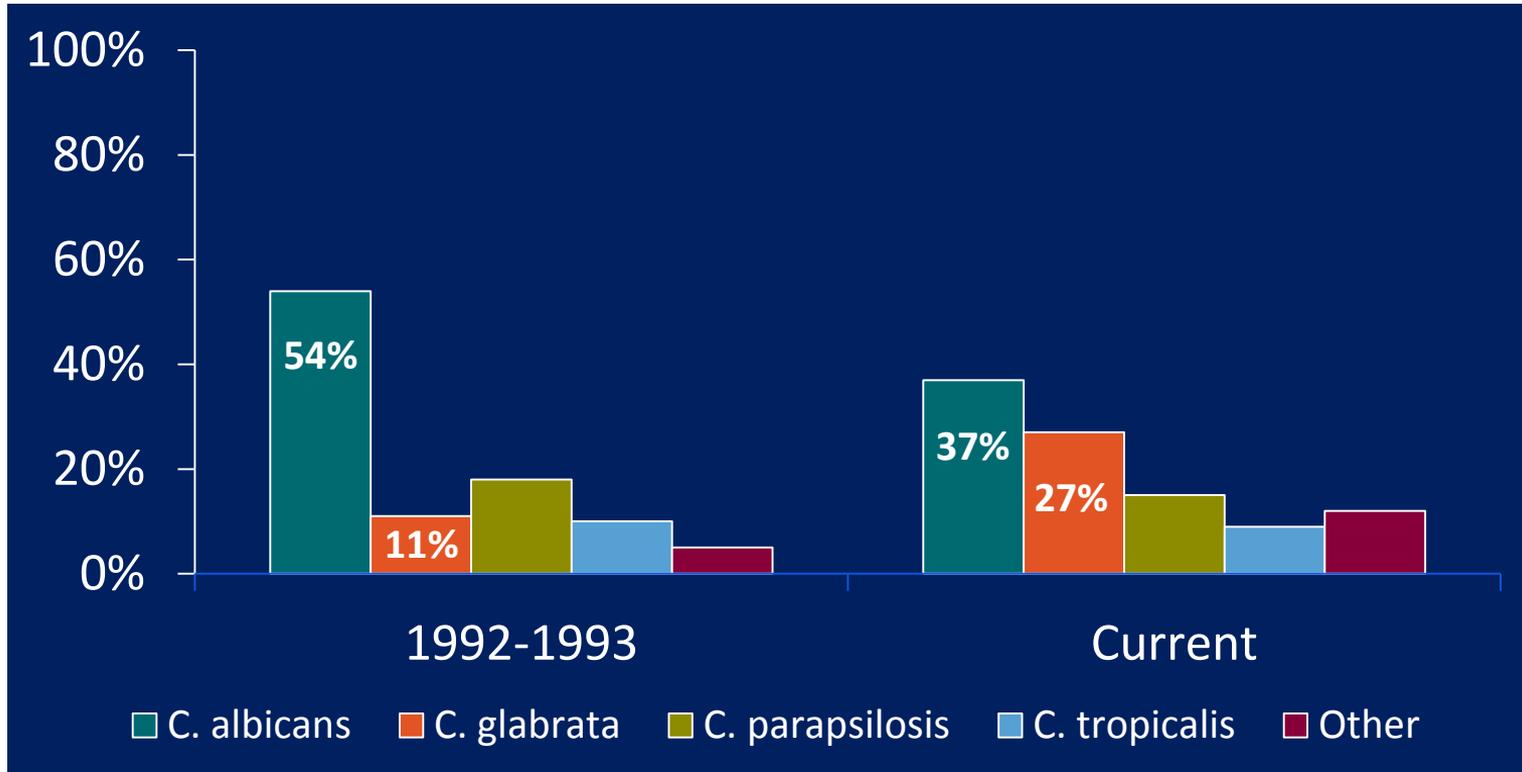
- Risk factors include:
 - Prolonged ICU stay
 - Central lines
 - Broad spectrum antibiotic use
 - Diabetics
 - Surgical patients
- Usually auto-inoculation of host flora (gut)
- Outbreaks rare, but reported with *C. parapsilosis*



