Candida Surveillance in Oregon

Alexia Zhang, MPH
Healthcare Associated Infections Epidemiologist
Acute and Communicable Disease Prevention

Lunch and Learn
December 11th, 2018
Polls

Thank you for your response!
Candida species background

- Yeast found in the environment
- Part of normal flora in humans
  - intestinal tract
  - mucous membranes
  - skin
- Over 150 species of Candida
  - Only 15-20 cause infections
Types of *Candida* infections

- Can cause multiple forms of infections
  - Thrush: oropharyngeal candidiasis
  - “Yeast infection”: candidiasis in the vagina
  - Invasive candidiasis: *Candida spp.* infections that can affect heart, brain, eyes, bones
- Candidemia: bloodstream *Candida spp.* infection
Oral Candidiasis

• Symptoms
  – white patches on mucous membranes in mouth/tongue
  – Redness or soreness
  – Cottony feeling in mouth
  – Pain while eating or swallowing

• Risk factors
  – Comorbid conditions
  – Neonates/babies
  – Denture use
  – Immunocompromising conditions
    (e.g., HIV)
  – Recent antibiotics or corticosteroids

• Prevention
  – Maintain good oral health
  – Management of immunocompromising conditions
Vaginal candidiasis

- **Symptoms**
  - Vaginal itching or soreness
  - Pain or discomfort
  - Abnormal vaginal discharge
- **Risk factors**
  - Pregnancy
  - Hormonal contraceptives
  - Immunocompromised
  - Recent antibiotic use
- **Prevention**
  - Antibiotic stewardship
Invasive candidiasis

- Invasive infection affecting blood, joints, eyes, heart, brain, etc
- Common healthcare associated infection
- Risk factors
  - Immunocompromised patients
  - Surgery
  - Chemotherapy
  - Injection drug use
  - Dialysis
  - Catheters
- Prevention
  - Antifungals
  - Central line care
Tracking *Candida* spp in healthcare settings

- Non-invasive *Candida* spp. infections (e.g., thrush) are not reportable
- Some invasive *Candida* spp. infections are reportable:
  - National Healthcare Safety Network
  - Active population-based surveillance in Portland Tri-county area
- *Candida auris* isolated from any site is immediately reportable to public health as it is an “uncommon illness of potential public health significance” (OAR 333-018-0015)
Candida auris
**Candida auris background**

- CDC Clinical Alert—June 2016, update Sept 2017
- Concerning for three main reasons
  1. Often multi-drug resistant
  2. Difficult to identify with standard laboratory methods
  3. Causes outbreaks in healthcare settings
- Can cause multiple types of infections
  - Blood
  - Ear
  - Wound
  - Respiratory tract
Single cases of *C. auris* have been reported from Austria, Belgium, Malaysia, the Netherlands, Norway, Russia, Switzerland, and the United Arab Emirates.

Multiple cases of *C. auris* have been reported from Australia, Canada, China, Colombia, France, Germany, India, Israel, Japan, Kenya, Kuwait, Oman, Pakistan, Panama, Saudi Arabia, Singapore, South Africa, South Korea, Spain, the United Kingdom, the United States (primarily from the New York City area, New Jersey, and the Chicago area) and Venezuela; in some of these countries, extensive transmission of *C. auris* has been documented in more than one hospital.

U.S. cases of *C. auris* have been found in patients who had recent stays in healthcare facilities in India, Kenya, Kuwait, Pakistan, South Africa, the United Arab Emirates, and Venezuela, which also have documented transmission.

Other countries not highlighted on this map may also have undetected or unreported *C. auris* cases.
Total: 457 confirmed, 30 probable

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.
Candida auris outbreaks

- *C. auris* source of multiple outbreaks in healthcare facilities
- Hard to control and eradicate
- United Kingdom hospitals
  - Multiple hospitals with extended outbreaks (>1 year)
  - Widespread contamination on surfaces
  - Continuous colonization despite decolonization efforts
  - Outbreak at one hospital linked to reusable axillary temperature probes
Candida auris outbreak—Chicago ventilated SNF unit

vSNF B Ventilator/Trach Floor
March 2017 C. auris PPS Results

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)
Candida auris outbreak—Chicago ventilated SNF unit

vSNF B Ventilator/Trach Floor
January 2018 C. auris PPS Results

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)
United States *Candida auris* isolates

U.S. case isolates related to those from multiple parts of the world --closely related within each state
Candida auris in Oregon?

