Candida auris: A Fungus We Don't Want Among Us

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The Epidemiology

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Candida auris

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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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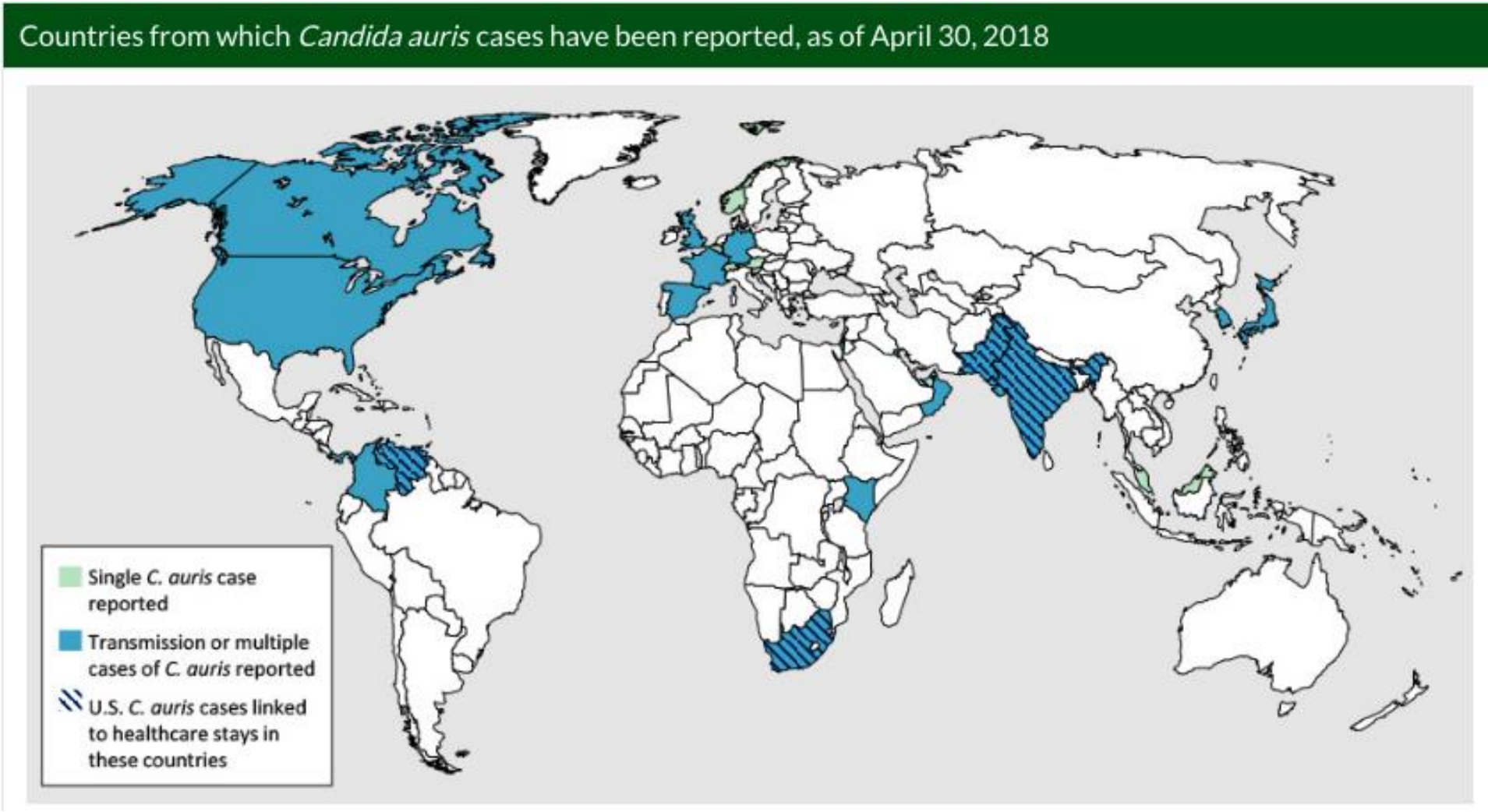
ABSTRACT