Candidemia surveillance through the Emerging Infections Program (EIP)



Surveillance reveals changing species epidemiology



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**

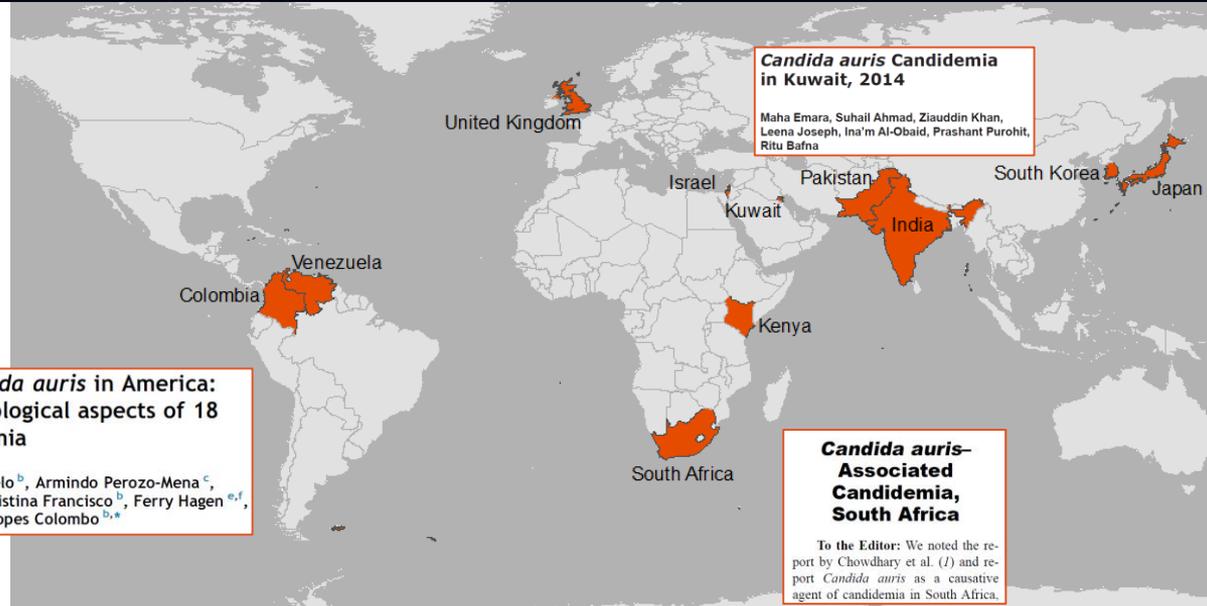
Kazuo Satoh^{1,2}, Koichi Makimura^{1,3}, Yayoi Hasumi¹, Yayoi Nishiyama¹, Katsuhisa Uchida¹ and Hideyo Yamaguchi¹

