

---

# *Candida* Surveillance in Oregon

Alexia Zhang, MPH

Healthcare Associated Infections Epidemiologist

Acute and Communicable Disease Prevention

Lunch and Learn

December 11<sup>th</sup>, 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



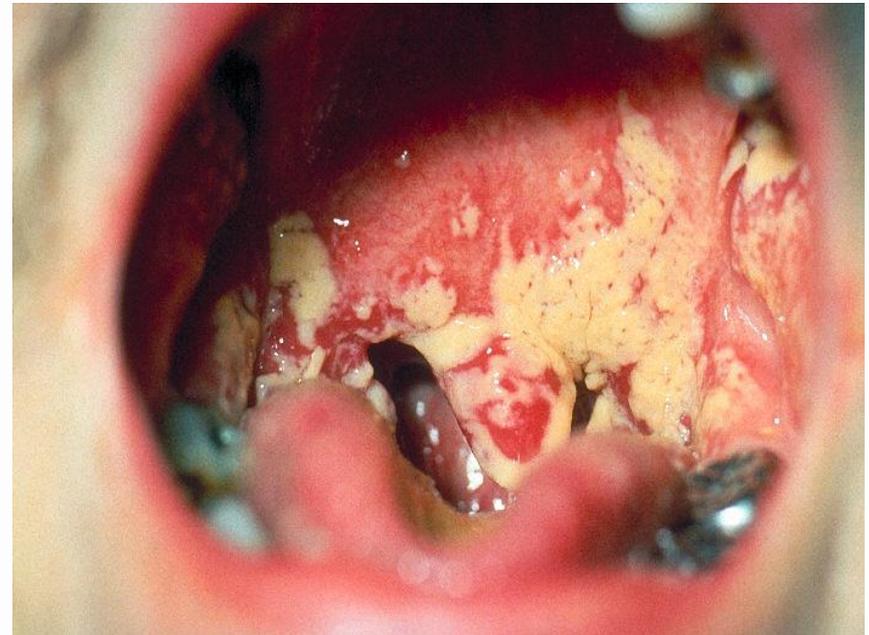
# Types of *Candida* infections

- 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



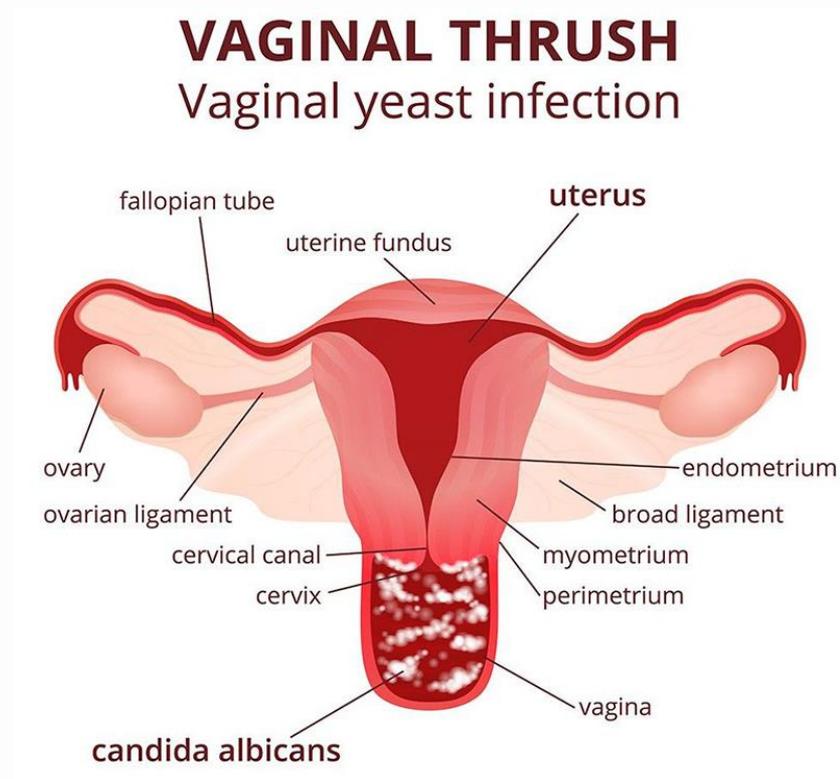
# Oral Candidiasis

- 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)