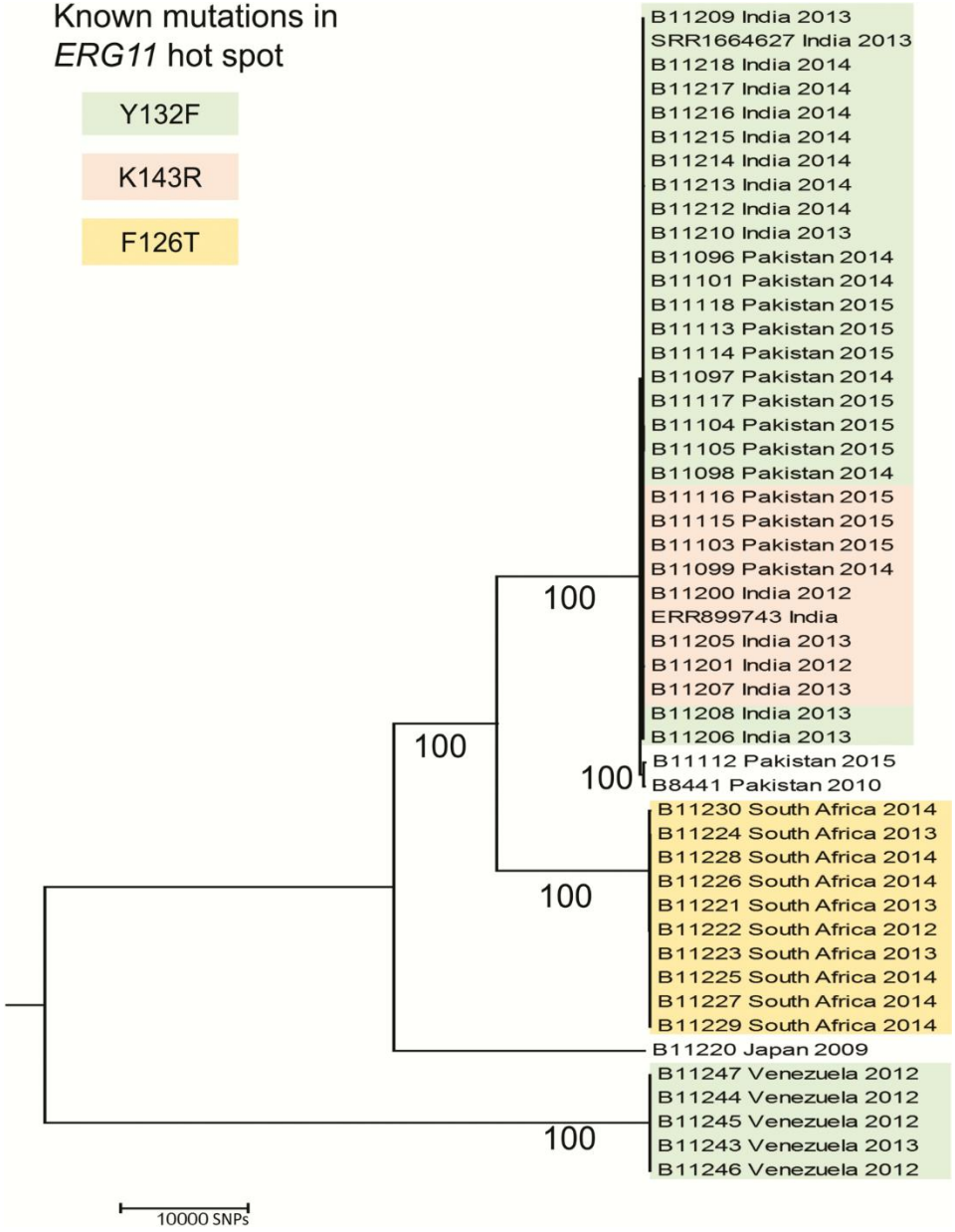
A single strain of a novel ascomycetous yeast species belonging to the genus *Candida* was isolated from the external ear canal of an inpatient in a Japanese hospital. Analyses of the 26S rDNA D1/D2 domain, nuclear ribosomal DNA ITS region sequences, and chemotaxonomic studies indicated that this strain represents a new species with a close phylogenetic relationship to *Candida ruelliae* and *Candida haemulonii* in the Metschnikowiaceae clade. This strain grew well at 40 °C, but showed slow and weak growth at 42 °C. The taxonomic description of *Candida auris* sp. nov. is proposed (type strain JCM15448^T = CBS10913^T = DSM21092^T).

Key words *Candida auris*, external ear canal, new species.

Retrospectively identified in a 1996 case isolate from South Korea and a 2008 isolate from Pakistan.

Countries from which *C. auris* cases have been reported, as of April 30, 2017 (CDC)





From: Simultaneous Emergence of Multidrug-Resistant Candida auris on 3 Continents Confirmed by Whole-Genome Sequencing and Epidemiological Analyses