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

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



Rapid emergence since 2009

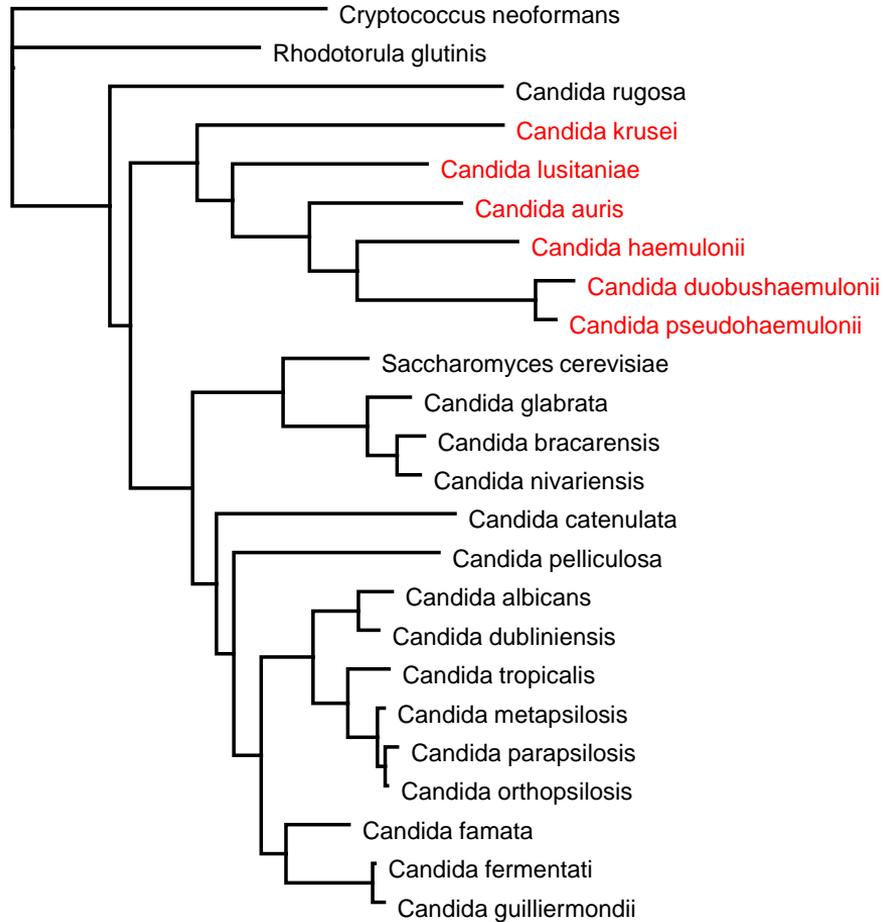


First report of *Candida auris* in America: Clinical and microbiological aspects of 18 episodes of candidemia

Belinda Calvo^a, Anely S.A. Melo^b, Armino Perozo-Mena^c, Martin Hernandez^d, Elaine Cristina Francisco^b, Ferry Hagen^{e,f}, Jacques F. Meis^{g,h}, Arnaldo Lopes Colombo^{b,h}

Candida auris-Associated Candidemia, South Africa

To the Editor: We noted the report by Chowdhary et al. (1) and report *Candida auris* as a causative agent of candidemia in South Africa.