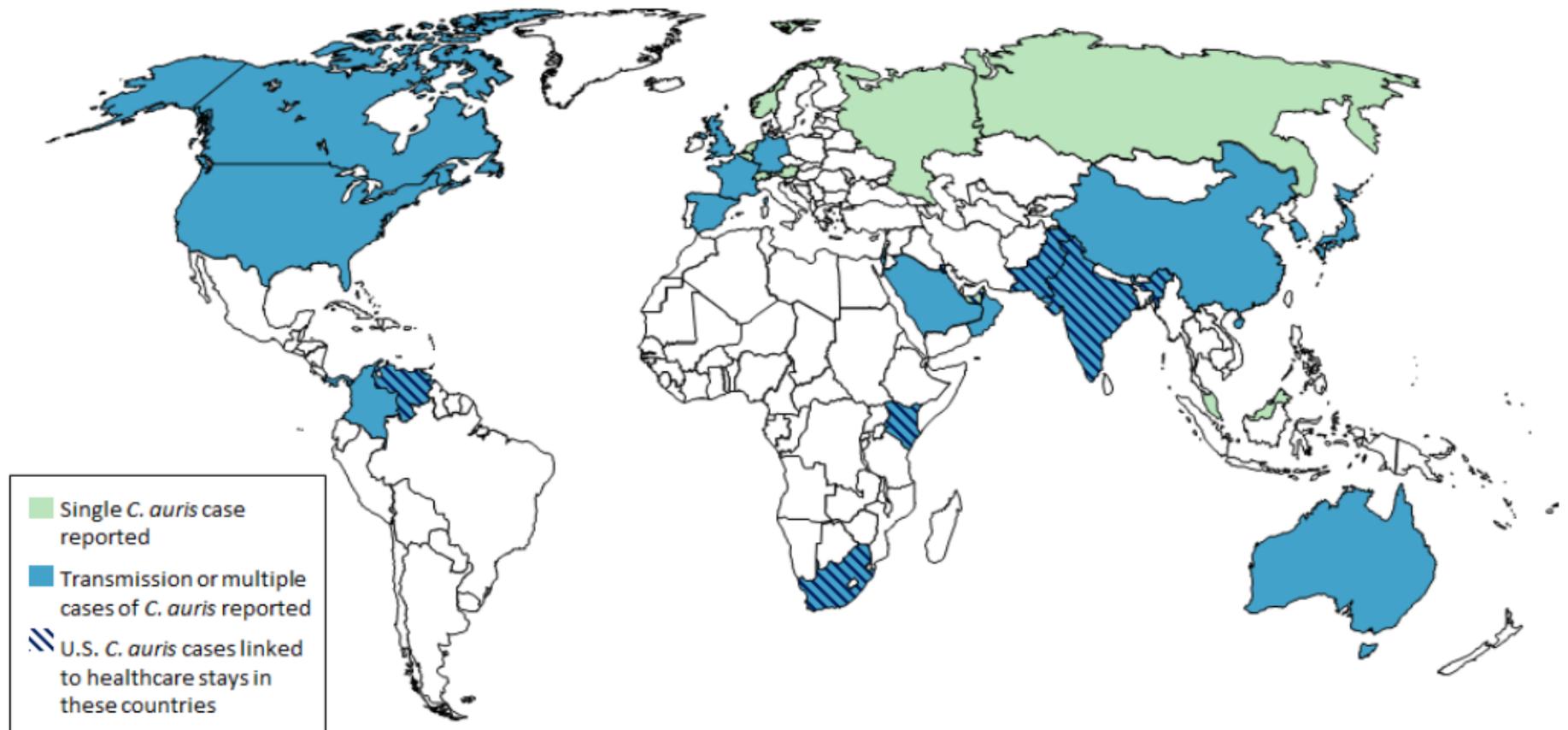
# *Candida auris*

# *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

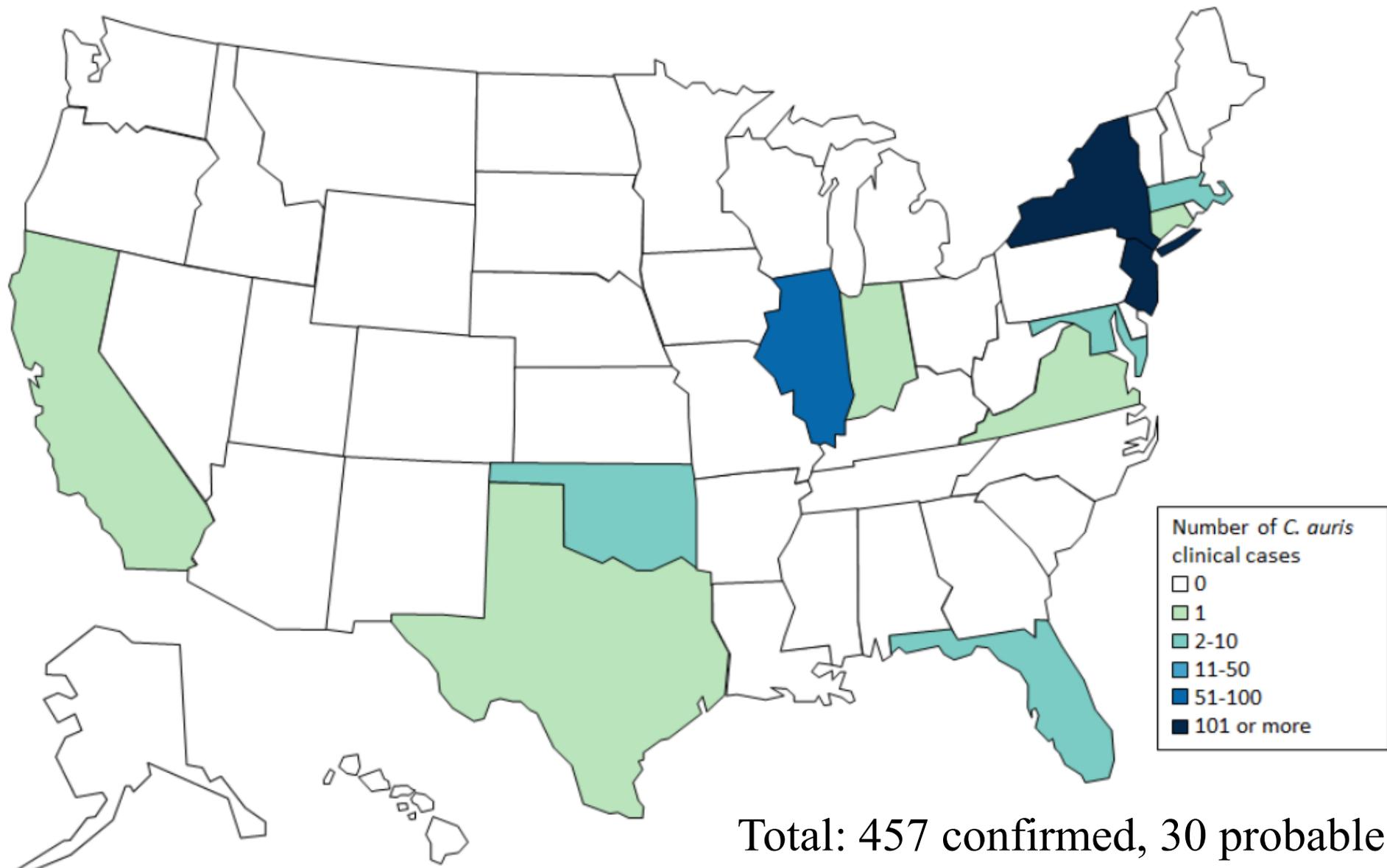


## Countries from which *Candida auris* cases have been reported, as of October 31, 2018



- 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.