Clin Infect Dis. 2016;64(2):134-140. doi:10.1093/cid/ciw691

Cases of *C. auris* by year by source, European Union, 2013-2017

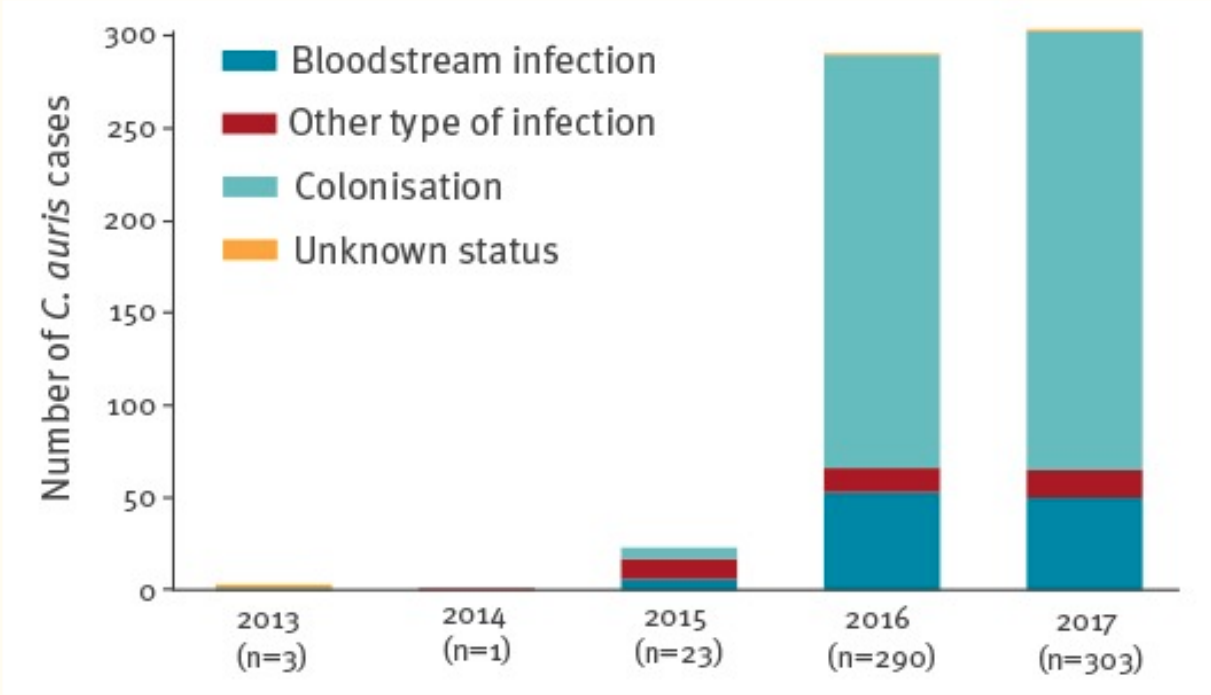
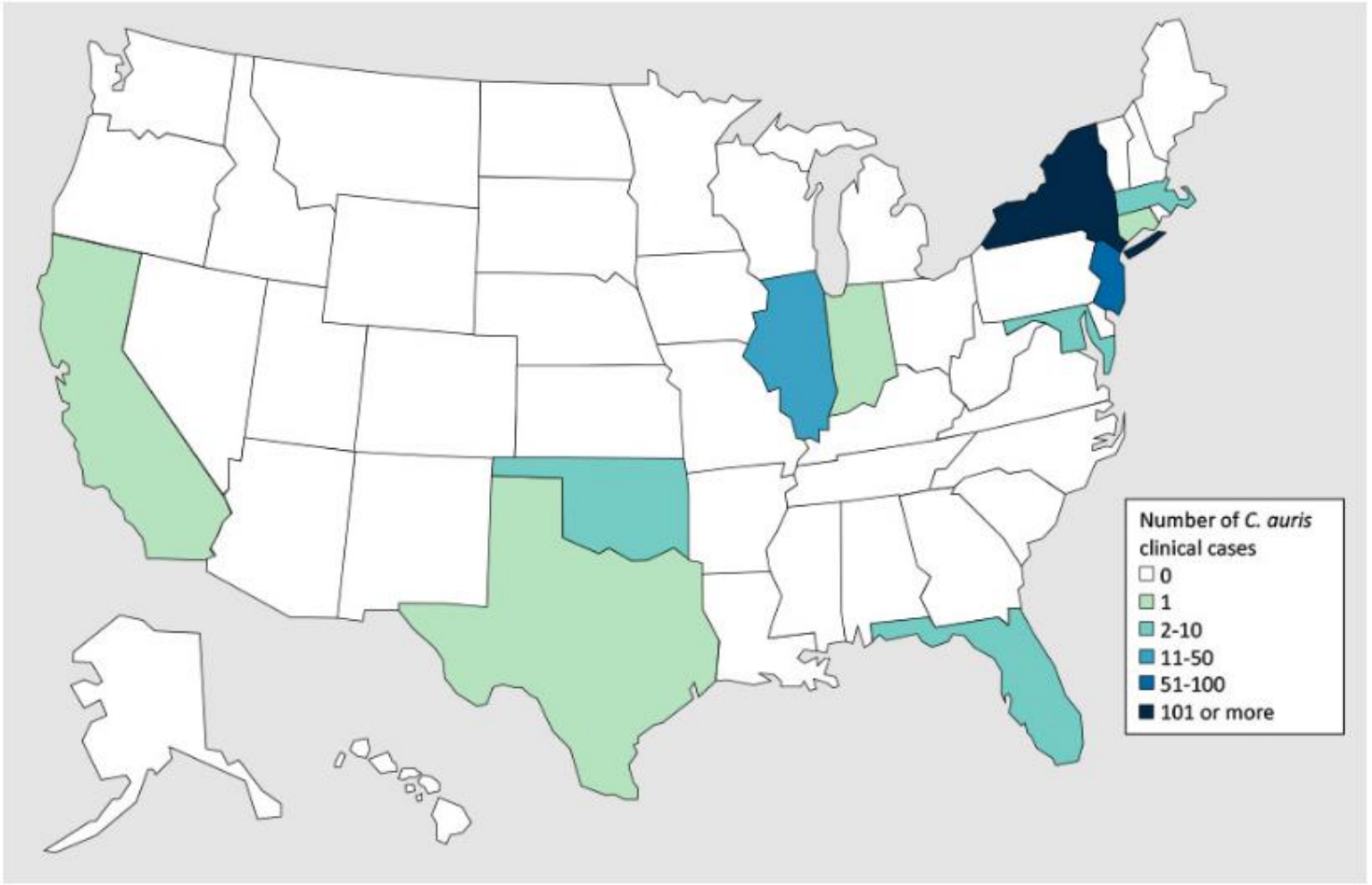