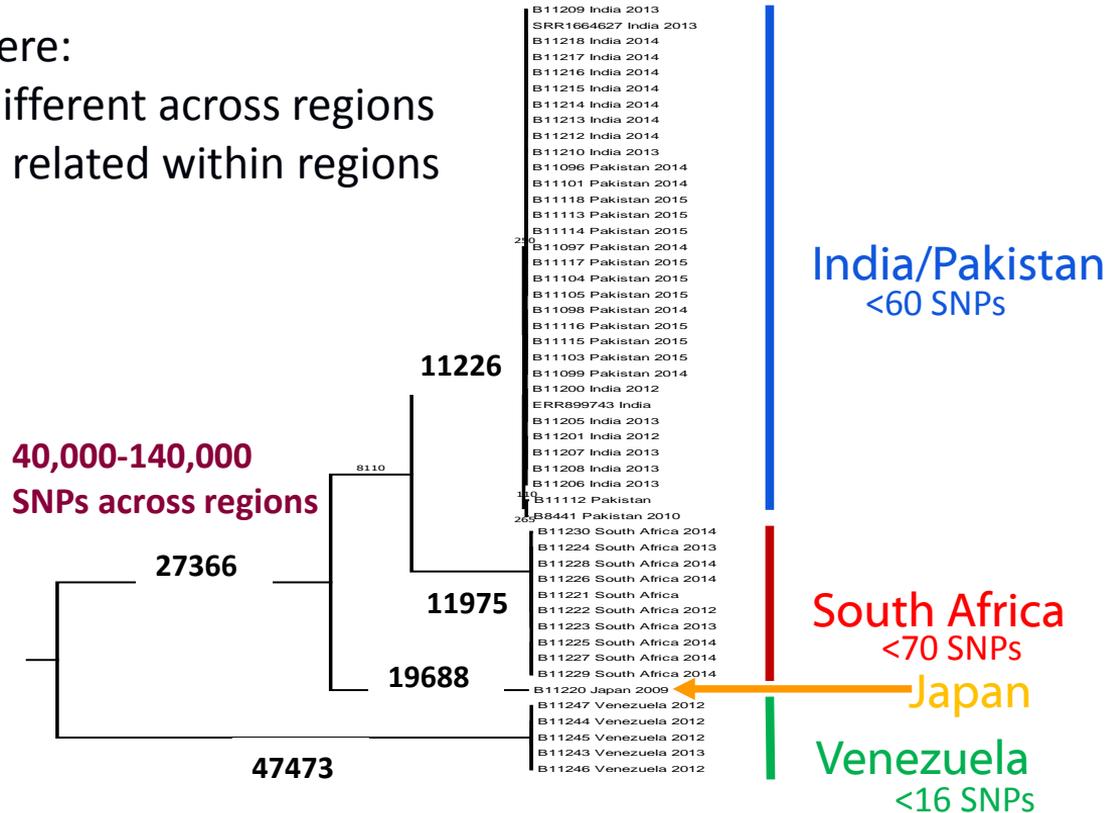


C. auris is closely related to other *Candida* species known for antifungal resistance

WGS of 47 isolates from 4 world regions

Strains were:

- Very different across regions
- Highly related within regions



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

Outbreak at a UK hospital: 2015-2016

Schelenz et al. *Antimicrobial Resistance and Infection Control* (2016) 5:35
DOI 10.1186/s13756-016-0132-5

Antimicrobial Resistance
and Infection Control

RESEARCH

Open Access

First hospital outbreak of the globally emerging *Candida auris* in a European hospital

Silke Schelenz^{1,3*}, Ferry Hagen², Johanna L. Rhodes³, Alireza Abdolrasouli³, Anuradha Chowdhary⁴, Anne Hall¹, Lisa Ryan¹, Joanne Shackleton¹, Richard Trimlett⁵, Jacques F. Meis^{2,6}, Darius Armstrong-James^{1,3} and Matthew C. Fisher³

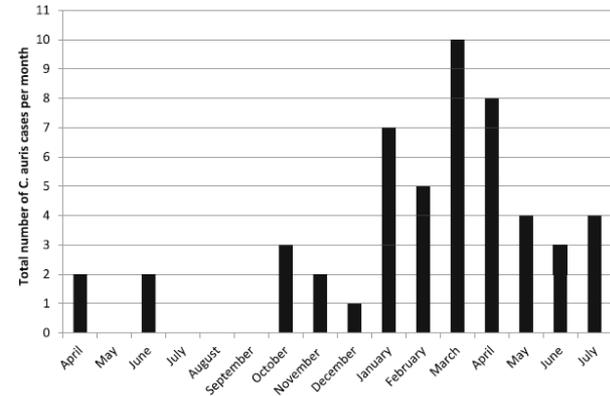


Fig. 1 New cases of *C. auris* per month. Total number of monthly new cases of *C. auris* are listed from the 1 April 2015 to the end of July 2016

- 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

Fungal Diseases

Fungal Diseases	
Types of Fungal Diseases	-
Aspergillosis	+
Blastomycosis	+
Candidiasis	-
Oropharyngeal / Esophageal Candidiasis	
Genital / vulvovaginal candidiasis	
Invasive candidiasis	
Candida auris Q&A	
Candida auris Alert	
Coccidioidomycosis	+
C. neoformans Infection	+
C. gattii Infection	+
Fungal Eye Infections	+

[CDC](#) > [Fungal Diseases](#) > [Types of Fungal Diseases](#) > [Candidiasis](#)

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 Japan¹. Since the 2009 report, *C. auris* infections, specifically fungemia, have been reported from South Korea², India³, South Africa⁴, and Kuwait⁵. 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 geographic region but highly distinct between continents⁶. The earliest known infection with *C. auris* based on retrospective testing of

Public Health England also released an alert



[See more information about this Research and analysis](#)