# U.S. Map: Clinical cases of *Candida auris* reported by state, United States, as of October 31, 2018



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

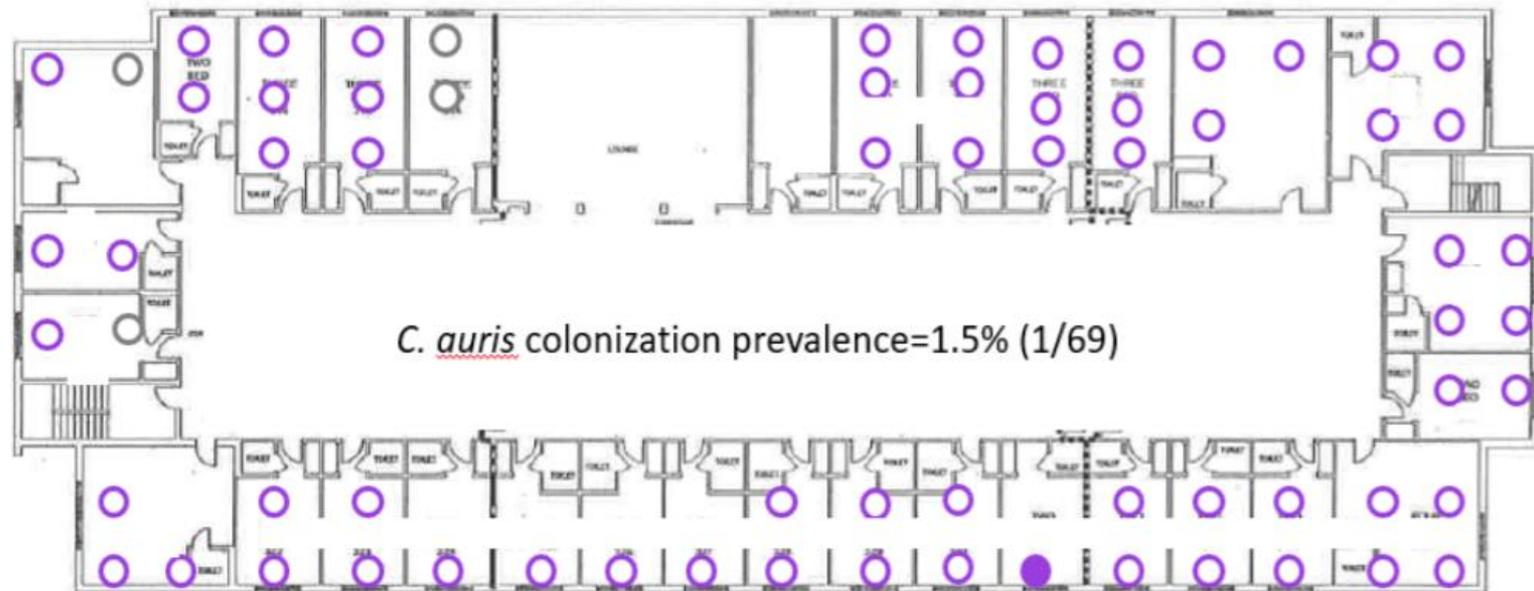


**Fungal disease spreads through UK hospitals – here's what you need to know about *Candida auris***

August 18, 2017 6:21am EDT

# Candida auris outbreak—Chicago ventilated SNF unit

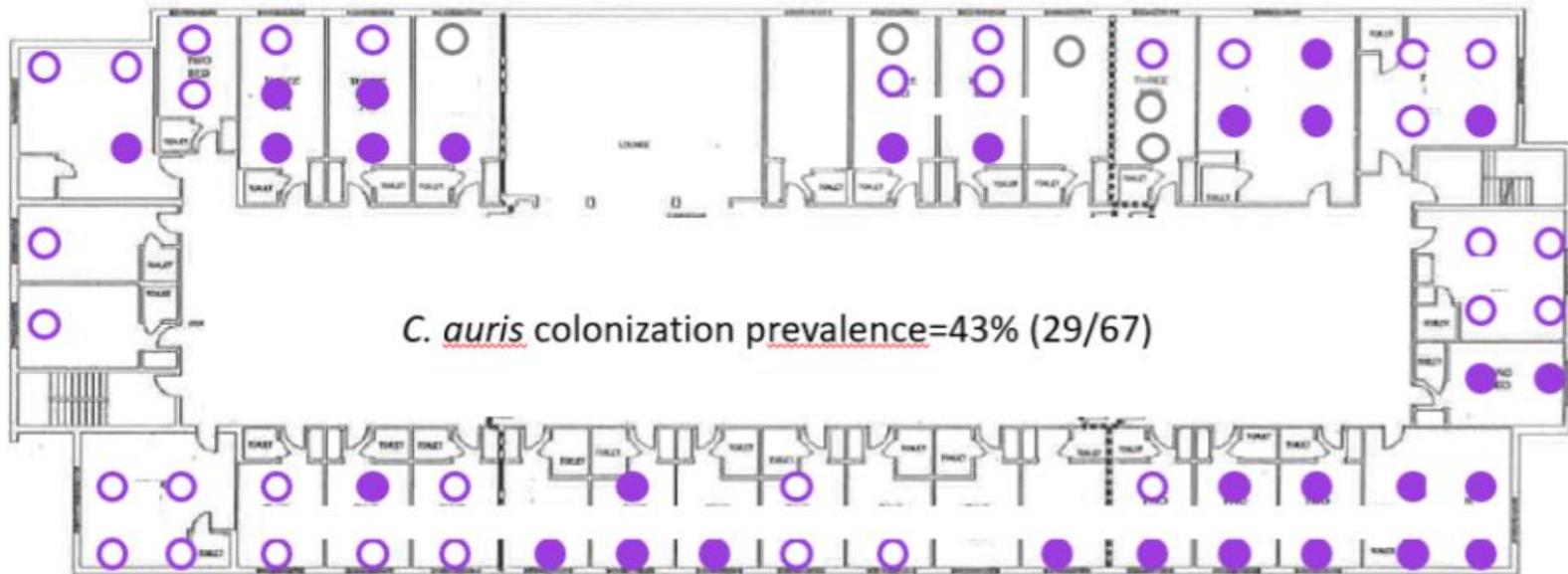
## vSNF B Ventilator/Trach Floor March 2017 *C. auris* PPS Results



- *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)



# Candida auris in Oregon?

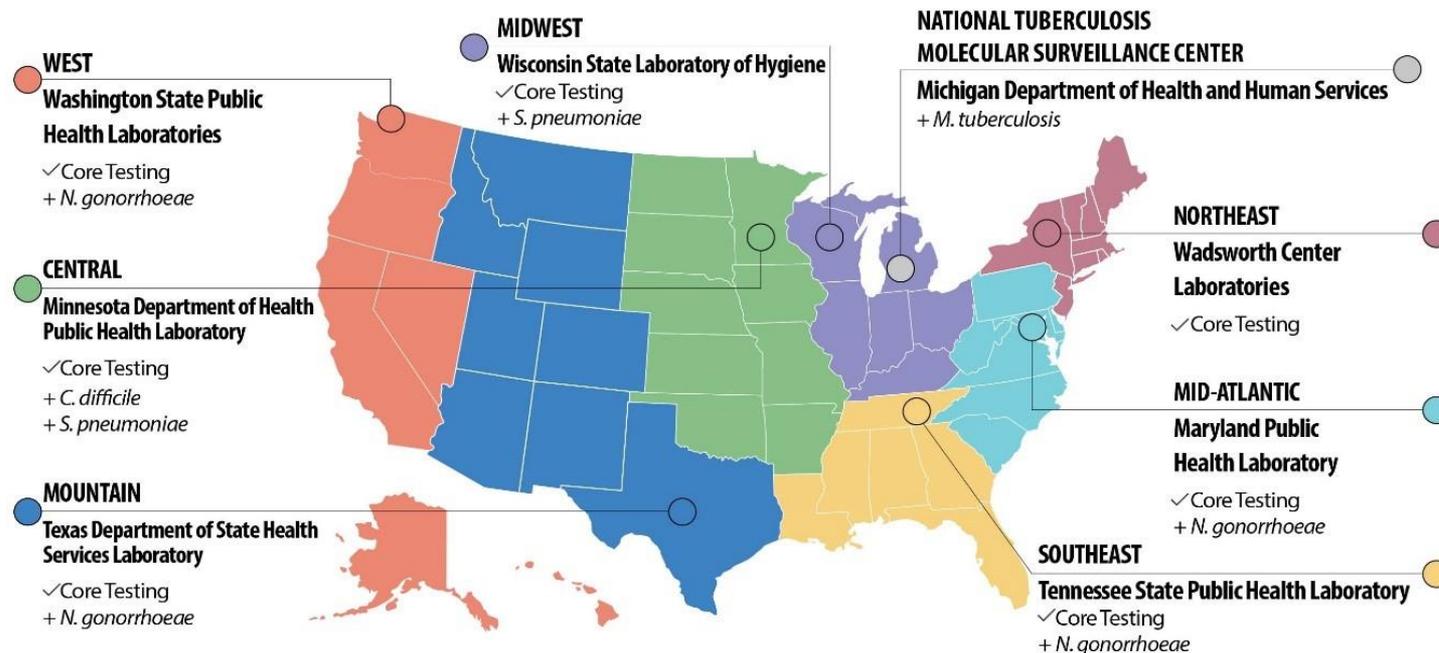
- Currently no known cases in Oregon
- Identification is difficult for most laboratories
- Easy to misidentify

