Candida auris: An Emerging Resistant Fungus

Tom Chiller, MD, MPHTM
Chief, Mycotic Diseases Branch
Fungus Immune to Drugs Quietly Sweeps the Globe

Lethal Infection Adds Alarming Dimension to Dangers of Overusing Medicines

By Matt Richtel and Andrew Jacobs

Last May, an 11-year-old boy was admitted to the Brooklyn branch of Mount Sinai Hospital for abdominal surgery. A blood test revealed that he was infected with a newly discovered germ as deadly as it was mysterious. Doctors swiftly isolated him in the intensive care unit.

The germ, a fungus called Candida auris, preys on people with weakened immune systems, and it is quietly spreading across the globe. Over the last five years, it has hit a neonatal unit in Venezuela, swept through a hospital in Spain, forced a prestigious British medical center to shut down its intensive care unit, and taken root in one of the world’s most intractable health threats: the rise of drug-resistant infections.

For decades, public health experts have warned that the overuse of antibiotics was reducing the effectiveness of drugs that have lengthened life spans by curing bacterial infections once commonly fatal. But lately, there has been an explosion of resistant fungi as well, adding a new and frightening dimension to a phenomenon that is undermining a pillar of modern medicine.

“It’s an enormous problem,” said Matthew Fisher, a professor of fungal epidemiology at Imperial College London, who was a co-author of a recent scientific review on the rise of resistant fungi.
Common perception of a Fungal Infection
Most Common Healthcare-Associated Bloodstream Infection was *Candida*
First reported in Japan and now, worldwide

Japan

2009

United States

2016
Why are we concerned about *Candida auris*?

- **Highly drug-resistant**
- **Patients can become colonized and develop invasive infections**
- **Spreads in healthcare settings**
A paradigm shift for *Candida* infections

**A Yeast that acts like a Bacteria!**

- Resistance is the norm
- Thrives on skin
- Contaminates patient rooms
- **TRANSMITTED IN HEALTHCARE SETTINGS**
C. auris cases have been reported in >30 countries
Strong phylogeographic structure – 4 clades

Simultaneous emergence on 3 continents

- South American clade
- East Asian clade
- South Asian clade
- African clade

Lockhart et al., Simultaneous emergence of Candida auris CID 2017
India

- Study of 27 ICUs in India (2011-12)
  - 19 already had *C. auris*
  - 5% of candidemia in ICUs
  - As high as 50% in some hospitals

Rudramurthy et al, *Candida auris* candidaemia in Indian ICUs: analysis of risk factors, JAC 2017
South Africa – now Major Cause of Candidemia

Candidemia South Africa, 2016-2017, n=2988

Public-sector
Private-sector

NICD GERMS Annual Report 2017 www.nicd.ac.za

Prior to April 2016 (n=154)
- C albicans: 31%
- C glabrata: 16%
- C tropicalis: 2%
- Other: 6%

Post April 2016 (n=154)
- C auris: 42%
- C albicans: 18%
- C parapsilosis: 21%
- C glabrata: 6%
- C tropicalis: 9%
- Other: 6%

https://www.eccmidlive.org/#resources/how-should-we-manage-the-c-auris-outbreak
C. auris clinical cases reported by state — United States, June 2016

CDC issued a clinical alert on C. auris
Clinical alert issued June 2016.
C. auris clinical cases reported by state — United States, 2013–March 2019

~645 clinical cases
~1770 clinical + screening cases

CDC’s clinical alert
Isolates from U.S cases cluster to all four *C. auris* clades.
Typically affects the sickest of the sick

- Tracheostomies
- Ventilator-dependent
- Colonized with other MDROs
- Recently received Antibacterials and Antifungals

Not a threat to general public or healthy individuals
Healthcare abroad is risk factor for *C. auris* in the U.S.