- Currently no known cases in Oregon
- Identification is difficult for most laboratories
- Easy to misidentify

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

*C. guilliermondii, C. lusitaniae, and C. parapsilosis generally make pseudohyphae on cornmeal agar. If hyphae or pseudohyphae are not present on cornmeal agar, this should raise suspicion for C. auris as C. auris typically does not make hyphae or pseudohyphae. However, some C. auris isolates have formed hyphae or pseudohyphae. Therefore, it would be prudent to consider any C. guilliermondii, C. lusitaniae, and C. parapsilosis isolates identified on MicroScan or any C. parapsilosis isolates identified on RapID Yeast Plus as possible C. auris isolates and forward them for further identification.*
If you suspect *C. auris*—

- Call Acute and Communicable Disease Prevention Program: 971-673-1111
- Send isolate to Oregon State Public Health Lab
- Isolate will be forwarded to Antibiotic Resistance Laboratory Network in WA
Candida auris infection prevention and control

- Place patient in single-patient room
- Standard and contact precautions as long as patient is colonized
- Hand Hygiene
- Clean and disinfect patient care environment with recommended product—EPA registered hospital grade disinfectant effective against C. difficile spores
  - Must also clean shared equipment
- Screen contacts of new cases
  - Current roommates
  - Any roommates in the month prior
- Consider point prevalence screening
- Notify facility prior to transferring
Candida auris prevention: nursing homes

• Nursing home residents should be placed on standard and contact precautions
• Residents can leave room as long as secretions are managed and resident can perform hand hygiene
• Thoroughly clean and disinfect shared equipment
  – Physical therapy
  – Lifts
Facilitate adherence to control measure

- Educate all healthcare personnel
- Educate environmental service staff
- Ensure adequate supplies are available
- Monitor adherence to infection control practices
Candidemia in Oregon
Multistate Point-Prevalence Survey of Health Care–Associated Infections


Bloodstream infections with *Candida* are associated with 30% mortality
Risk Factors for Candidemia

• Underlying conditions
  – Critical illness
  – Candida colonization
  – Hematologic malignant disease
  – Solid organ transplantation and tumors
  – Pancreatitis
  – Neonates

• Medical Interventions
  – Use of antibiotics
  – Presence of central vascular catheter
  – Use of total parenteral nutrition
  – Any type of dialysis
  – Corticosteroids and other immunosuppressants
  – Abdominal surgery
Active population-based surveillance

- Active population-based surveillance in 45 counties in 9 states

Total population under surveillance: 17 million
OR Candidemia Surveillance-Catchment

- 14 Hospitals (1 LTACH) in catchment area
- 3 Health Systems (10 hospitals), 4 standalone facilities
- 7 Hospitals in Multnomah County
- 4 Hospitals in Clackamas County
- 2 Hospitals in Washington County

Catchment area population: 1.7 million
Total Oregon population: 4.1 million
Case Report Form

- Case Definition: An incident case is the first blood culture with *Candida* spp in a surveillance area resident in a 30 day period.
Portland Tri-county candidemia—case count

- Total cases since January 1\textsuperscript{st} 2011: 577
- Average yearly case count 2011-2018: 72.3 cases (range 58-91)
- Average monthly case count 2011-2018: 6 cases (range: 1-14)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
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<tbody>
<tr>
<td>2011</td>
<td>65</td>
</tr>
<tr>
<td>2012</td>
<td>74</td>
</tr>
<tr>
<td>2013</td>
<td>58</td>
</tr>
<tr>
<td>2014</td>
<td>72</td>
</tr>
<tr>
<td>2015</td>
<td>76</td>
</tr>
<tr>
<td>2016</td>
<td>78</td>
</tr>
<tr>
<td>2017</td>
<td>91</td>
</tr>
<tr>
<td>2018</td>
<td>64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>County</th>
<th>Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clackamas</td>
<td>130 (22.5)</td>
</tr>
<tr>
<td>Multnomah</td>
<td>334 (57.9)</td>
</tr>
<tr>
<td>Washington</td>
<td>113 (19.6)</td>
</tr>
<tr>
<td>Total</td>
<td>577</td>
</tr>
</tbody>
</table>


Portland tri-county candidemia cases, by date of initial specimen collection, January 2011 – November 2018
Portland Tri-county candidemia—cases

- Of the 577 reported cases, 290 are male (50.3%)
- 122 (21.1%) cases died either during the hospitalization or in the 30 days after discharge
- Average deaths per year from 2011-2016: 14.8 (range 12-19)