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

\* *C. guilliermondii*, *C. lusitanae*, 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. lusitanae*, 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.

# Candida auris surveillance

- 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



# The NEW ENGLAND JOURNAL of MEDICINE

[HOME](#)[ARTICLES & MULTIMEDIA ▾](#)[ISSUES ▾](#)[SPECIALTIES & TOPICS ▾](#)[FOR AUTHORS ▾](#)[CME ▸](#)

## ORIGINAL ARTICLE

# Multistate Point-Prevalence Survey of Health Care–Associated Infections

Shelley S. Magill, M.D., Ph.D., Jonathan R. Edwards, M.Stat., Wendy Bamberg, M.D., Zintars G. Beldavs, M.S., Ghinwa Dumyati, M.D., Marion A. Kainer, M.B., B.S., M.P.H., Ruth Lynfield, M.D., Meghan Maloney, M.P.H., Laura McAllister-Hollod, M.P.H., Joelle Nadle, M.P.H., Susan M. Ray, M.D., Deborah L. Thompson, M.D., M.S.P.H., Lucy E. Wilson, M.D., and Scott K. Fridkin, M.D., for the Emerging Infections Program Healthcare-Associated Infections and Antimicrobial Use Prevalence Survey Team\*

N Engl J Med 2014; 370:1198-1208 | [March 27, 2014](#) | DOI: 10.1056/NEJMoa1306801