- Majority of cases don’t have direct links to healthcare abroad
- Cases are a result of introductions from abroad followed by local transmission
Healthcare facility exposure... ventilated Skilled Nursing Facilities (vSNF)

C. auris prevalence

in vSNFs: 7.7%

C. auris prevalence

in SNFs: 0.7%
Colonization testing of vSNF March 2017

C. auris colonization prevalence=1.5% (1/69)

- C. auris positive
- Screened negative for C. auris
- Not tested for C. auris (refused or not in room)

Slide courtesy of Chicago Department of Public Health.
Re-Colonization testing of vSNF January 2018

C. auris colonization prevalence = 43% (29/67)

- C. auris positive
- Screened negative for C. auris
- Not tested for C. auris (refused or not in room)

Slide courtesy of Chicago Department of Public Health.
Co-Colonization with other MDROs

- **C. auris** and CPO colonization

**Legend:**
- **Target** icon: **C. auris**
- **Red circle**: **C. auris** and KPC
- **Blue square** with lines: KPC or CRE with unknown mechanism of resistance
- **Orange triangle** with square: **C. auris**, KPC, and NDM
- **Yellow triangle** with square: **C. auris**, VIM-CRPA, and KPC
- **Gray triangle** with square: **C. auris** and KPC-CRPA
- **Not filled** circle: Screened negative for **C. auris**, but not tested for CRE
- **Not filled** square: Screened negative for CRE and **C. auris**

Slide courtesy of Chicago Department of Public Health.
Patients are often colonized for the long term

- Primarily on skin, but nares and other body sites also can become colonized
- Persistent, for many months
- No currently known decolonization strategies

- Leads to invasive infection
- Transmission to others
C. auris persists in the environment

- Can survive over a month
- Some common disinfectants (quats) don’t work
ARLN Labs – *Candida auris* identification services available

**WEST**
- Washington State Public Health Laboratories
  - Core Testing
  - *N. gonorrhoeae*

**CENTRAL**
- Minnesota Department of Health Public Health Laboratory
  - Core Testing
  - *C. difficile*
  - *S. pneumoniae*

**MOUNTAIN**
- Texas Department of State Health Services Laboratory
  - Core Testing
  - *N. gonorrhoeae*

**NATIONAL TUBERCULOSIS MOLECULAR SURVEILLANCE CENTER**
- Michigan Department of Health and Human Services
  - Core Testing
  - *M. tuberculosis*

**MIDWEST**
- Wisconsin State Laboratory of Hygiene
  - Core Testing
  - *S. pneumoniae*

**NORTHEAST**
- Wadsworth Center Bacteriology Laboratory
  - Core Testing

**MID- ATLANTIC**
- Maryland Public Health Laboratory
  - Core Testing
  - *N. gonorrhoeae*

**SOUTHEAST**
- Tennessee State Public Health Laboratory
  - Core Testing
  - *N. gonorrhoeae*
THREE CLASSES OF ANTIFUNGALS

1  Azoles 
2  Polyenes 
3  Echinocandins
Resistant in the US

<table>
<thead>
<tr>
<th></th>
<th>Azoles</th>
<th>Polyenes</th>
<th>Echinocandins</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>87.6%</td>
<td>33.7%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

- 33% multidrug resistant (2 drugs)
- 2 pan-resistant isolates found in 2019
Pan-resistance – all three classes

- First 2 CDC-confirmed pan-resistant *C. auris* cases found in NY
- Cases were unrelated
- Developed resistance on echinocandin treatment
  - already resistant to fluconazole and amphotericin B
- No transmission of resistance seen
- Pan-resistance has also been reported from a few other countries (5)
It’s new bug using old tricks

- Drug resistant, makes people sick, and spreads
- Similar to CRE, VRE, MRSA, and other drug resistant bugs
- We are still learning a lot about *C. auris*, but we also know how to control the spread of other similar germs
  - Many of the same principles can be applied to *C. auris*
Facility Level Prevention Strategies: Back to Basics…

But needs to applied to vSNFs and long term care

Hand Hygiene

Personal Protective Equipment & Precautions

Environmental Cleaning & Disinfection
What Keeps Us Up at Night

*C. auris* leaping ahead of other *Candida*