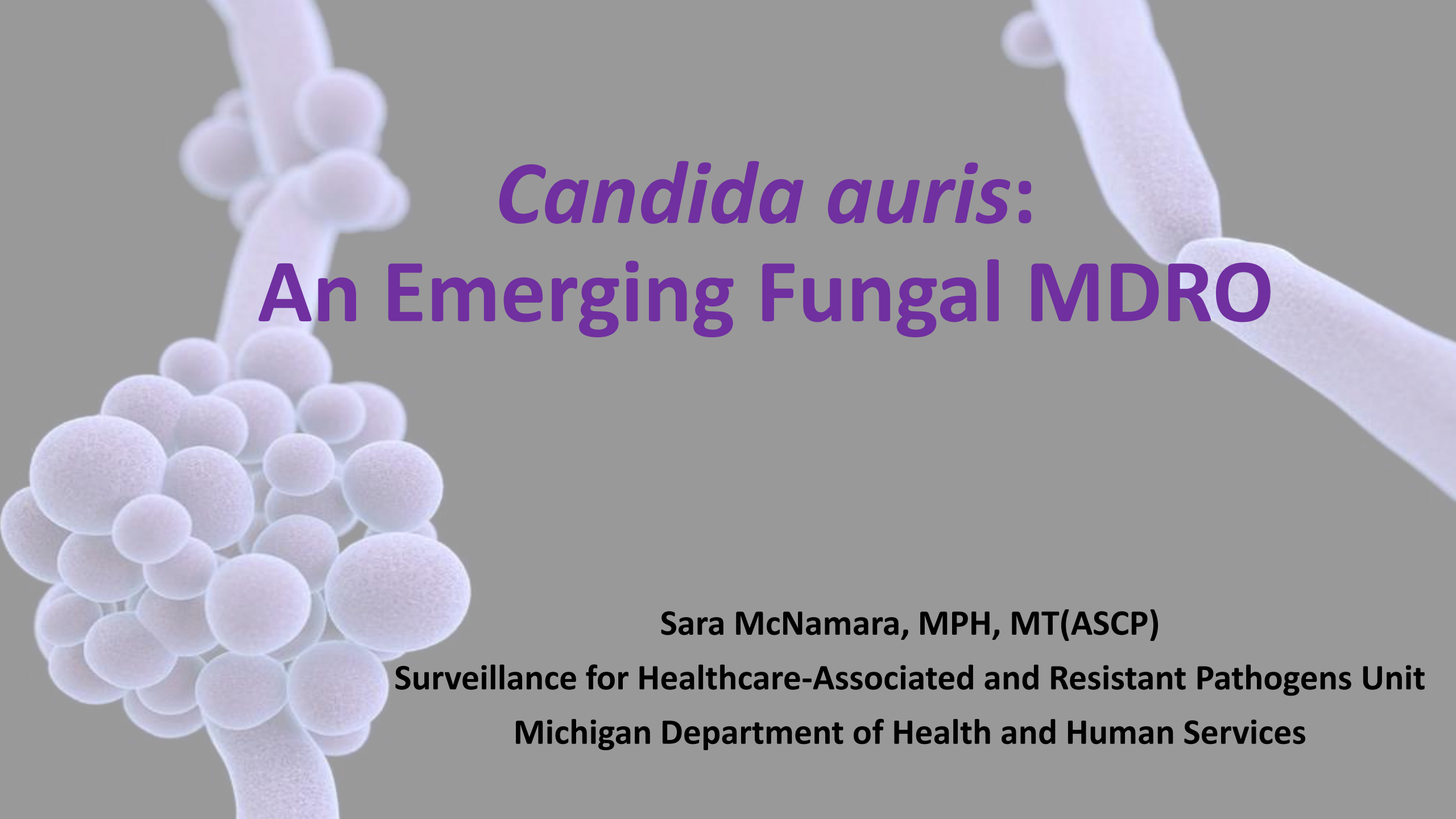


Candida auris: An Emerging Fungal MDRO

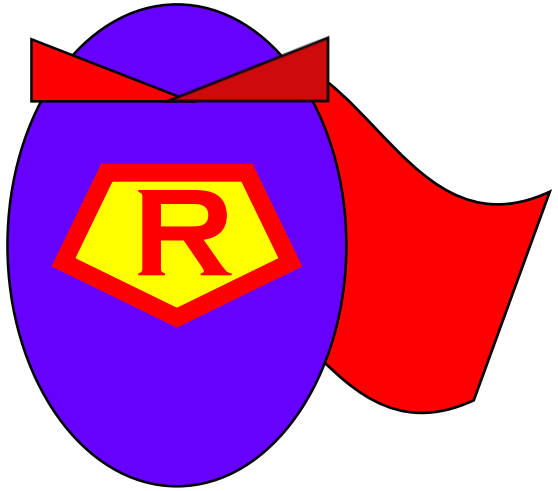
Sara McNamara, MPH, MT(ASCP)