**Bloodstream infections with  
*Candida* are associated with 30%  
mortality**



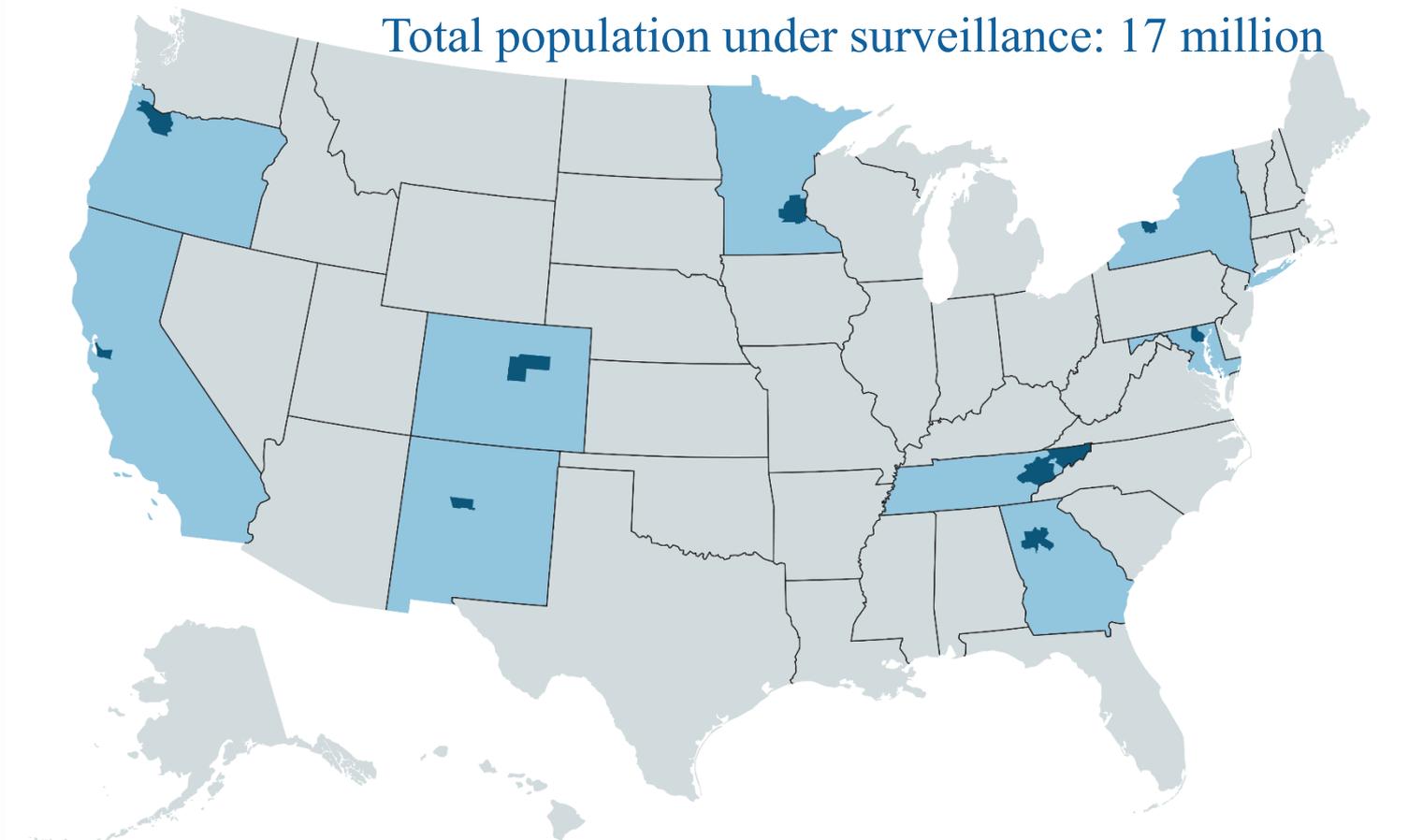
# Risk Factors for Candidemia

- 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

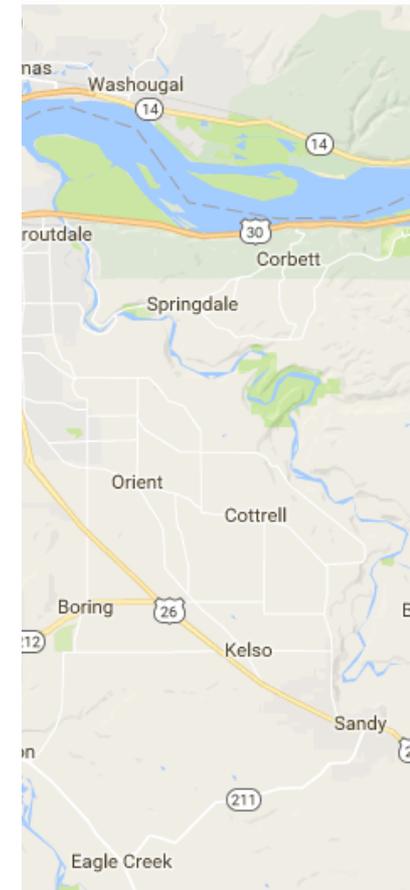
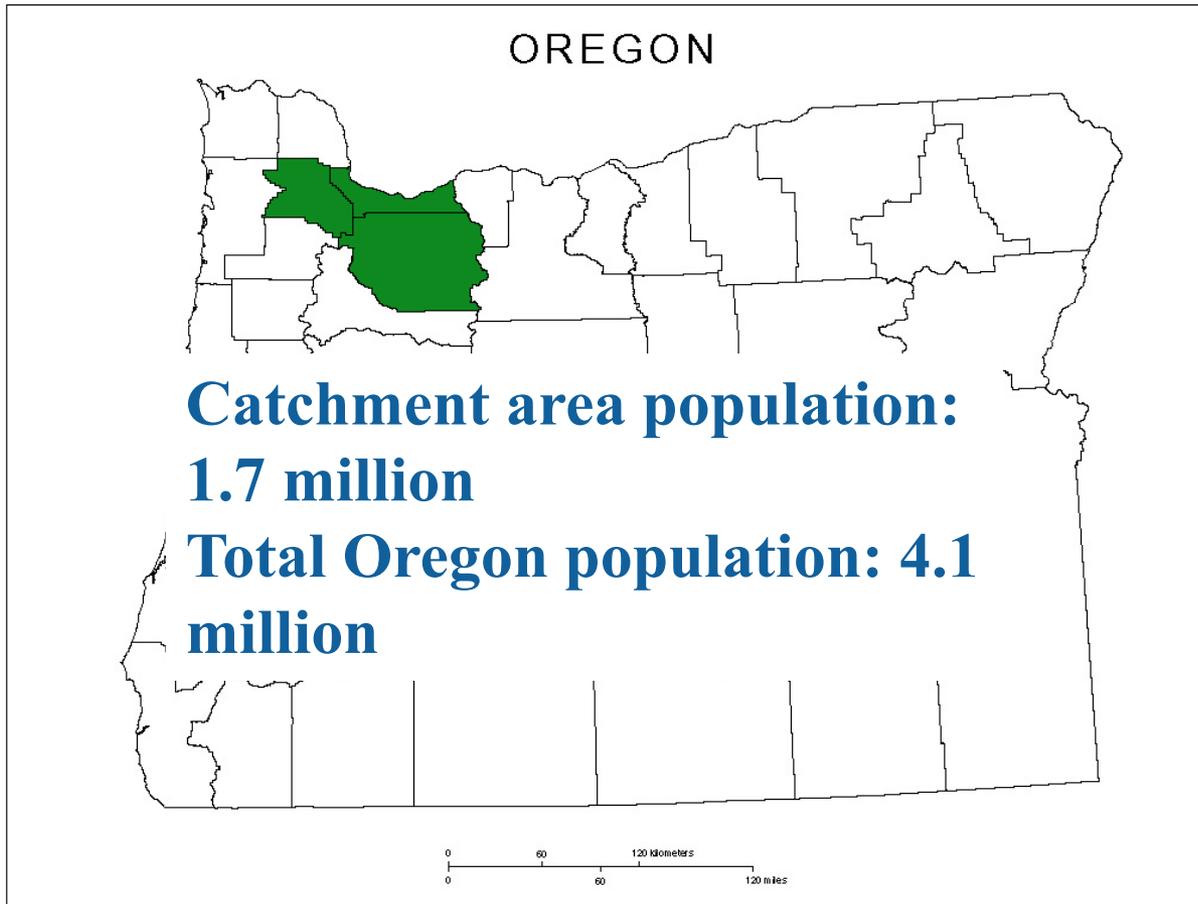


# Active population-based surveillance

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



# OR Candidemia Surveillance-Catchment



# 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

CANDIDEMIA 2018 CASE REPORT FORM				
Patient name: _____ <small>(Last, First, MI)</small>		Medical Record No.: _____		
Address: _____ <small>(Number, Street, Apt. No.)</small>		Hospital: _____		
_____ <small>(City, State)</small>		Acc No. (incident isolate): _____		
_____ <small>(Zip Code)</small>		Acc No. (subseq isolate): _____		
Phone no.: ( ) _____ - _____				
Check if not a case: <input type="checkbox"/>				
Reason not a case: <input type="checkbox"/> Out of catchment area <input type="checkbox"/> Duplicate entry <input type="checkbox"/> Not candidemia <input type="checkbox"/> Unable to verify address <input type="checkbox"/> Other (specify): _____				
SURVEILLANCE OFFICER INFORMATION				
1. Date reported to EIP site: □□-□□-□□□□	3. Was case first identified through audit? 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No	5. Previous candidemia episode? 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unknown 5a. If yes, enter state IDs: □□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□	6. CRF status: 1 <input type="checkbox"/> Complete 2 <input type="checkbox"/> Pending 3 <input type="checkbox"/> Chart unavailable	7. SO's initials: _____ _____
DEMOGRAPHICS				
8. State ID: □□□□□□□□		10. State: _____		11. County: _____
9. Patient ID: _____				
12. Lab ID where positive culture was identified: □□□□□□				
13. Date of birth (mm-dd-yyyy): □□-□□-□□□□		14. Age: □□□□ 1 <input type="checkbox"/> days 2 <input type="checkbox"/> mos 3 <input type="checkbox"/> yrs		15. Sex: <input type="checkbox"/> Female <input type="checkbox"/> Male <input type="checkbox"/> Check if transgender
16. Weight: _____ lbs. _____ oz. OR _____ kg <input type="checkbox"/> Unknown		17. Height: _____ ft. _____ in. OR _____ cm <input type="checkbox"/> Unknown		18. BMI: (record only if ht. and/or wt. is not available) <input type="checkbox"/> Unknown
19. Race (check all that apply): <input type="checkbox"/> White <input type="checkbox"/> Native Hawaiian/Pacific Islander <input type="checkbox"/> Black/African American <input type="checkbox"/> American Indian/Alaska Native <input type="checkbox"/> Asian <input type="checkbox"/> Unknown			20. Ethnic origin: 1 <input type="checkbox"/> Hispanic/Latino 2 <input type="checkbox"/> Not Hispanic/Latino 9 <input type="checkbox"/> Unknown	
LABORATORY DATA				
21. Date of Incident Specimen Collection (DISC) (mm-dd-yyyy): □□-□□-□□□□				
22. Location of Specimen Collection:				
<input type="checkbox"/> Hospital Inpatient Facility ID: _____ <input type="checkbox"/> ICU <input type="checkbox"/> Surgery/OR <input type="checkbox"/> Radiology <input type="checkbox"/> Other Unit		<input type="checkbox"/> Outpatient <input type="checkbox"/> Clinic/Doctor's office <input type="checkbox"/> Surgery <input type="checkbox"/> Dialysis center <input type="checkbox"/> Other outpatient		<input type="checkbox"/> Emergency Room <input type="checkbox"/> Observational/clinical decision unit <input type="checkbox"/> LTCF <input type="checkbox"/> LTACH Facility ID: _____ Facility ID: _____
23. Incident Specimen Collection Site (check all that apply): <input type="checkbox"/> Blood, Central Line <input type="checkbox"/> Blood, Peripheral stick <input type="checkbox"/> Blood, not specified <input type="checkbox"/> Other (specify): _____ <input type="checkbox"/> Unknown		24. <i>Candida</i> species from initial positive blood culture (check all that apply): <input type="checkbox"/> <i>Candida albicans</i> (CA) <input type="checkbox"/> <i>Candida krusei</i> (CK) <input type="checkbox"/> <i>Candida glabrata</i> (CG) <input type="checkbox"/> <i>Candida guilliermondii</i> (CGM) <input type="checkbox"/> <i>Candida parapsilosis</i> (CP) <input type="checkbox"/> <i>Candida</i> , other (CO) specify: _____ <input type="checkbox"/> <i>Candida tropicalis</i> (CT) <input type="checkbox"/> <i>Candida</i> , germ tube negative/non albicans (CGN) <input type="checkbox"/> <i>Candida dubliniensis</i> (CD) <input type="checkbox"/> <i>Candida</i> species (CS) <input type="checkbox"/> <i>Candida lusitanae</i> (CL) <input type="checkbox"/> Pending		