Figure 1

Number of reported *Candida auris* cases by year and infection or colonisation, European Union and European Economic Area countries, 2013–2017 (n = 620)[a]

Clinical cases of *C. auris* reported by state, as of April 30, 2017 (CDC)

U.S. Map: Clinical cases of *Candida auris* reported by state, United States, as of April 30, 2018



Cases are categorized by the state where the specimen was collected. Most probable cases were identified when laboratories with current cases of *C. auris* reviewed past microbiology records for *C. auris*. Isolates were not available for confirmation. Early detection of *C. auris* is essential for containing its spread in healthcare facilities.

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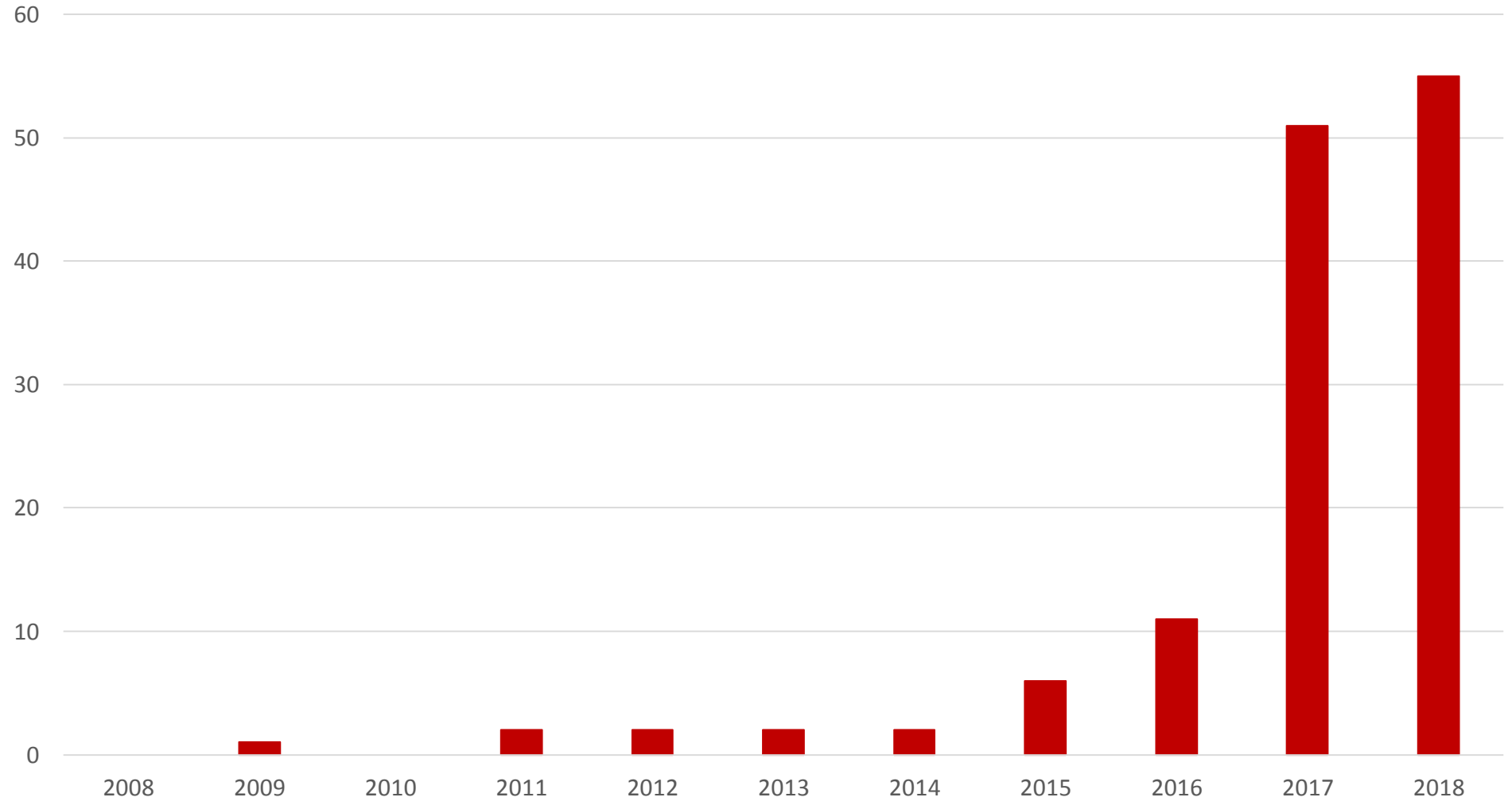
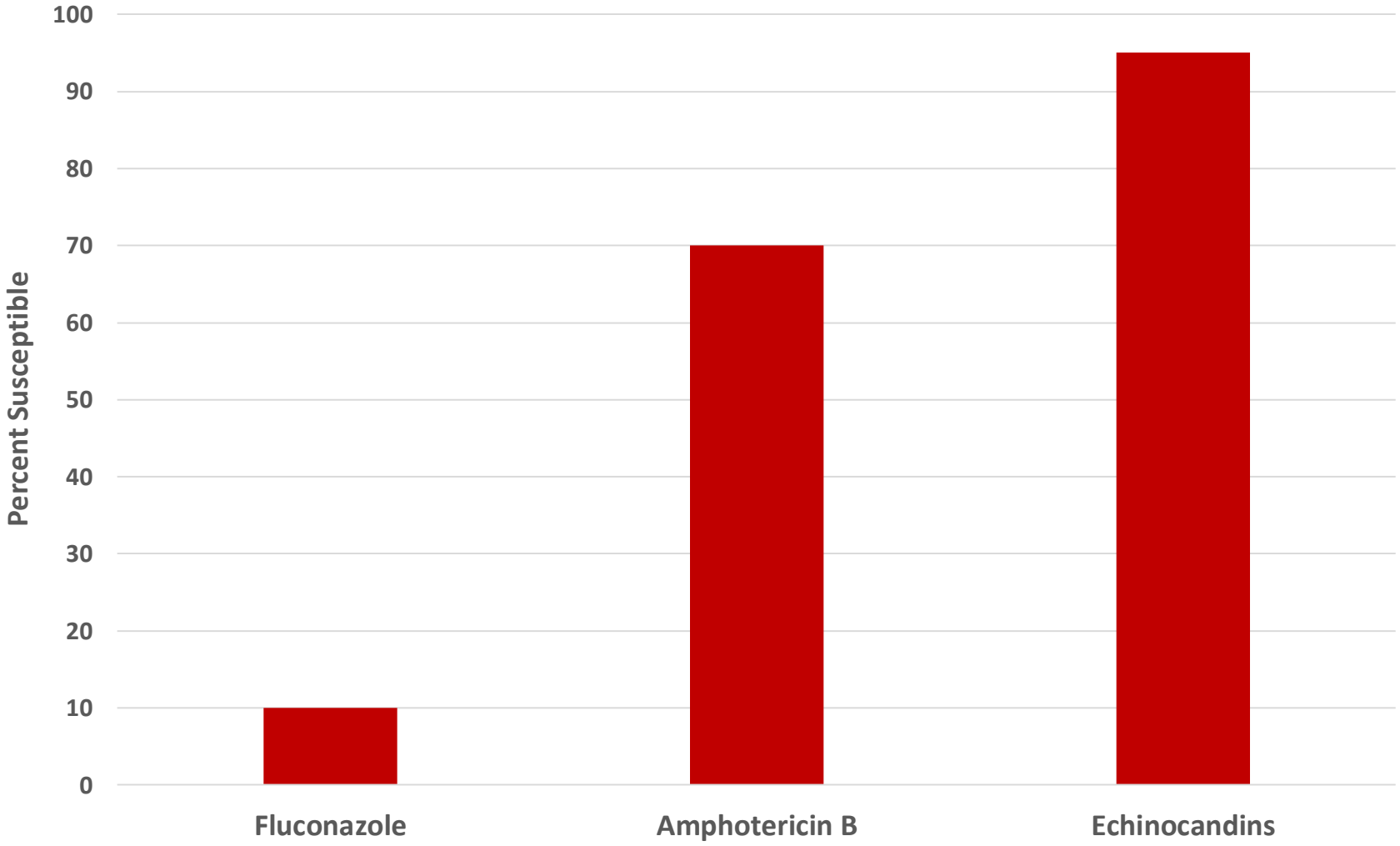
Number of Citations in PubMed for *C. auris* by Year



Susceptibility of U.S. *C. auris* Isolates (CDC)



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Candida auris – CDC Fact Sheet

Candida auris:
A drug-resistant germ that spreads in healthcare facilities

Candida auris (also called *C. auris)* is a fungus that causes serious infections. Patients with *C. auris* infection, their family members and other close contacts, public health officials, laboratory staff, and healthcare workers can all help stop it from spreading.

Why is *Candida auris* a problem?

It causes serious infections. *C. auris* can cause bloodstream infections and even death, particularly in hospital and nursing home patients with serious medical problems. More than 1 in 3 patients with invasive *C. auris* infection (for example, an infection that affects the blood, heart, or brain) die.