Surveillance for Healthcare-Associated and Resistant Pathogens Unit

Michigan Department of Health and Human Services

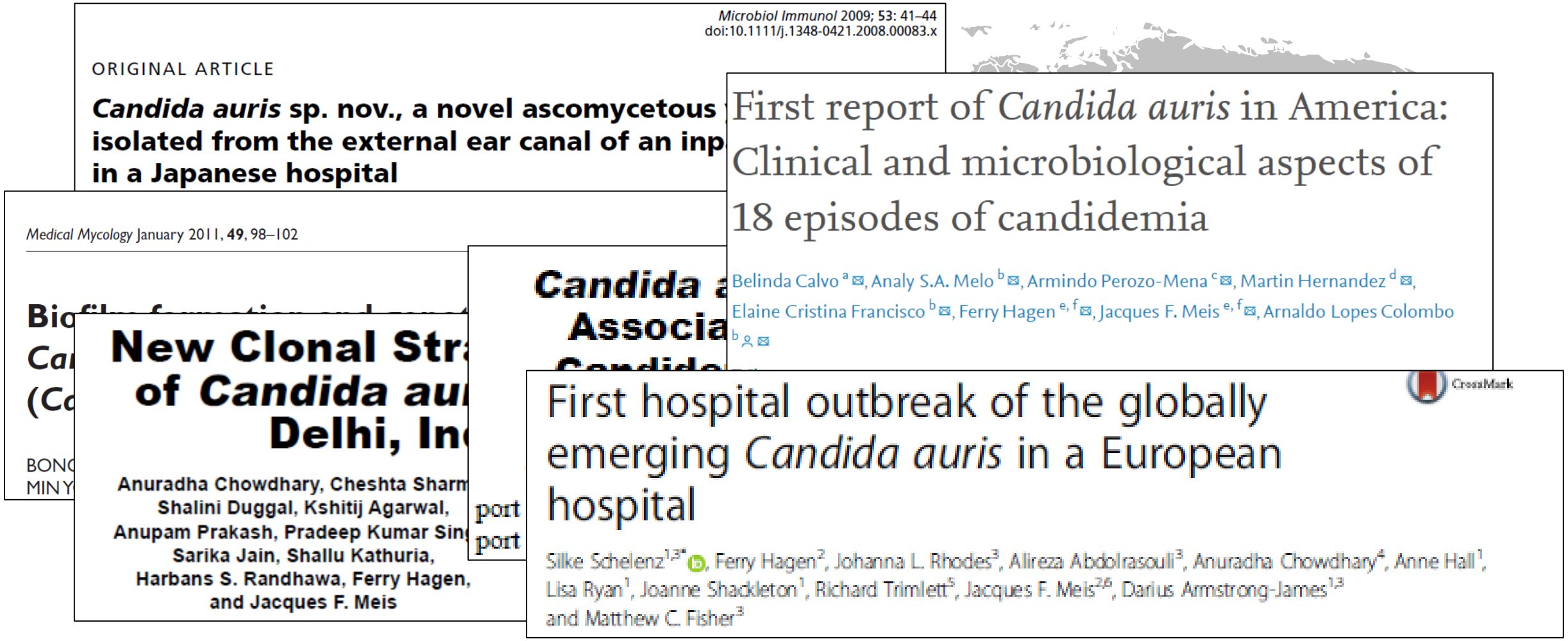
Candida auris is a Public Health Concern

- Recent worldwide emergence
- Highly drug-resistant yeast
- It can cause serious, invasive infections associated with high-mortality rates
- It is difficult to identify
- It can spread easily in healthcare settings



A Fungal Superbug!

Candida auris First Described in 2009



Microbiol Immunol 2009; 53: 41–44
doi:10.1111/j.1348-0421.2008.00083.x

ORIGINAL ARTICLE

***Candida auris* sp. nov., a novel ascomycetous**
isolated from the external ear canal of an inp
in a Japanese hospital

Medical Mycology January 2011, **49**, 98–102

New Clonal Str
of *Candida au*
Delhi, In

Anuradha Chowdhary, Cheshta Sharm
Shalini Duggal, Kshitij Agarwal,
Anupam Prakash, Pradeep Kumar Sin
Sarika Jain, Shallu Kathuria,
Harbans S. Randhawa, Ferry Hagen,
and Jacques F. Meis

Candida
Associa

First report of *Candida auris* in America: Clinical and microbiological aspects of 18 episodes of candidemia

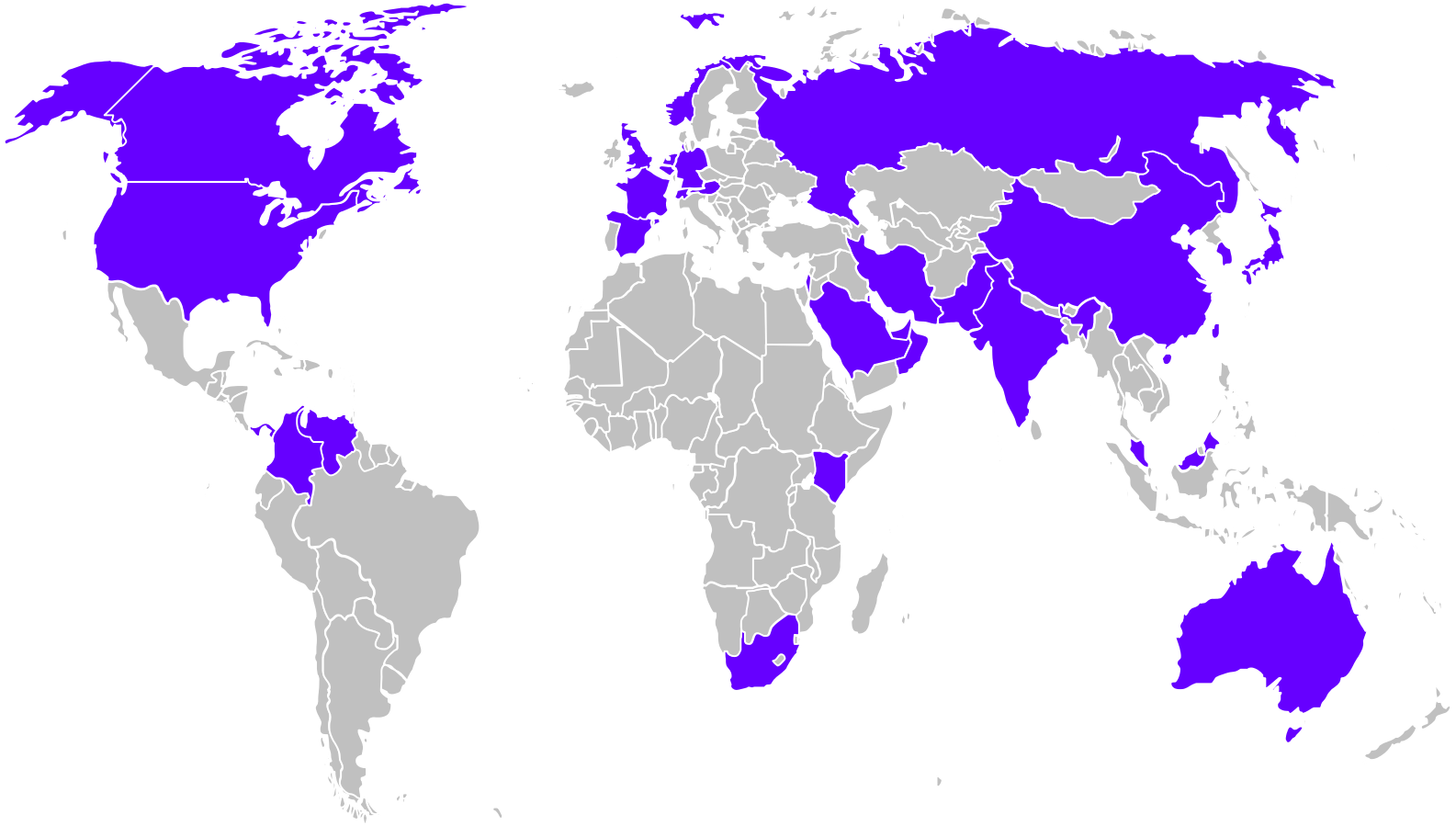
Belinda Calvo [a] ✉, Analy S.A. Melo [b] ✉, Armindo Perozo-Mena [c] ✉, Martin Hernandez [d] ✉, Elaine Cristina Francisco [b] ✉, Ferry Hagen [e, f] ✉, Jacques F. Meis [e, f] ✉, Arnaldo Lopes Colombo [b] ✉