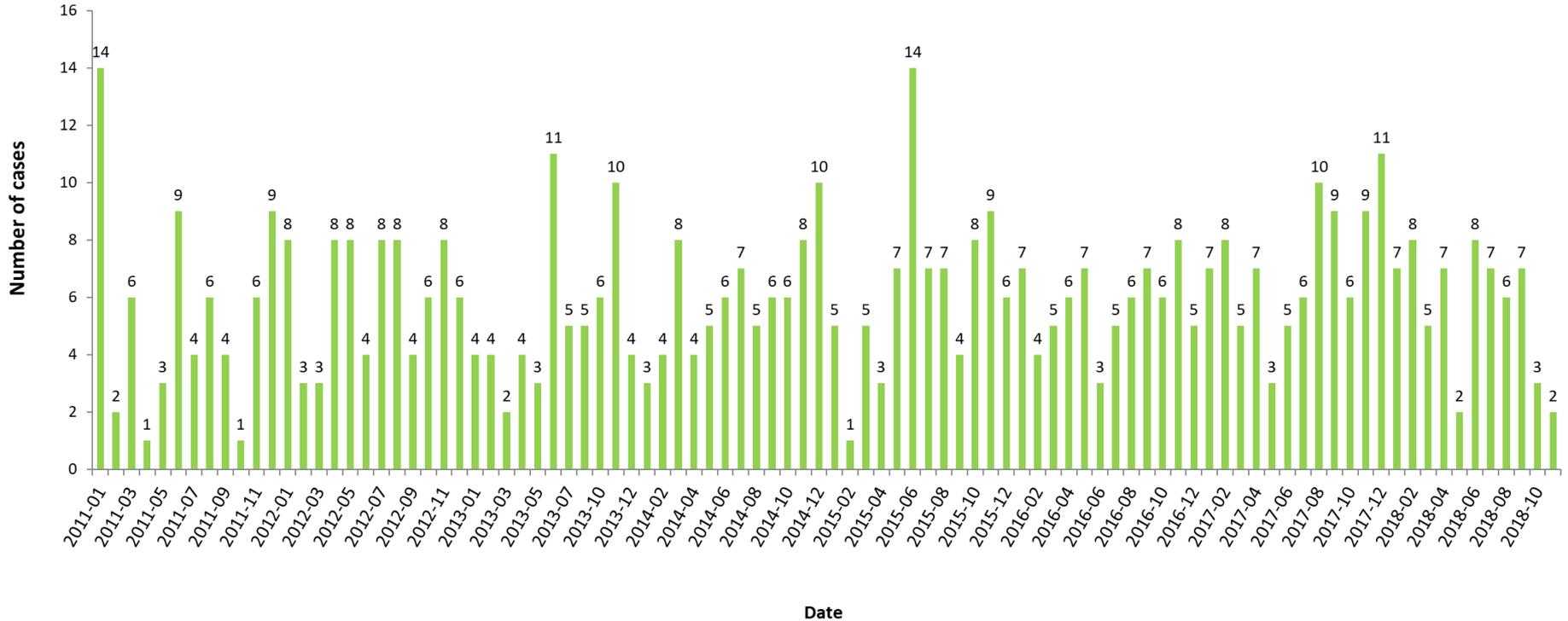
## Portland Tri-county candidemia—case count

- Total cases since January 1<sup>st</sup> 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)

Year	Cases
2011	65
2012	74
2013	58
2014	72
2015	76
2016	78
2017	91
2018	64

County	Cases (%)
Clackamas	130 (22.5)
Multnomah	334 (57.9)
Washington	113 (19.6)
Total	577

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)

Portland tri-county candidemia cases by age and sex, Nov 2018						
Age group	Female		Male		Deaths	Total
	n	%	n	%	n	
<5	4	1.2	14	1.8	0	18
5–17	6	1.2	6	2.0	3	12
18–34	57	10.2	37	7.1	2	94
35–49	52	8.4	43	7.3	13	95
50–64	87	19.3	110	19.4	44	197
65–79	66	11.0	46	8.0	44	112
≥80	15	2.4	34	6.3	16	49
<b>Total</b>	<b>287</b>		<b>290</b>		<b>122</b>	<b>577</b>

