Candida auris
Our Misunderstood Friend

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INFECTION CONTROL MANAGER
OU MEDICAL SYSTEM
Why is it a concern?

➢ Fungus causing severe invasive infections in healthcare facilities
➢ Resistant to commonly-used antifungals. Sometimes pan-resistant
➢ Difficult to identify with standard laboratory methods
➢ Causing outbreaks in nursing homes and healthcare facilities around the world
➢ 30-60% mortality rate
States reporting C. auris infections
This is us
Timeline

- 2013, 2015-2016
- Mar 2012 - Jul 2013

Maps showing South America and the United States.
Timeline

London 2015-2016

Oklahoma County 2017
Lab Diagnosis

- CDC recommends speciation for all Candida isolates from STERILE body sites.
- C. auris should be considered if increase in unidentified Candida infections noted.
- Isolates from non-sterile sites are not usually identified to species level because they usually represent colonization and do not require treatment.
Lab Diagnosis

➢ CDC recommends speciation of Candida from NON STERILE body sites when:
   ➢ When clinically indicated
   ➢ Recent history of C. auris in hospital/unit
   ➢ Patient with recent hospital stay in foreign country

➢ Consider speciation for patients with remote history of hospital stay in foreign country
Antifungal susceptibility

In the U.S.:
- 90% resistant to fluconazole/Voriconazole
- 30% resistant to Amphotericin B
- 5% resistant to Echinocandins
  - Anidulafungin
  - Caspofungin
  - Micafungin

In other countries, many isolates resistant to all 3 classes of antifungals

Patient may still be treated with drug in presence of elevated MIC, particularly if other antifungals ineffective
Infection Control: CDC recommendations

✓ Single patient room, Standard and Contact precautions
✓ Rigorous handwashing
✓ Cleaning and disinfection of environment/equipment- bleach
✓ Screening contacts of newly identified cases
✓ Ongoing assessment- hard to detect
Long Term Care Facilities

CDC recommends:

➢ Standard and Contact precautions if devices present
➢ May relax contact precautions if resident can wash hands
  ➢ Can leave room if secretions contained, hands washed
  ➢ HCW gown/glove for personal care
➢ Disinfect shared equipment
➢ Staff should not work with other residents while working with affected resident
Family & Personal Contacts

- Risk of transmission to healthy household contacts is low
- Rigorous hand hygiene
- Use of gloves if family or contact providing close personal care

Specific guidance for dialysis/infusion centers, home health, physician offices and wound care clinics can be found on the CDC website:

https://www.cdc.gov/fungal/diseases/candidiasis/c-auris-infection-control.html
Who was responsible for giving us *Candida auris*?
OUUMS Microbiology Laboratory

CINDY MCCLOSKEY, MD
DIRECTOR

DENA SHIBIB, DO
ASSOCIATE DIRECTOR
Day 0
Urine culture collected

Day 1
Pinpoint growth
Yeast only
Unable to ID

Day 2
MALDI-TOF MS ID – C. auris
RUO Database (not FDA approved)
Very poor quality ID (low log score)

Day 3
Supplemental testing also suspicious for C. auris

Day 4
Next business day: Reported to State Health Department

Section Medical Director notified: Chart review confirmed patient on contact precautions for other known MDRO; plan for supplemental testing to evaluate ID.

Results reviewed with Section Medical Director: Highly suspicious for C. auris. Clinical team and Infection Prevention notified.
Urine Culture Policy – ID & Susceptibility