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

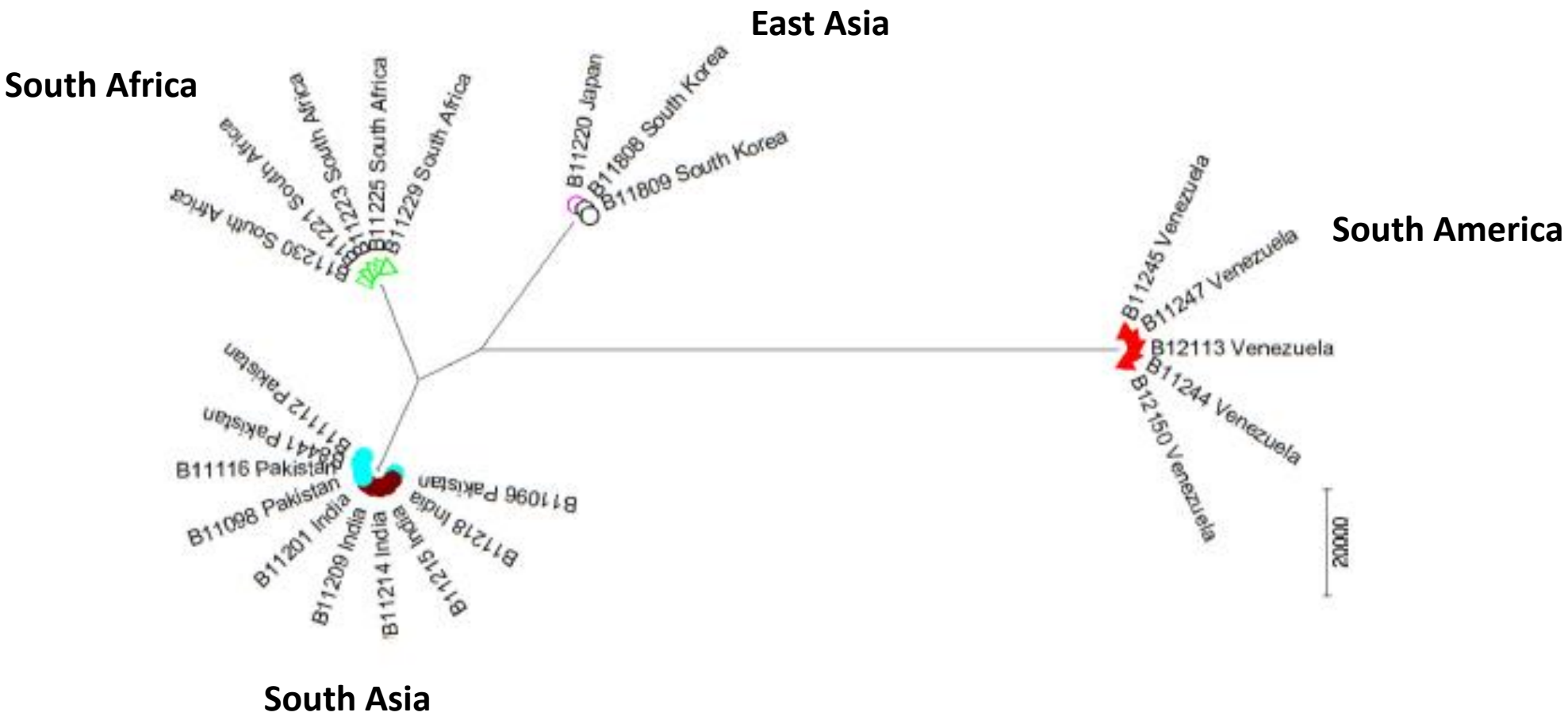
Silke Schelenz[1,3*], Ferry Hagen[2], Johanna L. Rhodes[3], Alireza Abdolrasouli[3], Anuradha Chowdhary[4], Anne Hall[1], Lisa Ryan[1], Joanne Shackleton[1], Richard Trimlett[5], Jacques F. Meis[2,6], Darius Armstrong-James[1,3] and Matthew C. Fisher[3]