# Portland Tri-county candidemia cases—underlying conditions

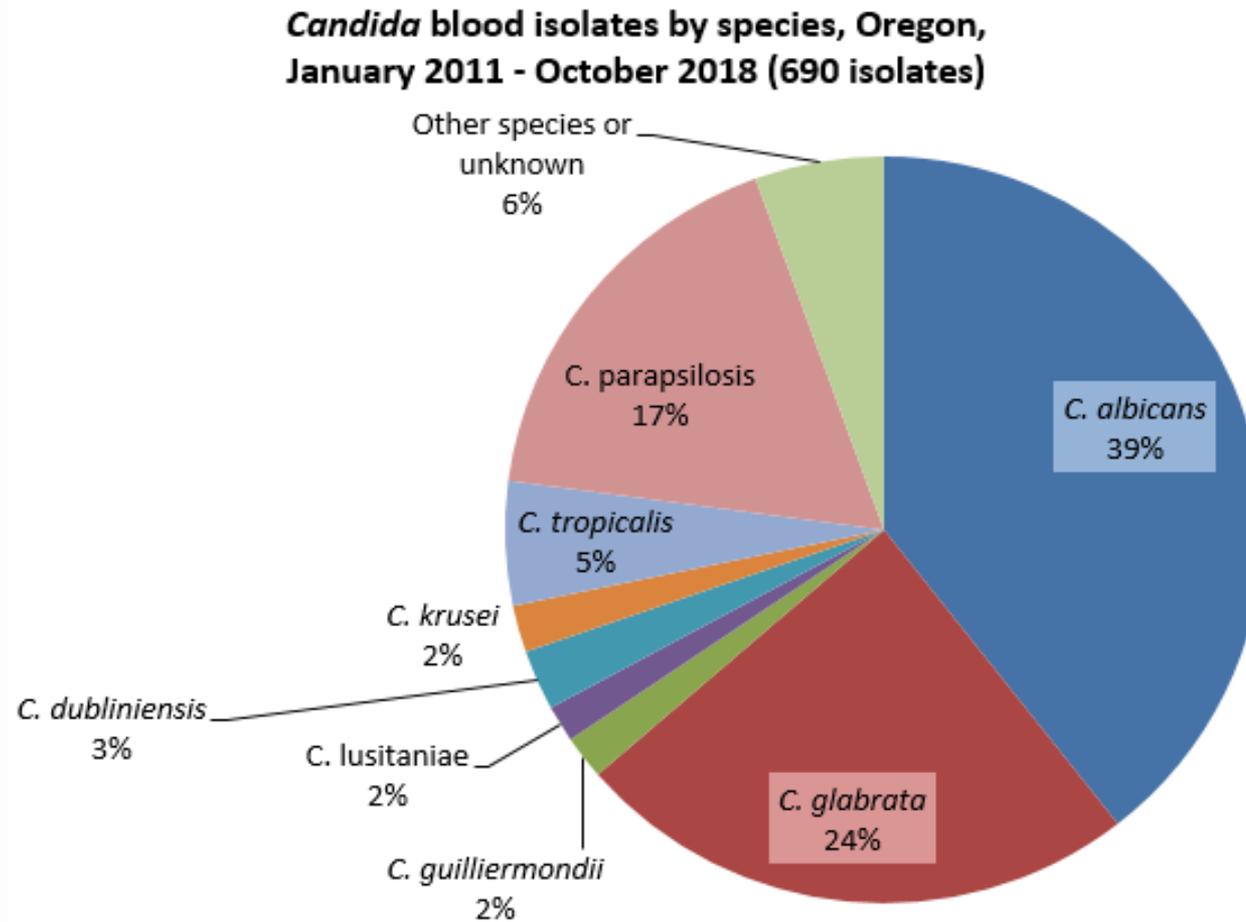
Underlying conditions in past 90 days associated with candidemia cases, January 2011–November 2018, Portland tri-county area (n=571 with chart review completed)

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

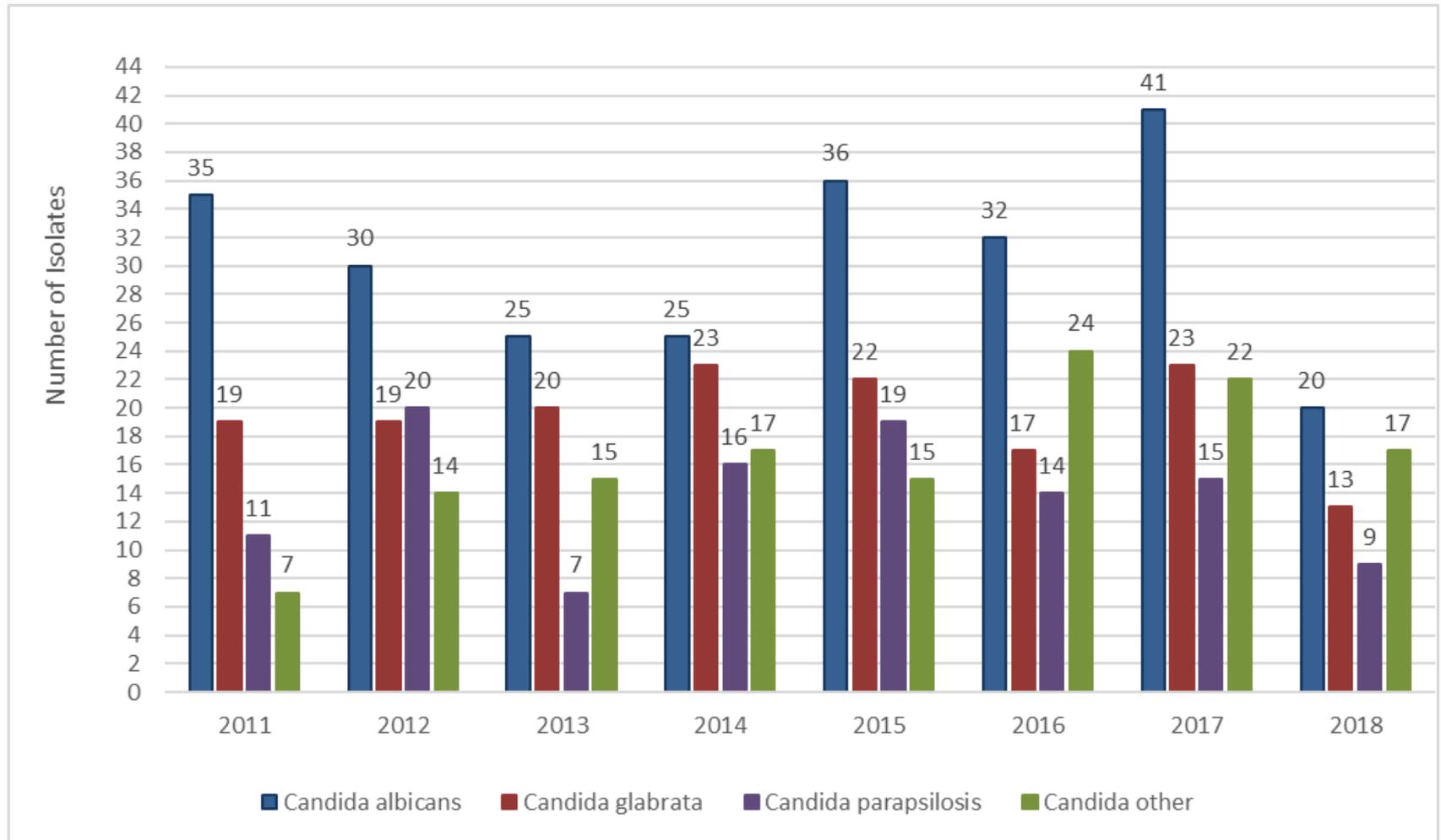
## Portland Tri-county candidemia cases—outcomes