It's often resistant to medicines. Antifungal medicines commonly used to treat *Candida* infections often don't work for *Candida auris*. Some *C. auris* infections have been resistant to all three types of antifungal medicines.

It's becoming more common. Although *C. auris* was just discovered in 2009, it has spread quickly and caused infections in more than a dozen countries.

It's difficult to identify. *C. auris* can be misidentified as other types of fungi unless specialized laboratory technology is used. This misidentification might lead to a patient getting the wrong treatment.

Candida auris - Summary

- "New"
- Simultaneous "emergence" in South Asia, East Asia and South Africa
- Introduced into North and South America
- Difficult to identify
- Resistant to antifungals
- Only Candida sp. associated with healthcare facility outbreaks
- Environmental persistence

Laboratory Diagnosis of *Candida auris*

Tracy Stiles, MS, M(ASCP), Microbiology
Division Director, MA SPHL

Laboratory Diagnosis of *Candida auris*

- 54% of *C. auris* from the blood
- 46% from other sites including urine, wounds, sputum and bile
- Candida isolates form normally sterile sites should be fully speciated
  - Especially if the patient is already known to be colonized, or the facility is known to have had other cases
- Consider speciation from non-sterile sites when
  - It is clinically indicated for patient care
  - When *C. auris* has been detected in the facility
  - When the patient has had overnight healthcare outside the US

https://www.cdc.gov/fungal/candida-auris/recommendations.html

Laboratory Diagnosis of *Candida auris*

- Visual ID: budding yeast, almost never produces short pseudohyphae, and does not form germ tubes
- Grows well at 40-42° C on CHROMagar (colonies appear white, pink, or red, some colonies can not be distinguished from *C. glabrata*
- Commercial systems
  - Bruker Biotyper Maldi-ToF (RUO)
  - Biomerieux software version 8.01
  - Molecular methods based on sequencing the D1-D2 region of the 28s rDNA or the Internal Transcribed Region (ITS) of rDNA
  - Other systems (Vitek 2 YST, API 20C, BD Phoenix Yeast, MicroScan) can misidentify with *Candida haemulonii, Candida sake, C. duobushaemulonii, Rhodotorula glutinis*
  - Confirm with instrument manufacturer
  - **https://www.cdc.gov/fungal/diseases/candidiasis/pdf/Testing-algorithm-by-Method-temp.pdf**

https://www.cdc.gov/fungal/candida-auris/recommendations.html

Biosafety

Good biosafety measures:

- In general, cultures growing yeast-like colonies can be read on the bench in a BSL-2 laboratory.
- If the isolate is suspected of being Candida auris, or any dimorphic fungus, move it to a Class II biosafety cabinet (BSC).
- Ensure that proper disinfection of work spaces is standard practice:
  - Dispose of contaminated waste.
  - Disinfect the outside of containers prior to removing them from the BSC.
  - Clean all work areas and equipment with 10% bleach followed by water or 70% alcohol

What should clinical labs do?

- MA SPHL does not have approved procedures for *Candida* identification
- If *C. auris* is confirmed or suspected, call 617-983-6800
  - Isolate will be sent to NY State Wadsworth Laboratory
- No isolates are to be sent to CDC or Wadsworth without SPHL approval

How to ship isolates of *C. auris*

- Isolates should be submitted on slants shipped at room temperature.
- *C. auris* can grow on blood or chocolate agar slants; mycology specific media are not necessary if the laboratory does not have them.

https://www.cdc.gov/fungal/candida-auris/recommendations.html

Candida auris: Containment, Control, Communication and Coordination

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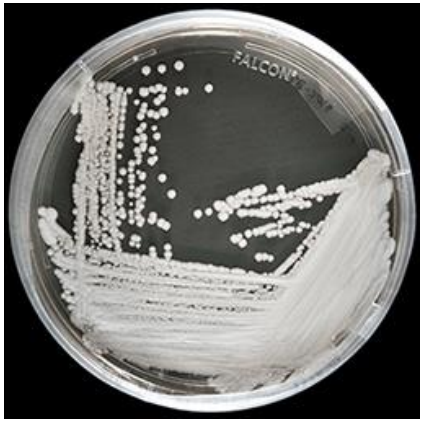
Candida auris: Why are We Concerned?