Candida auris in 2009

Candida auris in 2019

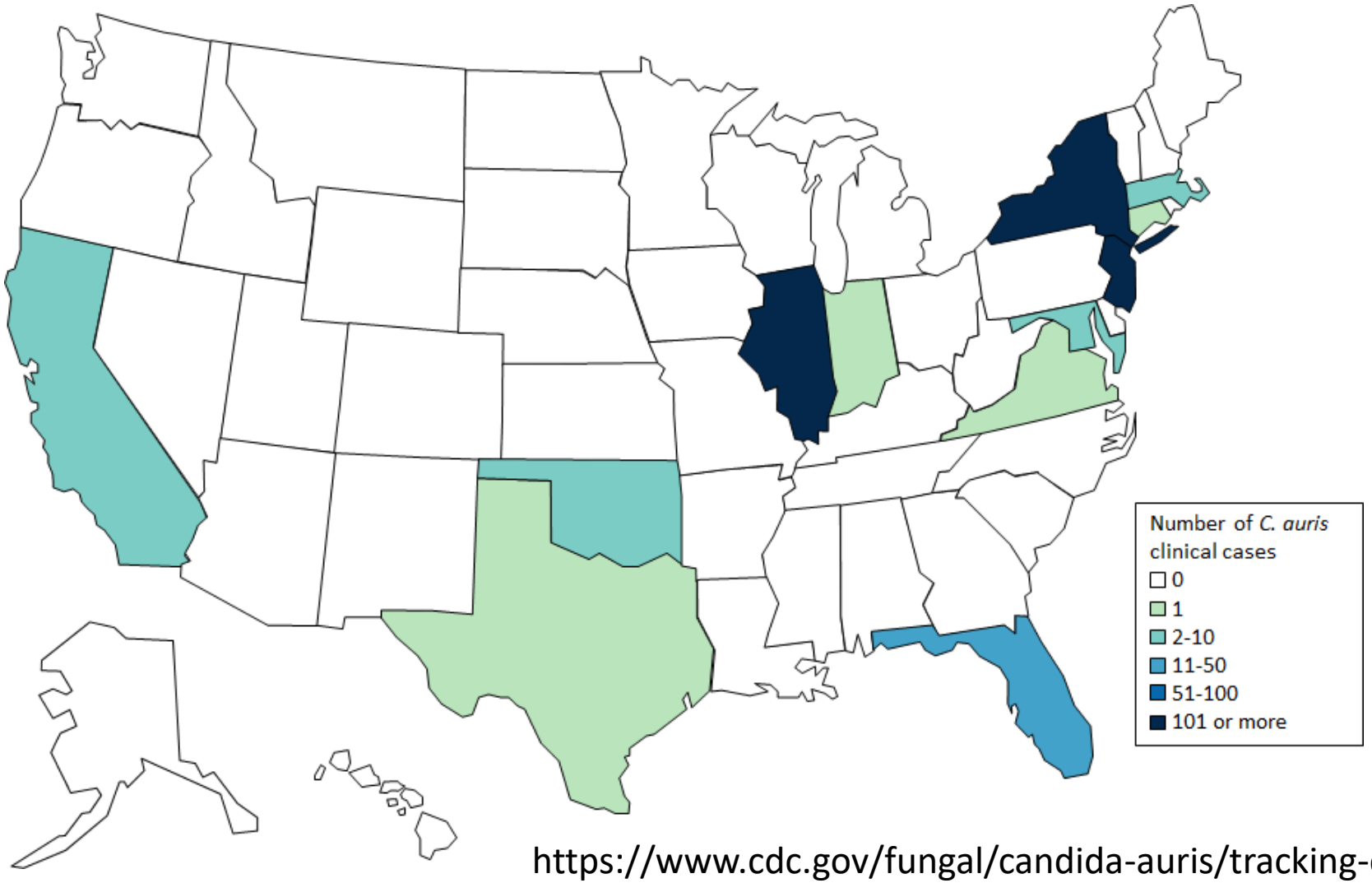


Four Distinct Clades of *Candida auris*



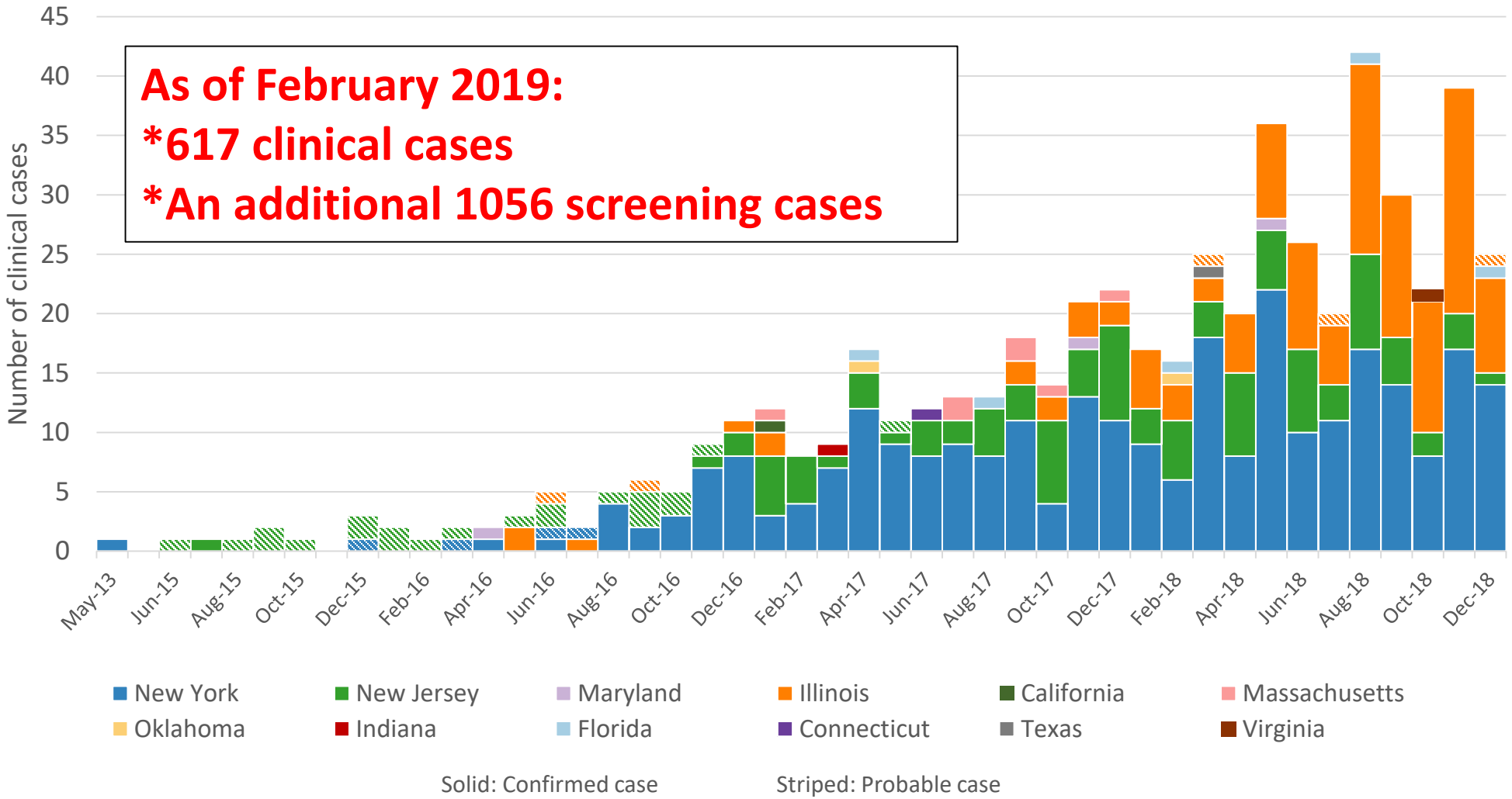
Lockhart et al. Clin Microbiol Newsl. 2017; 39(13): 99-103