### Clean Catch Urines

<table>
<thead>
<tr>
<th># Isolates</th>
<th>Colony Count</th>
<th>LE*</th>
<th>Identification</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 1</td>
<td>$5 \times 10^2$ to $10^5$</td>
<td>+ or -</td>
<td>Definitive</td>
<td>Yes</td>
</tr>
<tr>
<td>b. 1</td>
<td>$10^6$</td>
<td>-</td>
<td>Descriptive</td>
<td>No</td>
</tr>
<tr>
<td>c. 2</td>
<td>Both $&gt;10^5$ or $&gt;10^4$ and $&gt;10^4$ or Both $&gt;10^4$</td>
<td>+ or -</td>
<td>Definitive</td>
<td>Yes</td>
</tr>
<tr>
<td>d. 2</td>
<td>One $&gt;10^6$, predominant, other $&lt;10^6$</td>
<td>+ or -</td>
<td>Definitive (Predominant)</td>
<td>Yes</td>
</tr>
<tr>
<td>e. 2</td>
<td>Both $&lt;10^6$ or one $10^6$, $10^5$ but not predominant</td>
<td>-</td>
<td>Descriptive</td>
<td>Yes</td>
</tr>
<tr>
<td>f. 3 or &gt;</td>
<td>One organism $&gt;10^6$, clearly predominant</td>
<td>+</td>
<td>Descriptive (Predominant)</td>
<td>No</td>
</tr>
<tr>
<td>g. 3 or &gt;</td>
<td>Mixture of any # with none predominant</td>
<td>+ or -</td>
<td>Descriptive</td>
<td>No</td>
</tr>
</tbody>
</table>

*Leukocyte esterase results from LN strip test (urinalysis); LE results, when available, must be accessed for urines in categories b, e, & f.

- **Definitive identification:** ID to species
- **Descriptive identification:** ID to genus or gross ID (ex. Staph, diphtheroids, gram-negative bacilli)

### Cath Urines

<table>
<thead>
<tr>
<th># Isolates</th>
<th>Colony Count</th>
<th>Identification</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 1</td>
<td>$&gt;10^5$ pathogen</td>
<td>Definitive</td>
<td>Yes</td>
</tr>
<tr>
<td>1</td>
<td>$10^3$-$10^4$ skin flora</td>
<td>Descriptive</td>
<td>No</td>
</tr>
<tr>
<td>b. 2</td>
<td>Both $&lt;10^4$</td>
<td>Descriptive</td>
<td>No</td>
</tr>
<tr>
<td>c. 2</td>
<td>Both $&gt;10^4$</td>
<td>Definitive</td>
<td>Yes</td>
</tr>
<tr>
<td>d. 2</td>
<td>One $&gt;10^4$, Other $&lt;10^4$</td>
<td>Definitive ($&gt;10^4$)</td>
<td>Yes</td>
</tr>
<tr>
<td>e. 3</td>
<td>Any combination of $&gt;10^5$ or $&gt;10^4$ (Urol)</td>
<td>Definitive</td>
<td>Yes</td>
</tr>
<tr>
<td>f. 3</td>
<td>Any combination, none predominant</td>
<td>Descriptive</td>
<td>No</td>
</tr>
<tr>
<td>g. 4 or more</td>
<td>Any combination</td>
<td>Descriptive</td>
<td>No</td>
</tr>
</tbody>
</table>

### Yeast

- Treat as pathogen for identification purposes
- Only provide susceptibility testing upon request
# Common Misidentifications by Test Method

<table>
<thead>
<tr>
<th>Identification Method</th>
<th>Organism <em>C. auris</em> can be misidentified as</th>
</tr>
</thead>
</table>
| Vitek 2 YST                            | *Candida haemulonii*  
                                          | *Candida duobushaemulonii*                                                        |
| API 20C                                 | *Rhodotorula glutinis*  
                                          | (characteristic red color not present) ♠  
                                          | *Candida sake*                                                                    |
| BD Phoenix yeast identification system  | *Candida haemulonii*  
                                          | *Candida catenulata*                                                              |
| Microscan                               | *Candida famata*  
                                          | *Candida guilliermondii*  
                                          | *Candida lusitaniae*  
                                          | *Candida parapsilosis*                                                            |