- Can cause invasive infections with high mortality
- Difficult for laboratories to identify
- Often multi-drug resistant to antifungals
- Documented transmission within hospitals, nursing homes, and other healthcare facilities
  - Outbreaks in multiple countries and states
  - Can colonize skin and persist in the healthcare environment, allowing for transmission between patients
  - Can live for many weeks on surfaces and equipment



CDC Image

Risk Factors for *C. auris*

C. auris does not typically cause infections in healthy people

- Nearly all patients had multiple underlying medical conditions and extensive health care facility exposure
  - Immunosuppressed
  - Significant medical comorbidities
  - Medical devices
    - Central venous catheters, urinary catheters, tracheostomy, g-tube, ventilators
  - Exposure to broad spectrum antibiotics
  - Extensive healthcare exposure
    - Acute care hospitals, LTACHs, nursing homes with ventilator units

Centers for Disease Control and Prevention (CDC): Clinical cases of *Candida auris* reported by state, as of May 18, 2018

State	Number clinical cases reported
California	1
Connecticut	1
Florida	3
Illinois	29
Indiana	1
Maryland	2
Massachusetts	**7**
New Jersey	67
New York	165
Oklahoma	2
Texas	1
TOTAL	279

https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html

Responding to Emerging Resistance

CDC Containment Strategy

- Goal is to prevent new or rare forms of antibiotic/antifungal resistance from spreading.
- Complements foundational CDC strategies, including improving antibiotic use and preventing infections.
- Requires an aggressive response to ≥1 case of targeted organisms.
- Emphasis on the following settings:
  - Long term care facilities (e.g., skilled nursing)
  - Long term acute care facilities
  - High acuity skilled nursing (e.g., ventilator skilled nursing facilities)
- Response activities have tiered approach based on organism/mechanism attributes.

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CDC's Tiered Strategies for Containment

- CDC has issued interim guidance for highly drug resistant organisms that defines three different categories (Tiers 1-3) and the recommended approach to control each.
- Classification of an organisms' tier is dependent on the regional and state epidemiology for that resistance mechanism.
- Tier 1: *C. Auris*
  - Organisms are never or rarely identified in the United States.

https://www.cdc.gov/hai/outbreaks/docs/Health-Response-Contain-MDRO.pdf

Preventing *C. auris* Transmission in Healthcare Settings

- A single case in a healthcare facility will prompt an aggressive response and investigation
- Containment efforts focus on:
  - Rapid identification
  - Implementing infection control interventions, including hand hygiene, standard and contact precautions, and thorough environmental cleaning and disinfection
  - Identifying additional patients/residents who are infected or colonized with *C. auris*
  - Coordinated response between facilities

Recommendations include acute care hospitals, long-term acute care hospitals, and nursing homes. Recommendations apply to both infected and colonized patients.

- Single-patient room
- Standard and Contact Precautions
- Strict adherence to hand hygiene
- Daily and terminal cleaning and disinfecting the patient/resident care environment with agent active against *Clostridium difficile* spores
- Shared equipment (e.g., ventilators, physical therapy equipment) should also be cleaned and disinfected before being used by another patient
- Screening high risk contacts
  - Roommates
  - Others depending on clinical characteristics and length of stay

https://www.cdc.gov/fungal/candida-auris/index.html

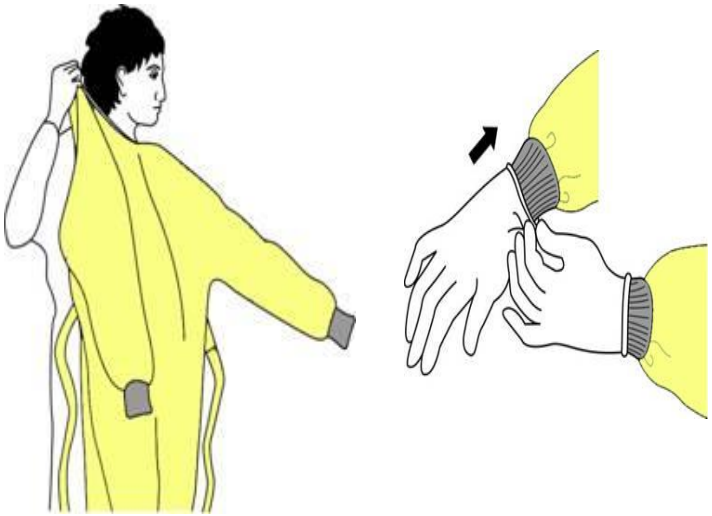
Cleaning and Disinfection

- EPA-registered hospital grade disinfectant effective against *Clostridium difficile* spores
- https://www.epa.gov/pesticide-registration/list-k-epas-registered-antimicrobial-products-effective-against-clostridium
- Follow manufacturer's instructions for use

CDC Image

Standard Precautions for all Healthcare Workers

- Hand hygiene
- Personal protective equipment (PPE)
- Safe injection practices
- Environmental cleaning
- Respiratory hygiene/cough etiquette
- Resident placement—single resident rooms, cohorting



CDC Images

Hand Hygiene

- Increased emphasis on hand hygiene is needed on the unit where a patient with *C. auris* resides.
- When caring for patients/residents with *C. auris*, healthcare personnel should follow standard hand hygiene practices, which include alcohol-based hand sanitizer use or, if hands are visibly soiled, washing with soap and water.
- Gloves are not a substitute for hand hygiene!