Research and analysis

Candida auris identified in England

Published 1 July 2016

PAHO also released an alert in Latin America, prompted by cases in Colombia



Epidemiological Alert

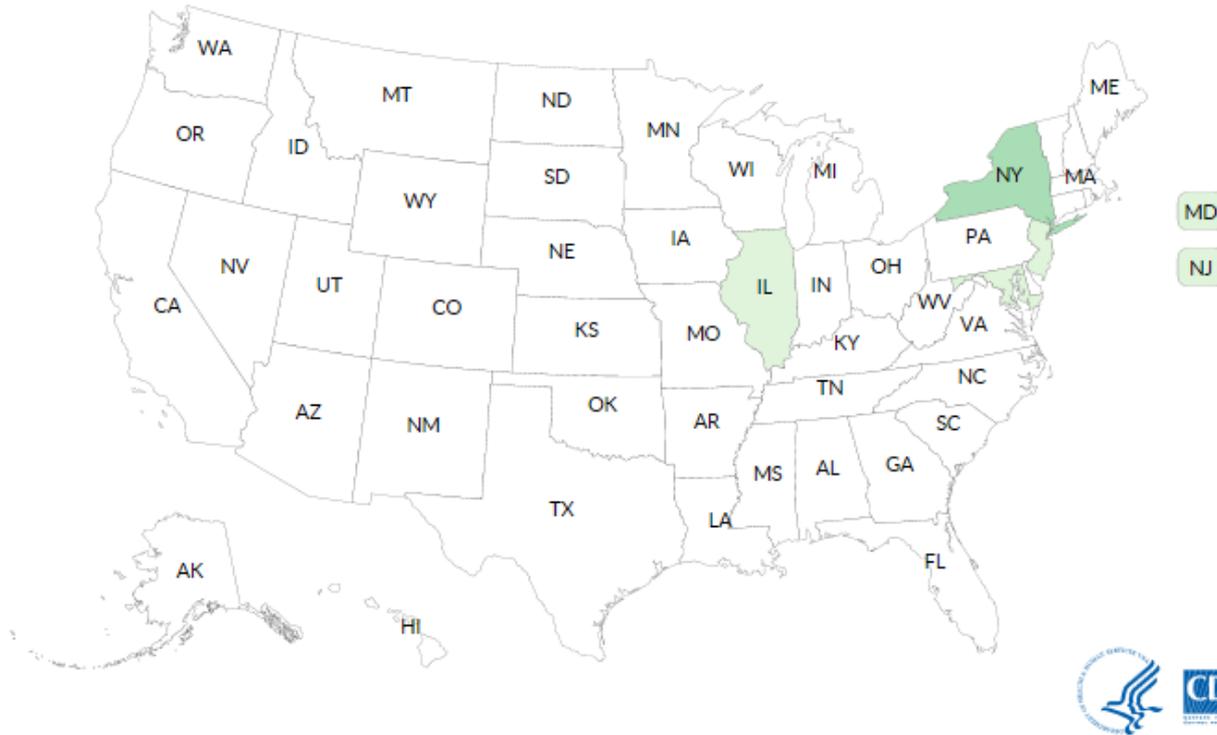
Candida auris outbreaks
in health care services

3 October 2016

So, is it in the United States?

- EIP Candidemia Surveillance Program
 - >7000 *Candida* isolates collected in U.S. 2008 –2016
 - 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

Candida auris cases in the United States



New York: 42
(28 cases, 14 colonized)

