Candida auris:
The rise and response to an emerging multidrug-resistant yeast

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Communicable Disease Forum
April 2017
Candida auris in the news

The Washington Post

To Your Health

Deadly fungal infection that doctors have been fearing now reported in U.S.

By Lena H. Sun  March 10  

Source: https://www.washingtonpost.com/news/to-your-health/wp/2017/03/10/deadly-fungal-infection-that-doctors-have-been-fearing-now-reported-in-u-s/?utm_term=.5eeb6a12e18a
Candida auris in the field

Antimicrobial Resistance & Infection Control

RESEARCH | OPEN ACCESS

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

Silke Schelenz1,3*, Ferry Hagen2, Johanna L. Rhodes3, Alireza Abdolrasouli3, Anuradha Chowdhary4, Anne Hall1, Lisa Ryan1, Joanne Shackleton1, Richard Trimlett5, Jacques F. Meis2,6, Darius Armstrong-James1,3 and Matthew C. Fisher3

The rise of *Candida auris*

Reasons for concern
- Identification
- Resistance
- Transmission

*C. auris* in the US and New Jersey
- Recommendations
- Response

Call for action

Takeaways
Candida auris: Not your Grandparent’s Candida

- *Candida*: Catch-all for asexual yeasts
  - Hundreds of **unrelated species**
- *Candida albicans* vs ‘non-albicans Candida’
  - Less than half of *Candida* infections are caused by *C. albicans*, today

Source: https://www.ncbi.nlm.nih.gov/pubmed/24863164
Candida auris: An overnight sensation...

First isolate identified

Oldest isolate identified (1996)

South Korea

Global emergence

South Africa, Kenya, Kuwait

Pakistan, Venezuela, Israel, Germany, U.K.

Colombia, Spain, U.S.A.

...With international roots

- Whole genome sequencing used to review ‘fingerprints’ of isolates
- Four clades covering three continents
  - Simultaneous development

Image courtesy of CDC Mycotic Diseases Branch
It’s just *Candida!* What’s the big deal, eh?
Candida auris: A fast learner

- Three major classes of antifungals
  - Azoles
    - Fluconazole: 94% resistant
    - Voriconazole: 54% resistant
  - Polyenes
    - Amphotericin B: 35% resistant
  - Echinocandins: 7% resistant

- Most C. auris isolates are drug resistant
  - 41% multidrug resistant
  - 4% resistant to all three major classes of antifungals

Percentages are calculated on susceptibility testing interpretation of 54 isolates, data courtesy of CDC Mycotic Diseases Branch
Candida auris: Master of disguise

- Laboratory protocols (slips through the cracks)
  - No speciation
  - No susceptibility testing
  - By physician request only

- Laboratory instruments (unrecognizable)
  - Results vary by automated methods
  - Missing from reference databases
    - Research use only
    - Older, outdated software

Candida auris can be misidentified as:

- Candida haemulonii
- Candida famata
- Candida sake
- Candida spp. (inconclusive results)
- Saccharomyces cerevisiae
- Rhodotorula glutinis
Candida auris: Overstays its welcome

- Vast environmental contamination
  - Detected on bed, chairs, equipment, tables, IV poles of patient rooms
    - Continued detection more than a month after discharge
    - Can survive on plastic surfaces for more than four weeks
- Fungal claims don’t always work
  - Quaternary ammonium compounds are ineffective
- No known decolonization regimens
*Candida auris*: Takes advantage of the (healthcare) system

- Healthcare associated
  - Has not been isolated in the natural environment
- Similar risk factors for other *Candida spp.* infections
- Known cases typically have:
  - History of antifungal therapy
  - Multiple underlying conditions
  - Indwelling devices
    - Catheters, G-tubes, tracheostomy tubes
  - Extensive history in healthcare settings
    - LTACHs, SNFs, acute care hospitals
**Candida auris:** Uses frequent-flier miles

- Infected patients are usually healthcare ‘frequent fliers’
- *C. auris* affects closely-linked healthcare facilities
  - Network problem, not a facility problem
  - LTACHs as ‘center’ of networks
- Similar concerns to the spread of CRE

Network analysis of cases of KPC-CRE linked to healthcare facilities in a region

Don’t panic, but *Candida auris* is already here...
First there were seven...
...And now, we’re past the seventies

- 80 total *C. auris* cases reported by CDC as of March 16, 2017
  - 53 confirmed, clinical infections
  - 27 colonized cases identified

Confirmed clinical *Candida auris* cases reported by CDC
Listed by state of culture collection, March 2017

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<thead>
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North American isolates are closely related to other regions
44 *Candida auris* cases under investigation as of March 25, 2017
- 14 confirmed, clinical cases
- 21 probable cases (*C. haemulonii*)
- 9 surveillance cases (colonized)

Each case linked to at least one other case

One outbreak among a healthcare network

*Candida auris* cases by month of first identifying culture
New Jersey Residents | June 2015 to March 25, 2017
...And we’re doing something about it.