From CDC website for *Candida auris*: Recommendations for Identification of *Candida auris*
https://www.cdc.gov/fungal/diseases/candidiasis/recommendations.html
OUMS Laboratory Test Results

Bruker Biotyper MALDI-TOF MS → C. auris (Log scores: 1.54 & 1.8)

Supplemental Tests Performed at OUMS:

◦ MicroScan Yeast ID → C. albicans
◦ Germ tube test → Negative
  ◦ rules out C. albicans
◦ Yeast API → Rhodotorula glutinis (99.2% confidence score)
  ◦ Typical pink colony morphology was not present/rules out Rhodotorula
◦ TREK Yeast Y03 Susceptibility Panel
  ◦ Fluconazole and echinocandin resistant
  ◦ Results not typical of Candida spp. isolates seen at OUMS
Algorithm to identify *Candida auris* based on biochemical laboratory method and initial species identification

**PURPOSE**

*Candida auris* is a multidrug-resistant yeast that has been found in multiple countries, including the United States. *C. auris* can cause invasive infections, be passed from person to person, and persist in the environment. Its severity, communicability, and drug resistance makes correctly identifying *C. auris* crucial to treating patients and preventing infections. However, this is challenging because traditional biochemical methods frequently misidentify *C. auris*. This algorithm details the steps needed to determine the correct *Candida* spp. based on the tests and equipment available in your lab.

**TABLE OF CONTENTS – ALGORITHMS BY METHOD**
1. Bruker Biotype MALDI-TOF
2. bioMérieux VITEK MS MALDI-TOF
3. VITEK 2 YST
4. API 20C
5. BD Phoenix
6. MicroScan
7. Summary of this algorithm in table form

Please note that these algorithms are based on our current knowledge about misidentification of *C. auris* and may change as we learn new information.

Additional Laboratory Actions

Reviewed ~ 1 year of yeast identification results - Was our patient the index patient or had we encountered this organism previously without realizing it?

- Yeast IDs that potentially could have been *C. auris*- the mis-identification guidelines from CDC
- No MDR organisms identified– fairly confident we had not seen this before

Identified ALL yeast from specimens collected on floors occupied by index patient for surveillance

- Identified yeast from all sources, including colonization and not ID beyond ruling out *Cryptococcus*
- Attempt at real-time surveillance among patients potentially at highest risk
And then the CDC offers to send a team...
The CDC Visit

- Three physicians
- Goal was to prevent spread
- Met with staff immediately
- Inservices throughout the day- worst kept secret
- Health department partners
- Identified areas/patients/staff
- Environmental cultures
- Three teams went out

“...a containment success story...”
ENVIRONMENTAL CULTURING-
What?

- high touch surfaces in the care area
  - Computer keyboard/mouse
  - Cardiac Monitor, Infusion Pump, Oxygen flow meter knob
  - I-stat
  - Bed rail, Call light, Overbed table
  - Chair
  - Hand washing sink
  - Bathroom door handles (inside and out), Toilet handle/additional water flush arm
ENVIRONMENTAL CULTURING - Why?

• Environmental biofilms – *C. auris* can be viable up to approximately 14 days on a surface.
ENVIRONMENTAL CULTURING - How?

- Customized culture medium was utilized on a sponge stick to collect surface cultures

- Each surface of the sponge stick was utilized

- Packaged and stored at the correct temperature to ship to CDC
SCREENING of HOSPITALIZED INDIVIDUALS

• WHY?

• Patients with *C. auris* could have been colonized for months prior to detection

• Transmission potential could occur to other patients around the case-patient while control measures weren’t in place (standard/contact precautions).
SCREENING of HOSPITALIZED INDIVIDUALS

• WHAT?

• A composite swab of the axilla and groin (most common and consistent sites of colonization).
SCREENING of HOSPITALIZED INDIVIDUALS

• WHO? Close Contacts
  ◦ Roommates
  ◦ Patients/staff on the unit
  ◦ Family members
References