CDC Image

Hand Hygiene

- Primary means of preventing transmission of infection
- Indications for hand hygiene:
  - Hands are visibly soiled
  - Before and after having direct contact with a patient's intact skin (taking a pulse or blood pressure, performing physical examinations, lifting the patient/resident in bed)
  - After contact with blood, body fluids or excretions, mucous membranes, non-intact skin, or wound dressings
  - After contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient
  - Before and after entering isolation settings
  - After removing gloves or gowns
  - Before eating
  - After using the restroom

CDC Image

Contact Precautions

- Prevention of transmission of infectious pathogens that are spread by direct or indirect contact with a patient/resident or their environment.
- Hand hygiene, gown and glove use when entering patient/resident room.
- Contact Precautions are indicated when a patient/resident has:
  - uncontained excessive wound drainage;
  - uncontained fecal incontinence or other body fluids; and/or
  - **infection or colonization with MDROs or other epidemiologically significant organisms**.

Considerations for Nursing Home Residents

- Single room
  - If not available, consult with MDPH for guidance on cohorting with other residents colonized or infected with *C. auris.*
- Standard and contact precautions
  - Consult with MDPH to discuss modification of contact precautions for residents who are highly functional, without wounds or indwelling medical devices (e.g., urinary and intravenous catheters and gastrostomy tubes) who can perform hand hygiene.
  - Use gowns/gloves for changing wound dressings and linens and assisting with bathing, toileting, and dressing.

CDC Image

Monitor Adherence to Infection Control Practices

- Hand hygiene observations
- Environmental cleaning and disinfection
- Standard and contact precautions
- Personal protective equipment
  - Appropriate use
  - Adequate supplies

Hand Hygiene and Contact Precautions Observations

Staff type*	Type of opportunity	HH performed?	Gown or glove indicated?	Gown/glove used?
Click here to enter text.	○ Room entry ○ Room exit ○ Before resident contact ○ After resident contact ○ Before glove ○ After glove ○ Other: Click here to enter text.	○ Alcohol-rub ○ Hand Wash ○ No HH done	○ Gown only ○ Glove only ○ Both ○ No	○ Gown used ○ Glove used ○ Both ○ Neither
Click here to enter text.	○ Room entry ○ Room exit ○ Before resident contact ○ After resident contact ○ Before glove ○ After glove ○ Other: Click here to enter text.	○ Alcohol-rub ○ Hand Wash ○ No HH done	○ Gown only ○ Glove only ○ Both ○ No	○ Gown used ○ Glove used ○ Both ○ Neither

https://www.cdc.gov/infectioncontrol/pdf/icar/ltcf.pdf

Communication

Intrafacility:

- Timely notification of results from lab to IP and unit
  - Notify and educate patient/resident/family/guardian
  - Educate and inform healthcare personnel
  - 'Flag' medical record

Interfacility:

- If present at admission, notify transferring facility
- Ensure patient/resident's status and infection control precautions are communicated at transfer:
  - To another healthcare facility
  - Discharged to home

With MDPH:

- Immediate reporting when cases are identified: Bureau of Infectious Diseases and Laboratory Sciences (617-983-6800) and the Bureau of Health Care Safety and Quality (617-753-8000)

Coordination

When cases of *C. auris* infection or colonization are identified in a facility, MDPH epidemiologists work collaboratively with facility staff to provide:

- Recommendations for contact tracing and collecting surveillance cultures from contacts.
- Review and reinforcement of infection prevention recommendations.
- Laboratory support for collecting and submitting screening cultures.

Summary

- *C. auris* is an emerging drug resistant fungus that is often difficult to identify and can spread in healthcare settings through contact with contaminated environmental surfaces, equipment, or from person to person.
- Coordinated aggressive response has the potential to slow the spread of *C. auris.*
- Keys to reducing transmission include adherence to known prevention strategies.
- Interfacility communication of patient/resident status and implementation of contact precautions is essential in preventing transmission.
- Successful containment requires collaboration among many partners including CDC, MDPH, and facilities across the continuum of care.

Resources

1. Centers for Disease Control and Prevention (CDC). Candida auris interim recommendations for healthcare facilities and laboratories available at: https://www.cdc.gov/fungal/candida-auris/index.html
2. CDC Standard Precautions for All Patient Care available at: https://www.cdc.gov/infectioncontrol/basics/standard-precautions.html
3. CDC Hand Hygiene in Healthcare Settings available at: https://www.cdc.gov/handhygiene/index.html
4. CDC Transmission Based Precautions available at: https://www.cdc.gov/infectioncontrol/basics/transmission-based-precautions.html
5. CDC Infection Control Assessment Tools available at: https://www.cdc.gov/hai/prevent/infection-control-assessment-tools.html
6. CDC HAI Prevention Toolkits available at: https://www.cdc.gov/hai/prevent/prevention_tools.html
7. CDC Antibiotic/Antimicrobial Resistance available at: https://www.cdc.gov/drugresistance/index.html
8. CDC Core Elements of Antibiotic Stewardship for Nursing Homes available at: https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
9. MDPH Long Term Care Facilities Infection Control Guidelines available at: http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/providers/infection-control.html

MDPH Contacts

MDPH Epidemiology Program

– 617-983-6800

MDPH Bureau of Health Care Safety and Quality

– 617-753-8000