Clinical Cases of *Candida auris*, February 2019

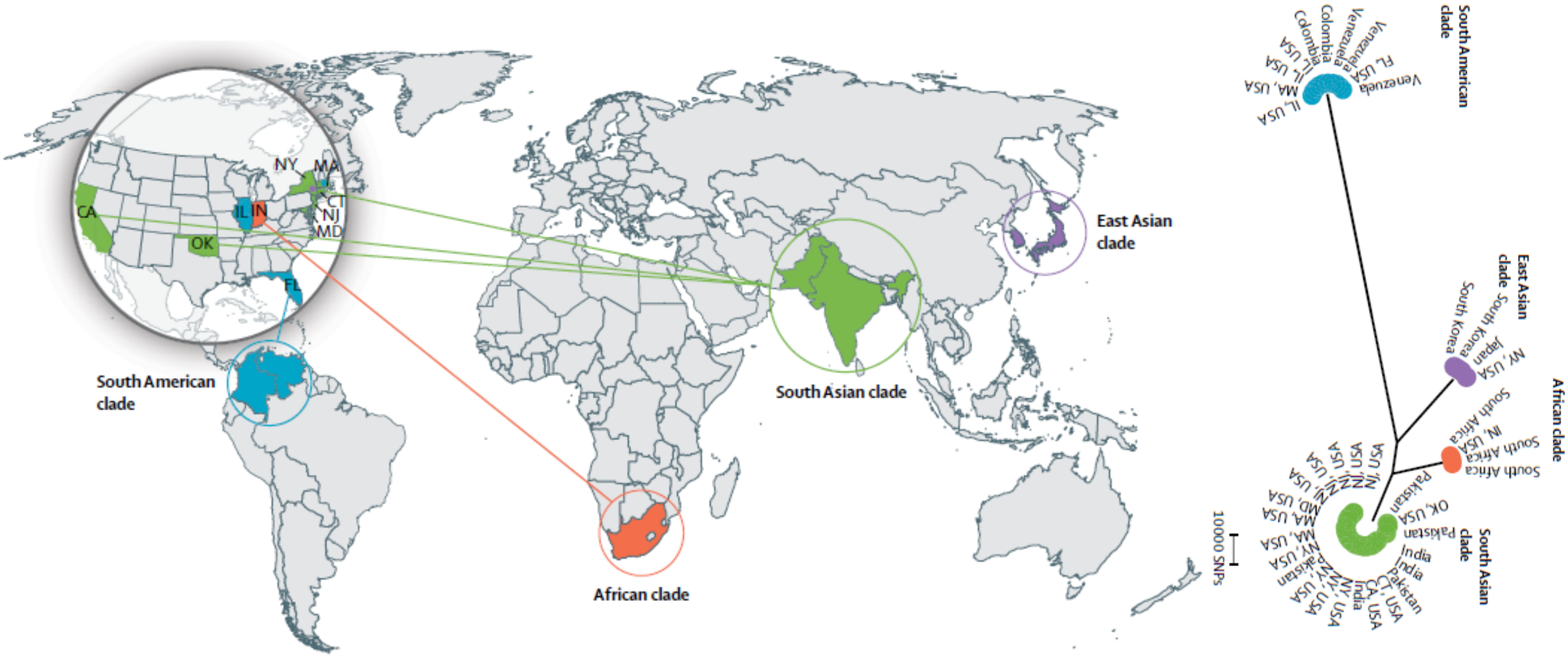


https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html#world

Candida auris Clinical Cases, 2013–December 2018



U.S. Isolates Related to the 4 Known Clades



Chow et al. Lancet Infect Dis 2018;18:1377-84

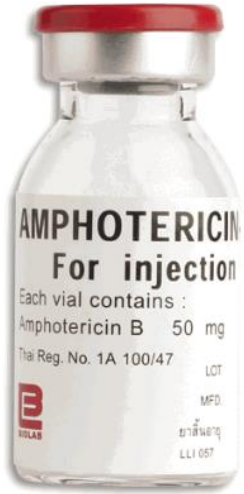
Antifungal Resistance is Common

>90%

Azoles

7%

Echinocandins



35%

Polyenes

- >40% multi-drug resistant
- A few isolates resistant to all three classes

Lockhart et al. Clin Infect Dis 2017;64:134-140

Candida auris Causes Invasive Infections

- ~50% of clinical cases had bloodstream infections
- Candidemia associated with 30-60% mortality rates