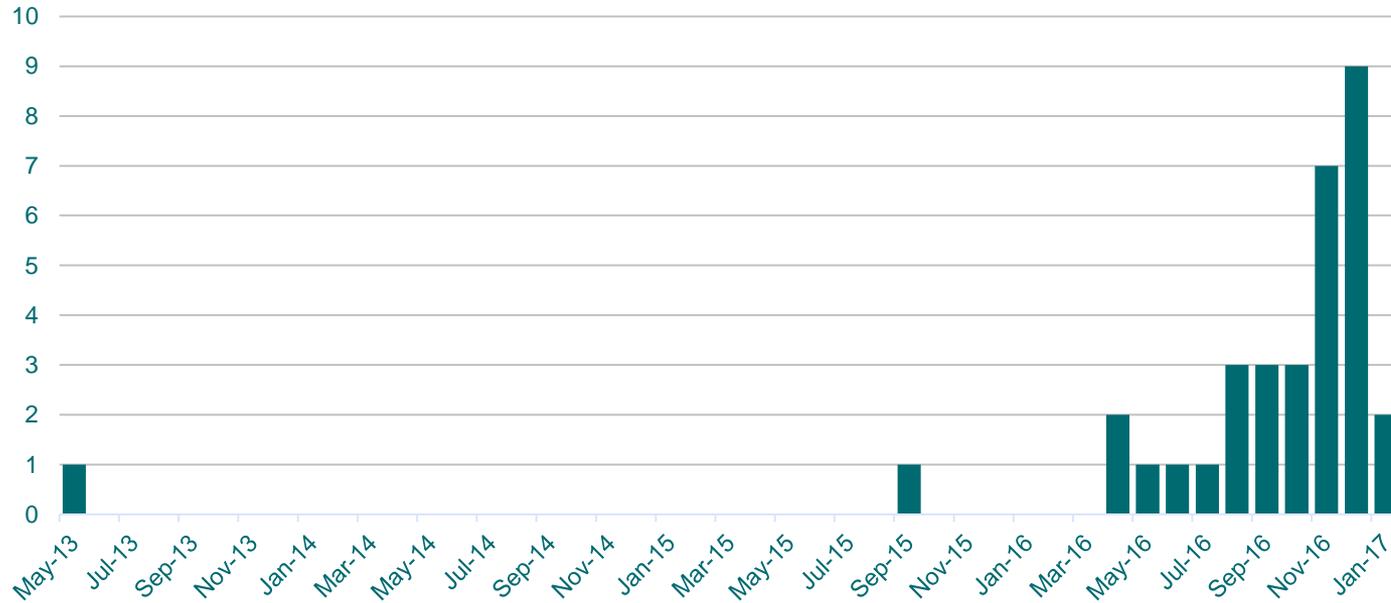
New Jersey: 2

Maryland: 1 (resident of NJ)

Illinois: 6
(3 cases, 3 colonized)



C. auris cases* reported in the U.S. by collection date as of January 31, 2017 (n = 34)



*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

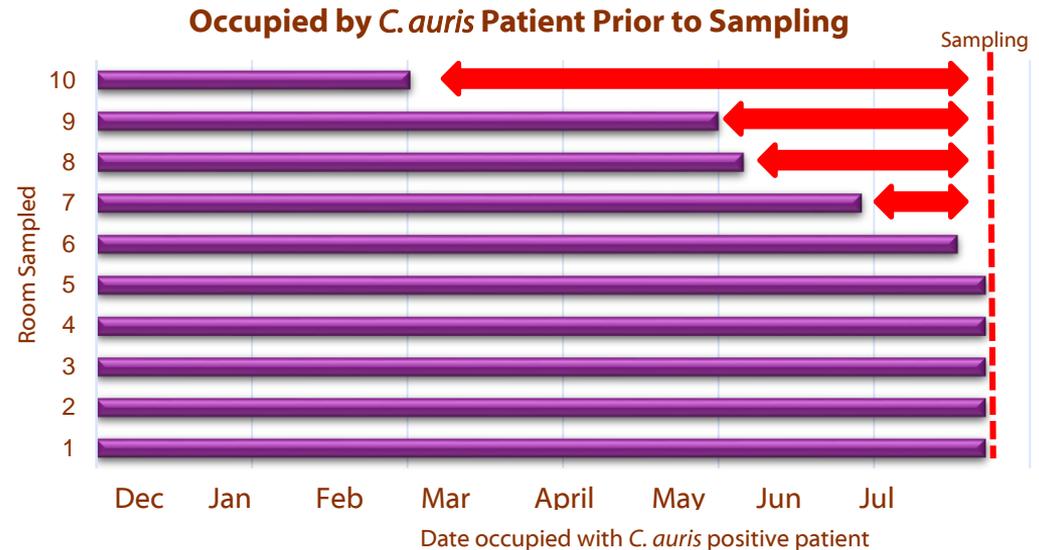
- Of 34 isolates:
 - 26 blood, 3 urine, 2 respiratory, 1 ear, 1 bile, 1 central catheter tip
- Age range 21-96 years, 56% male
- Multiple underlying medical conditions and indwelling devices
 - Tracheostomy tube, central venous catheter, gastrostomy tube
- Extensive healthcare exposure (acute care hospitals, 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 (eg. transport stretchers)
 - Sinks in common areas
- Persistence
 - Environmental Samples positive for *C. auris* up to 6 months later and after terminal clean



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

Thank you for your time and attention.
Any questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