<table>
<thead>
<tr>
<th>Age group</th>
<th>Female</th>
<th>Male</th>
<th>Deaths</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>&lt;5</td>
<td>4</td>
<td>1.2</td>
<td>14</td>
<td>1.8</td>
</tr>
<tr>
<td>5–17</td>
<td>6</td>
<td>1.2</td>
<td>6</td>
<td>2.0</td>
</tr>
<tr>
<td>18–34</td>
<td>57</td>
<td>10.2</td>
<td>37</td>
<td>7.1</td>
</tr>
<tr>
<td>35–49</td>
<td>52</td>
<td>8.4</td>
<td>43</td>
<td>7.3</td>
</tr>
<tr>
<td>50–64</td>
<td>87</td>
<td>19.3</td>
<td>110</td>
<td>19.4</td>
</tr>
<tr>
<td>65–79</td>
<td>66</td>
<td>11.0</td>
<td>46</td>
<td>8.0</td>
</tr>
<tr>
<td>≥80</td>
<td>15</td>
<td>2.4</td>
<td>34</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>287</td>
<td></td>
<td>290</td>
<td></td>
</tr>
</tbody>
</table>
## Portland Tri-county candidemia cases—underlying conditions

Underlying conditions in past 90 days associated with candidemia cases, January 2011–November 2018, Portland tri-county area (n=571 with chart review completed)

<table>
<thead>
<tr>
<th>Underlying condition</th>
<th>n (%) out of 571</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any cancer</td>
<td>93 (16.1%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>130 (22.5%)</td>
</tr>
<tr>
<td>HIV-related diagnoses</td>
<td>6 (1.0%)</td>
</tr>
<tr>
<td>AIDS (CD4 count &lt;200)</td>
<td>3 (0.5%)</td>
</tr>
<tr>
<td>HIV infection without AIDS</td>
<td>3 (0.5%)</td>
</tr>
<tr>
<td>Any Liver Diagnoses</td>
<td>118 (20.4%)</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>89 (15.4%)</td>
</tr>
<tr>
<td>Organ transplant</td>
<td>6 (1.0%)</td>
</tr>
<tr>
<td>Stem cell transplant</td>
<td>1 (0.2%)</td>
</tr>
<tr>
<td>Solid organ transplant</td>
<td>5 (0.9%)</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>11 (2.0%)</td>
</tr>
<tr>
<td>Any surgery in 90 days prior</td>
<td>147 (25.5%)</td>
</tr>
<tr>
<td>Abdominal surgery</td>
<td>79 (13.7%)</td>
</tr>
<tr>
<td>Non-abdominal surgery</td>
<td>68 (11.9%)</td>
</tr>
<tr>
<td>IV drug use</td>
<td>91 (15.8%)</td>
</tr>
<tr>
<td>Drug use—Access unknown</td>
<td>16 (2.8%)</td>
</tr>
</tbody>
</table>
Portland Tri-county candidemia cases—outcomes

• 535 (92.7%) of cases were hospitalized in the 6 days after initial culture
• Mean admissions days until initial culture date: 7.3 days (range: 0-156 days)
• Mean length of stay: 22.2 days (range: 0-258 days)
• 57.2% (n=330) cases had CVC in previous 2 days
• 67.1% (n=387) cases were on a systemic antibacterial in 14 days before culture
• 19.3% (n=106) received total parenteral nutrition in 14 days before culture
• 5% (n=29) had neutropenia in the 2 days before culture
OR Candidemia Surveillance—Species

*Candida* blood isolates by species, Oregon, January 2011 - October 2018 (690 isolates)

- **C. albicans**: 39%
- **C. glabrata**: 24%
- **C. parapsilosis**: 17%
- **C. tropicalis**: 5%
- **C. dubliniensis**: 3%
- **C. krusei**: 2%
- **C. lusitaniae**: 2%
- **C. guillermondi**: 2%
- Other species or unknown: 6%

34
Candida blood isolates by species, January 2011-October 2018

- **Candida albicans**
- **Candida glabrata**
- **Candida parapsilosis**
- **Candida other**

![Bar chart showing the number of isolates by species from 2011 to 2018](chart.png)
Portland Tri-county candidemia—antifungal resistance

- See very few isolates resistant to antifungals
- Fluconazole sufficient to treat most candidemia infections in Oregon