Forsberg et al. Med Mycol. 2019;57(1):1-12

Risk Factors for *Candida auris*

Older age

Multiple healthcare exposures

Long-term care

Acute care

Outside US

Antifungals and antibiotics

Indwelling devices

Catheters

Ventilator

PEG tube

Comorbid conditions

Cancer

Diabetes

Renal Disease

Recent surgery

Candida auris Identification Can Be Difficult

- Phenotypic characteristics are not sufficient for identification
- Many yeast identification methods may not correctly identify *C. auris*
  - Misidentification of species
  - No identification
- Yeast isolates may not be identified, especially in non-invasive sites
  - >40% of U.S. clinical cases were identified from non-bloodstream isolates (e.g., urine, wounds)

Candida auris on CHROMagar Candida, displaying multiple color morphs

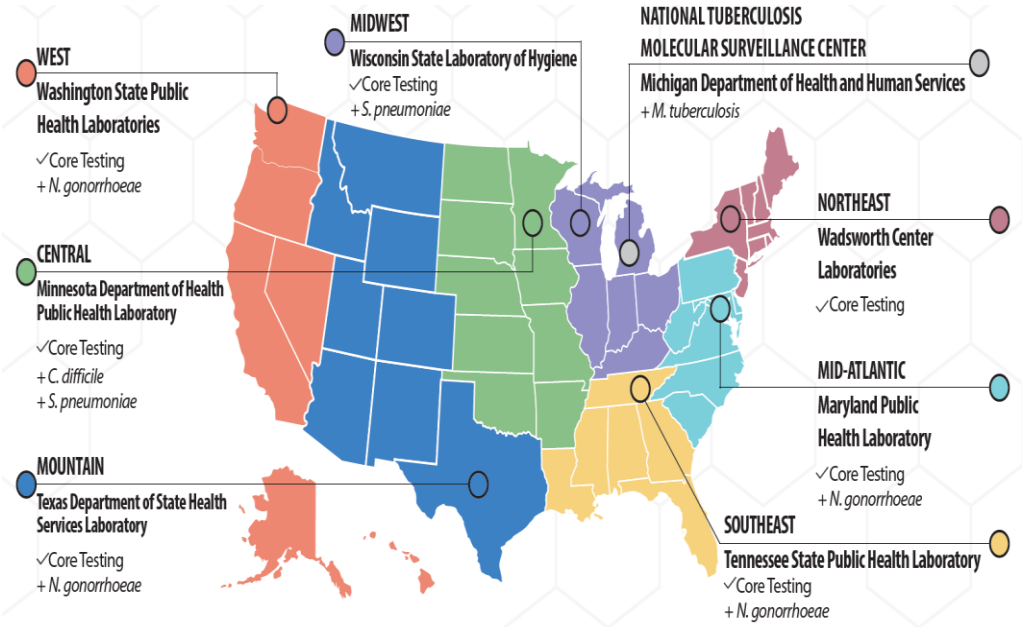
Identification Method	Database/Software, if applicable	*C. auris* is confirmed if initial identification is *C. auris*.	*C. auris* is possible if the following initial identifications are given. Further work-up is needed to determine if the isolate is *C. auris*.
Bruker Biotyper MALDI-TOF	RUO libraries (Versions 2014 [5627] and more recent)	*C. auris*	n/a
	CA System library (Version Claim 4)	*C. auris*	n/a
bioMérieux VITEK MS MALDI-TOF	RUO library (with Saramis Version 4.14 database and Saccharomycetaceae update)	*C. auris*	*C. haemulonii* No identification
	IVD library	n/a	*C. haemulonii* No identification
VITEK 2 YST	Software version 8.01	*C. auris*	*C. haemulonii* *C. duobushaemulonii* *Candida* spp. not identified
	Older versions	n/a	*C. haemulonii* *C. duobushaemulonii* *Candida* spp. not identified
API 20C		n/a	*Rhodotorula glutinis* (with characteristic red color present) *C. sake* *Candida* spp. not identified
BD Phoenix		n/a	*C. catenulata* *C. haemulonii* *Candida* spp. not identified
MicroScan		n/a	*C. lusitaniae** *C. guilliermondii** *C. parapsilosis** *C. famata* *Candida* spp. not identified
RapID Yeast Plus		n/a	*C. parapsilosis** *Candida* spp. not identified

* *C. guilliermondii, C. lusitaniae,* and *C. parapsilosis* generally make hyphae or pseudohyphae on cornmeal agar. If hyphae or pseudohyphae are not present on cornmeal agar, the isolate should raise suspicions of being *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 and any *C. parapsilosis* isolates identified on RapID Yeast Plus as possible *C. auris* isolates and further work-up should be considered.

https://www.cdc.gov/fungal/diseases/candidiasis/pdf/Testing-algorithm-by-Method-temp.pdf