- 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, January 2011-October 2018



# 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)

Total Isolates from 2017

Species	Total Isolates	Echinocandins						Azoles						5FC MIC50	AMB MIC50	
		ANF MIC50	ANF Resistant	CAS MIC50	CAS Resistant	MFG MIC50	MFG Resistant	FLU MIC50	FLU Resistant	ISU MIC50	ITR MIC50	PSC MIC50	VRC MIC50			VRC Resistant
<i>Candida albicans</i>	36	0.008	0%	0.016	0%	0.016	0%	0.50	0%	0.016	0.12	0.12	0.008	0%		0.094
<i>Candida glabrata</i>	19	0.016	0%	0.016	0%	0.016	0%	4.00	0%	0.50	0.50	0.50	0.25	0%		0.094
<i>Candida parapsilosis</i>	8	1.00	0%	0.25	0%	0.50	0%	1.00	13%	0.03	0.12	0.06	0.03	0%		0.047
<i>Candida tropicalis</i>	5	0.008	0%	0.03	0%	0.03	0%	0.50	0%	0.03	0.06	0.06	0.06	0%		0.047
<i>Candida guilliermondii</i>	3	0.50	0%	0.25	0%	0.25	0%	2.00	0%	0.12	0.50	0.25	0.06	0%		0.032
<i>Candida lusitanae</i>	3	0.50		0.25		0.06		2.00		0.25	0.25	0.25	0.03			0.032
<i>Candida dublimiensis</i>	1	0.016		0.03		0.03		0.50		0.008	0.12	0.06	0.016			0.012
<i>Candida fermentati</i>	1	1.00		0.25		1.00		2.00		0.12	0.50	0.25	0.06			0.023
<i>Candida metapsilosis</i>	1	0.25		0.12		0.50		1.00		0.03	0.12	0.06	0.016			0.016
<i>Candida orthopsilosis</i>	1	0.50		0.25		0.50		4.00		0.12		0.25	0.25		0.50	0.064
<i>Candida pelliculosa</i>	1	<0.008		0.016		0.03		2.00		0.12	0.25	0.50	0.12			0.016
<b>Total Isolates</b>	<b>79</b>															

# 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

## Checklist for Prevention of Central Line Associated Blood Stream Infections

Based on 2011 CDC guideline for prevention of intravascular catheter-associated bloodstream infections:

<https://www.cdc.gov/infectioncontrol/guidelines/bsi/index.html>

Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

<http://www.jstor.org/stable/10.1086/676533>

### For Clinicians:

#### Follow proper insertion practices

- Perform hand hygiene before insertion.
- Adhere to aseptic technique.
- Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full body drape).
- Choose the best insertion site to minimize infections and noninfectious complications based on individual patient characteristics.
  - Avoid femoral site in obese adult patients.
- Prepare the insertion site with >0.5% chlorhexidine with alcohol.
- Place a sterile gauze dressing or a sterile, transparent, semipermeable dressing over the insertion site.
- For patients 18 years of age or older, use a chlorhexidine impregnated dressing with an FDA cleared label that specifies a clinical indication for reducing CLABSI for short term non-tunneled catheters unless the facility is demonstrating success at preventing CLABSI with baseline prevention practices.

#### Handle and maintain central lines appropriately

- Comply with hand hygiene requirements.
- Bathe ICU patients over 2 months of age with a chlorhexidine preparation on a daily basis.
- Scrub the access port or hub with friction immediately prior to each use with an appropriate antiseptic (chlorhexidine, povidone iodine, an iodophor, or 70% alcohol).
- Use only sterile devices to access catheters.
- Immediately replace dressings that are wet, soiled, or dislodged.
- Perform routine dressing changes using aseptic technique with clean or sterile gloves.
  - Change gauze dressings at least every two days or semipermeable dressings at least every seven days.
  - For patients 18 years of age or older, use a chlorhexidine impregnated dressing with an FDA cleared label that specifies a clinical indication for reducing CLABSI for short-term non-tunneled catheters unless the facility is demonstrating success at preventing CLABSI with baseline prevention practices.
- Change administration sets for continuous infusions no more frequently than every 4 days, but at least every 7 days.
  - If blood or blood products or fat emulsions are administered change tubing every 24 hours.
  - If propofol is administered, change tubing every 6-12 hours or when the vial is changed.

#### Promptly remove unnecessary central lines

- Perform daily audits to assess whether each central line is still needed.

#### For Healthcare Organizations:

- Educate healthcare personnel about indications for central lines, proper procedures for insertion and maintenance, and appropriate infection prevention measures.
- Designate personnel who demonstrate competency for the insertion and maintenance of central lines.
- Periodically assess knowledge of and adherence to guidelines for all personnel involved in the insertion and maintenance of central lines.
- Provide a checklist to clinicians to ensure adherence to aseptic insertion practices.
- Reeducate personnel at regular intervals about central line insertion, handling and maintenance, and whenever related policies, procedures, supplies, or equipment changes.
- Empower staff to stop non-emergent insertion if proper procedures are not followed.
- Ensure efficient access to supplies for central line insertion and maintenance (i.e. create a bundle with all needed supplies).
- Use hospital-specific or collaborative-based performance measures to ensure compliance with recommended practices.

#### Supplemental strategies for consideration:

- Antimicrobial/Antiseptic impregnated catheters
- Antiseptic impregnated caps for access ports



# Candida resources

- Oregon Candidemia data:  
<https://www.oregon.gov/oha/PH/DISEASES/CONDITIONS/DISEASESAZ/Pages/candida.aspx>
- CDC Invasive Candidiasis:  
<https://www.cdc.gov/fungal/diseases/candidiasis/invasive/index.html>
- CDC *Candida auris*: <https://www.cdc.gov/fungal/candida-auris/index.html>
- Checklist for Prevention of Central Line Associated Bloodstream Infections: <https://www.cdc.gov/hai/pdfs/bsi/checklist-for-CLABSI.pdf>
- Management of candidemia and invasive candidiasis in adults:  
<https://www.uptodate.com/contents/management-of-candidemia-and-invasive-candidiasis-in-adults>

# Questions?

# Thank you!

Email: [Alexia.Y.Zhang@state.or.us](mailto:Alexia.Y.Zhang@state.or.us)

Phone: (971) 673-1076