![Site Antibiogram of Antifungal Susceptibility, by Candida Species and Agent Isolates collected in 2017 (Oregon)](chart)

| Species               | Total Isolates | ANF MIC50 | ANF Resistant | CAS MIC50 | CAS Resistant | MFG MIC50 | MFG Resistant | FLU MIC50 | FLU Resistant | ISU MIC50 | ISU Resistant | ITR MIC50 | ITR Resistant | PSC MIC50 | PSC Resistant | VRC MIC50 | VRC Resistant | 5FC MIC50 | 5FC Resistant | AMB MIC50 | AMB Resistant |
|-----------------------|----------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|
| Candida albicans      | 36             | 0.008     | 0%            | 0.016     | 0%            | 0.016     | 0%            | 0.50      | 0%            | 0.010     | 0%            | 0.12      | 0.12          | 0.12      | 0.12          | 0.008     | 0%            | 0.094     |
| Candida glabrata      | 19             | 0.016     | 0%            | 0.016     | 0%            | 0.016     | 0%            | 4.00      | 0%            | 0.50      | 0%            | 0.50      | 0%            | 0.50      | 0%            | 0.25      | 0%            | 0.047     |
| Candida parapsilosis  | 8              | 1.00      | 0%            | 0.25      | 0%            | 0.25      | 0%            | 1.00      | 0%            | 0.10      | 0%            | 0.03      | 0%            | 0.06      | 0%            | 0.03      | 0%            | 0.047     |
| Candida tropicalis    | 5              | 0.008     | 0%            | 0.03      | 0%            | 0.03      | 0%            | 0.50      | 0%            | 0.03      | 0%            | 0.06      | 0%            | 0.06      | 0%            | 0.047     |
| Candida guilliermondii| 3              | 0.50      | 0%            | 0.25      | 0%            | 0.25      | 0%            | 2.00      | 0%            | 0.12      | 0%            | 0.50      | 0%            | 0.25      | 0%            | 0.06      | 0%            | 0.032     |
| Candida lusitaniae    | 3              | 0.50      | 0%            | 0.25      | 0%            | 0.25      | 0%            | 2.00      | 0%            | 0.25      | 0%            | 0.25      | 0%            | 0.25      | 0%            | 0.03      | 0%            | 0.032     |
| Candida dubitensis    | 1              | 0.016     | 0%            | 0.03      | 0%            | 0.03      | 0%            | 0.50      | 0%            | 0.008     | 0%            | 0.06      | 0%            | 0.08      | 0%            | 0.016     | 0%            | 0.012     |
| Candida fermentati    | 1              | 1.00      | 0%            | 0.25      | 0%            | 1.00      | 0%            | 2.00      | 0%            | 0.12      | 0%            | 0.50      | 0%            | 0.25      | 0%            | 0.06      | 0%            | 0.023     |
| Candida metapsilosis  | 1              | 0.25      | 0%            | 0.12      | 0%            | 0.50      | 0%            | 1.00      | 0%            | 0.03      | 0%            | 0.12      | 0%            | 0.06      | 0%            | 0.016     | 0%            | 0.016     |
| Candida orthopsilosis | 1              | 0.50      | 0%            | 0.25      | 0%            | 0.50      | 0%            | 4.00      | 0%            | 0.12      | 0%            | 0.25      | 0%            | 0.25      | 0%            | 0.50      | 0%            | 0.064     |
| Candida pelliculosa   | 1              | <0.008    | 0%            | 0.016     | 0%            | 0.03      | 0%            | 2.00      | 0%            | 0.12      | 0%            | 0.25      | 0%            | 0.50      | 0%            | 0.12      | 0%            | 0.016     |
| Total Isolates       | 79             |           |               |           |               |           |               |           |               |           |               |           |               |           |               |           |               |           |               |           |
New data: injection drug use and candidemia

• Unexpectedly large proportion of candidemia cases had a recent history of injection drug use
• Stark difference in demographic and clinical characteristics
  • Majority were white, non-Hispanic
  • Fewer underlying conditions
    – Most common: hepatitis C, smoker
• More likely to be homeless
• More likely to be community associated cases
• More work is needed to understand, quantify and prevent candidemia and other infectious outcomes among persons who inject drugs

• Candidemia should be on the differential diagnosis for severely ill persons who inject drugs
Candidemia prevention

- Hand hygiene
- Antibiotic stewardship
- Appropriate care of medical devices
  - Invasive lines and tubes
- Consider prophylactic antifungal medication for immunocompromised patients
**Candida resources**

- Oregon Candidemia data: [https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/DISEASESAZ/Pages/candida.aspx](https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/DISEASESAZ/Pages/candida.aspx)


Questions?
Thank you!

Email: Alexia.Y.Zhang@state.or.us
Phone: (971) 673-1076