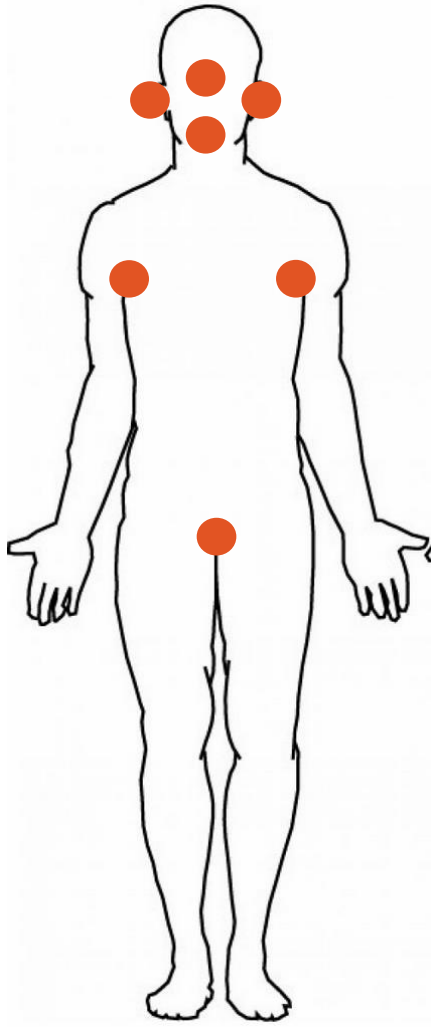
Candida Testing Available Through ARLN

- Any confirmed or suspected *Candida auris* isolates
- *Candida glabrata* from normally sterile sites (including serial isolates from patients receiving antifungal treatment)
- Multi-drug resistant *Candida* isolates
- Unusual *Candida* species (any species other than *albicans*, *C. parapsilosis*, *C. dubliniensis*, *C. lusitaniae*, *C. tropicalis*, *C. krusei*)
- Any *Candida* species that was unable to be identified after a validated method was attempted

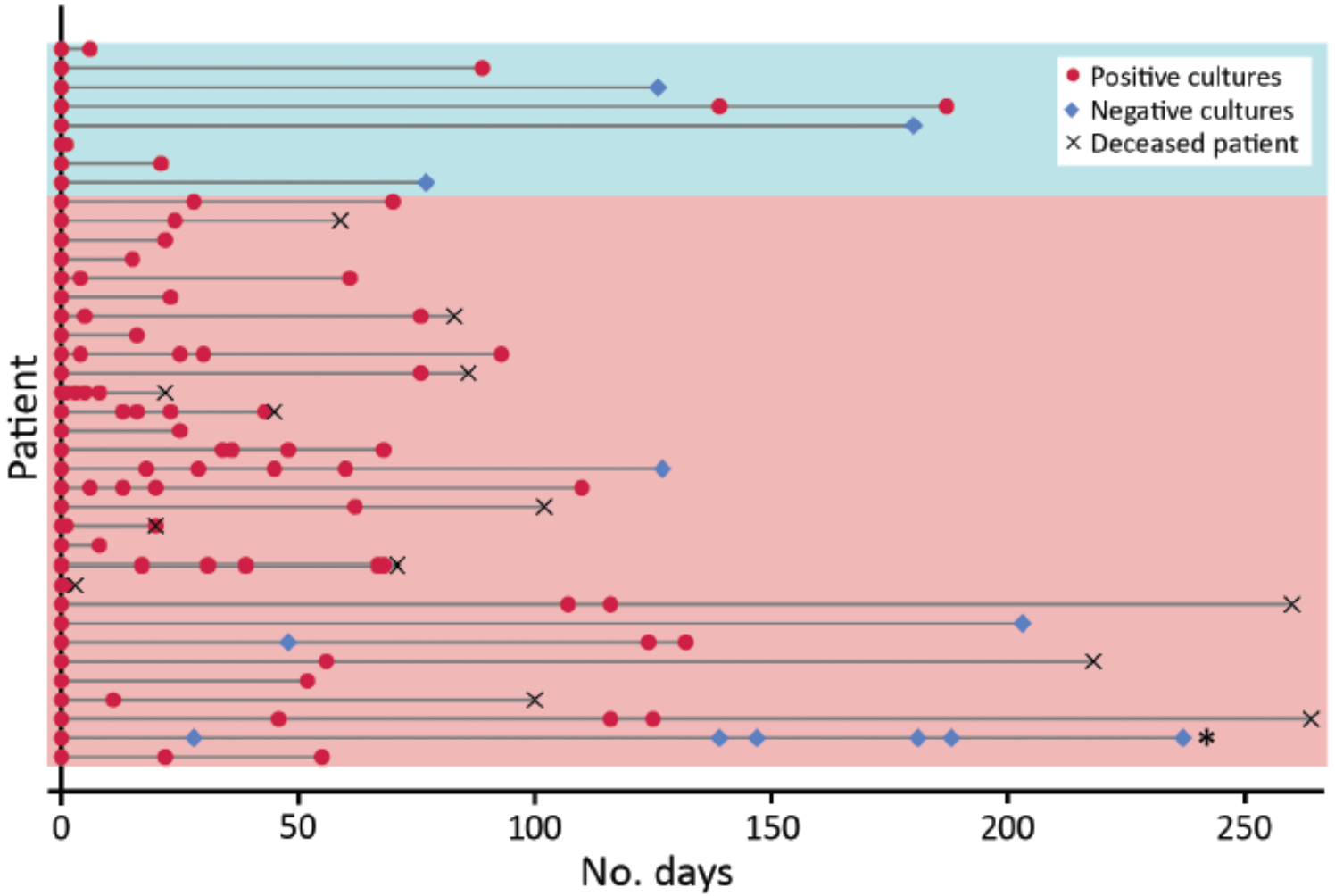


Candida auris Colonizes Skin & Other Body Sites

- Colonization is a risk for:
  - Invasive infections
  - Transmission to other patients