Contain, contain, contain!
**Containment: What we’re doing**

- Case definitions
- Laboratory, healthcare facility guidance
- Investigation into every report
  - Laboratory testing
  - Selective case finding (backwards)
  - Case tracking (forwards)
- Outbreak investigation
- Laboratory testing and support
Candida auris draft case definition

- Case definitions based on proposed national definition
  - **Confirmed**: *Candida auris* isolated from any body site.
  - **Probable**: *Candida haemulonii* isolated from a normally sterile body site of a patient with an epidemiological link to a known *C. auris* case.
  - **Suspect**: *Candida haemulonii* isolated from a normally sterile body site
- All cases can be either **clinical** or **surveillance** (e.g. infection or colonization)
- Additional labs for one patient do not indicate a new case.
Candida auris laboratory guidance

- Retrospective microbiology record review for possibly misidentified isolates
  - January 1, 2015 to present
  - See organism list in previous slides
  - Share records review with LHD or Communicable Disease Service

- Suspect C. auris when non-albicans Candida isolates are identified with unusual antifungal resistance

- Report and save all suspect C. auris isolates

- Communicate with infection prevention staff

- Remember: misidentification varies with laboratory methods!
Candida auris healthcare facility guidance

- Control measures for colonized and infected cases:
  - **Contact precautions**
    - Placement in single room, with patient-specific equipment
    - Diligent hand hygiene, gown and glove use whenever entering patient room
    - Only remove after two consecutive, negative skin surveillance cultures
  - **Environmental cleaning**
    - Daily and terminal cleaning of patient room
    - Thorough cleaning of shared equipment
    - EPA-registered disinfectant effective against Clostridium difficile
- Notification to receiving healthcare facilities and public health upon patient transfer
Candida auris case investigations

- Single cases of *C. auris* should be reported to public health
- *Candida auris* Case Report Form
  - 90 days before first positive culture
  - Healthcare exposures
  - Link cases in place and time
  - Helps to characterize *C. auris*
- Laboratory confirmation at CDC and NYSDOH Wadsworth Mycotic Laboratories
  - Species identification
  - Whole genome sequencing
- Identifying laboratory microbiology reports are collected
**Candida auris case investigations**

- Identify healthcare exposures in 90 days before positive lab
- Track case through all healthcare future exposures
- Collection date of first positive *Candida auris* lab

**Day 0**
- Notify all facilities
- Collect case report forms
- Provide guidance
- Recommend laboratory review

- Notify all facilities
- Provide guidance
- Recommend laboratory review
- Colonization testing
- Monitor for possible transmission
Candida auris outbreak investigations

- **Candida auris outbreak**: Two or more *C. auris* cases linked in place in time
  - Outbreaks can span across multiple healthcare facilities
- Laboratory testing to monitor transmission
  - Point prevalence survey (PPS)
  - Active surveillance testing (AST)
- Additional control measures
  - Cohorting of cases, healthcare workers
  - Enhanced environmental cleaning
  - Auditing
- Public health site visit
Candida auris laboratory testing

- Laboratory support is provided by CDC and NYSDOH Wadsworth Mycotic Laboratories
- Confirmatory testing
  - Testing of any isolates suspected to be Candida auris
    - E.g. Candida spp. not identified, Candida haemulonii
    - MALDI-TOF and DNA sequencing (gold standard)
- Surveillance testing
  - Culturing of skin swabs with C. auris confirmatory testing
  - Individual cases, case contacts, PPS, or AST
  - Positive cultures indicate colonized cases
- Whole genome sequencing
  - DNA ‘fingerprinting’ of all C. auris isolates
To move from ‘contain’ to ‘prevent’, everyone has a role to play.
Call for prevention: Local health departments

- Discuss *C. auris* with facilities in your jurisdiction
  - Share recommendations
  - Encourage surveillance and reporting
  - Request retrospective laboratory records review

- **Respond immediately** to *C. auris* reports
  - Collect basic case information
  - Laboratory reports
  - Notify Communicable Disease Service

- Maintain situational awareness
  - Monitor CDC guidance
  - Watch for NJ LINCS updates
Call for prevention: Healthcare facilities

- Request a retrospective laboratory records review
  - Share with local health and Communicable Disease Service
- Surveillance plan for *Candida auris*
  - Ensure communication between Infection Control and Laboratory
  - Identify persons responsible for reporting to public health
- Response plan for *C. auris* cases
  - Can all recommendations be followed?
  - Are there existing policies that can be adapted? (e.g. MRSA, CRE)
  - On discharge, how will *C. auris* history be communicated?
- Maintain situational awareness
Call for prevention: Clinical and reference laboratories

- Complete the recommended laboratory records review
  - Share with local health and Communicable Disease Service
- Surveillance plan for *Candida auris*
  - Can our methods/instruments identify *C. auris*?
    - What are the most likely misidentifications for our lab?
    - Can susceptibility testing indicate a possible *C. auris*?
  - What isolates will be saved?
  - Who is responsible for communicating with infection control?
  - Who is responsible for reporting to public health?
- Maintain situational awareness
To sum it all up...

- Candida auris is an emerging, drug-resistant yeast that is difficult to identify in most clinical laboratories, pervasive in the healthcare environment, and can easily spread through healthcare facility networks.

- Outbreaks of *C. auris* are likely to occur and difficult to control.

- In individual facilities: laboratory and infection control partnership is necessary to identify and contain *C. auris*.

- In healthcare networks: clear and consistent communication is needed to prevent transmission of *C. auris* across facilities.

- In New Jersey: immediate reporting and swift public health response is necessary to prevent a *C. auris* epidemic.

- There is still time to contain *C. auris* before it achieves ‘super-bug’ status!
Special thanks to:

- CDC Mycotic Diseases Branch Staff
- NYSDOH HAI Program Staff
- NJDOH Regional Epidemiology Program Staff
Thank you!

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Recommended reading:

- CDC web resources:
  - *Candida auris* main page: www.cdc.gov/fungal/diseases/candidiasis/candida-auris.html
  - *Candida auris* interim recommendations: www.cdc.gov/fungal/diseases/candidiasis/recommendations.html
  - *Candida auris* FAQ’s: www.cdc.gov/fungal/diseases/candidiasis/candida-auris-qanda.html

- Publications:
  - MMWR: Investigation of the first seven reported cases of *Candida auris* [...] – United States, Mary 2013-August 2016: www.cdc.gov/media/pdf/releases/2016/p1104-candida-auris-mm6544e1-ebook.pdf