Duration of Colonization Can Be Prolonged



Adams et al. EID 2018;24(10): 1816-1824

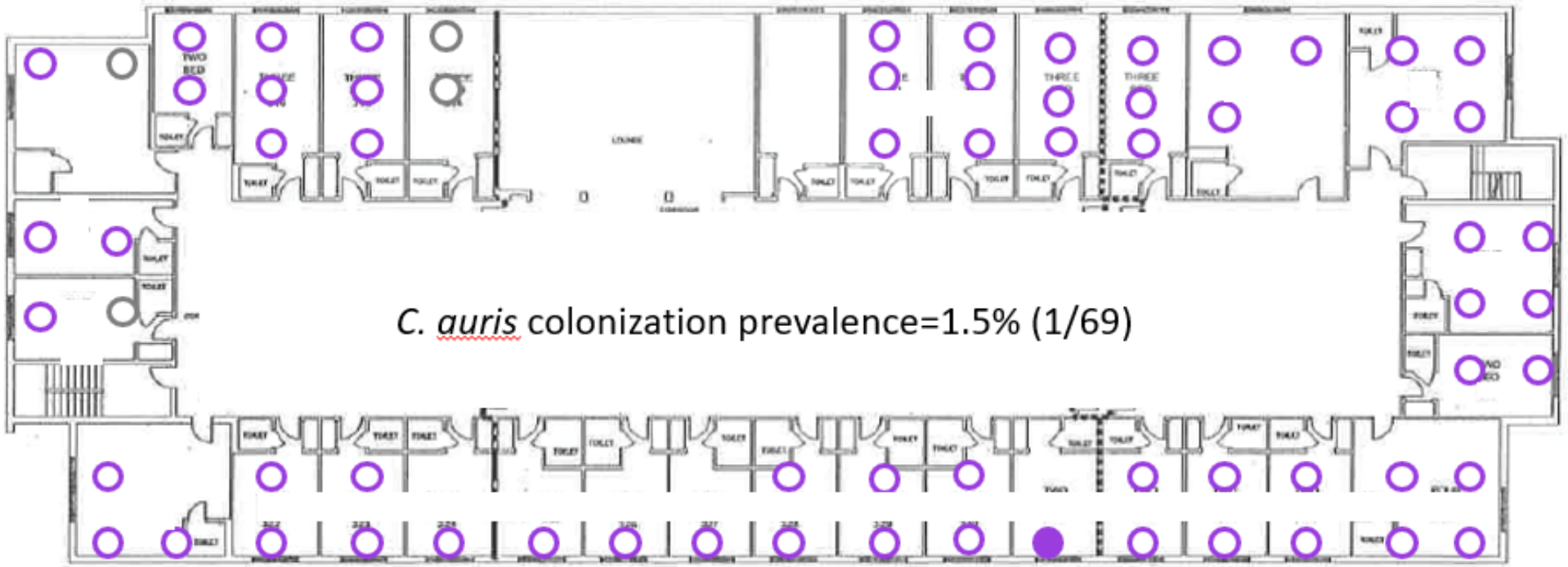
Higher Colonization Rates in High-Acuity LTCF

- In NY, 572 patients screened in 19 facilities for *Candida auris* colonization
  - 61 (11%) were positive for *C. auris*
    - 19 (31%) admitted to acute care hospital
    - 42 (67%) resided at a long-term care facility
      - 40 (66%) were at a vSNF
- In Chicago, 1,364 patients screened in 20 facilities
  - 92 (6.7%) were positive for *C. auris*
    - Prevalence median (range):
      - vSNF - 7.7% (0-43.3%)
      - LTAC - 0% (0-14.3%)
      - Acute care - 0% (0-6.3%)
      - SNF - 0% (0-1.5%)

Adams et al. EID 2018;24(10): 1816-1824

Kerins et al. OFID 2018:5 (Suppl 1) S28

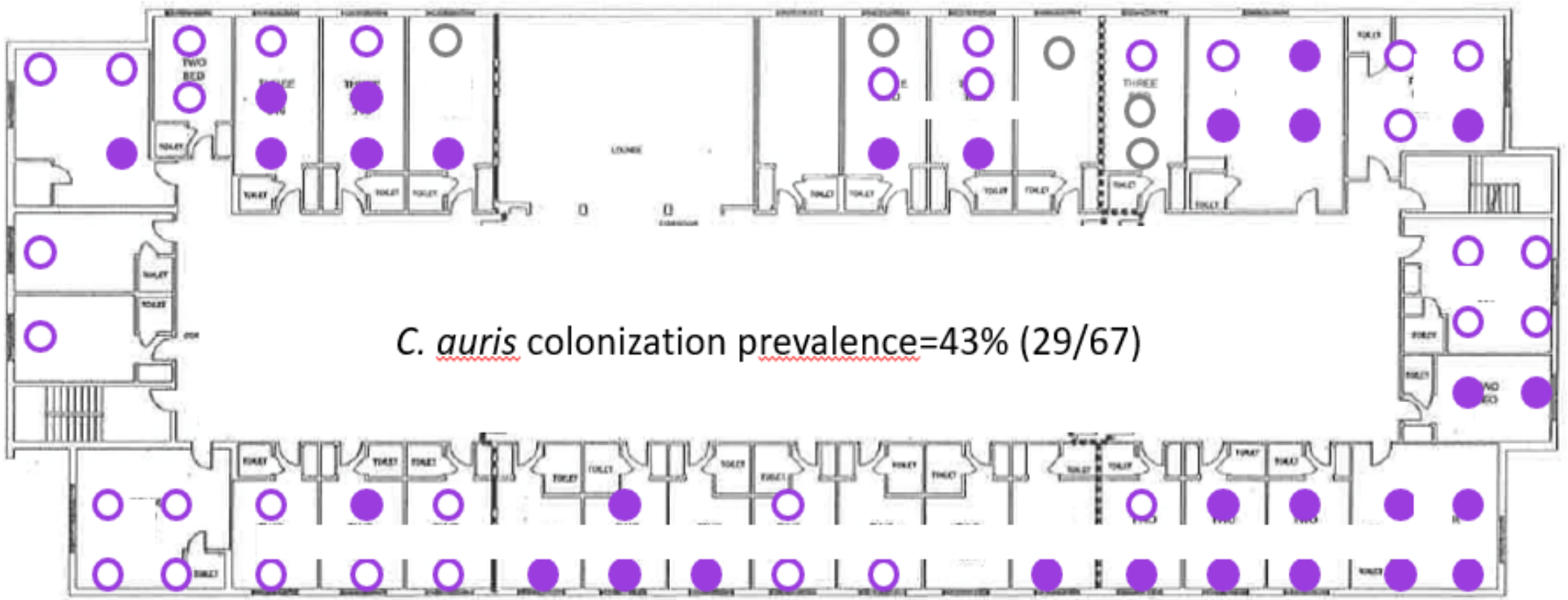
vSNF A Ventilator/Trach Floor
March 2017 *C. auris* PPS Results



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

Slide courtesy of Chicago Department of Public Health.

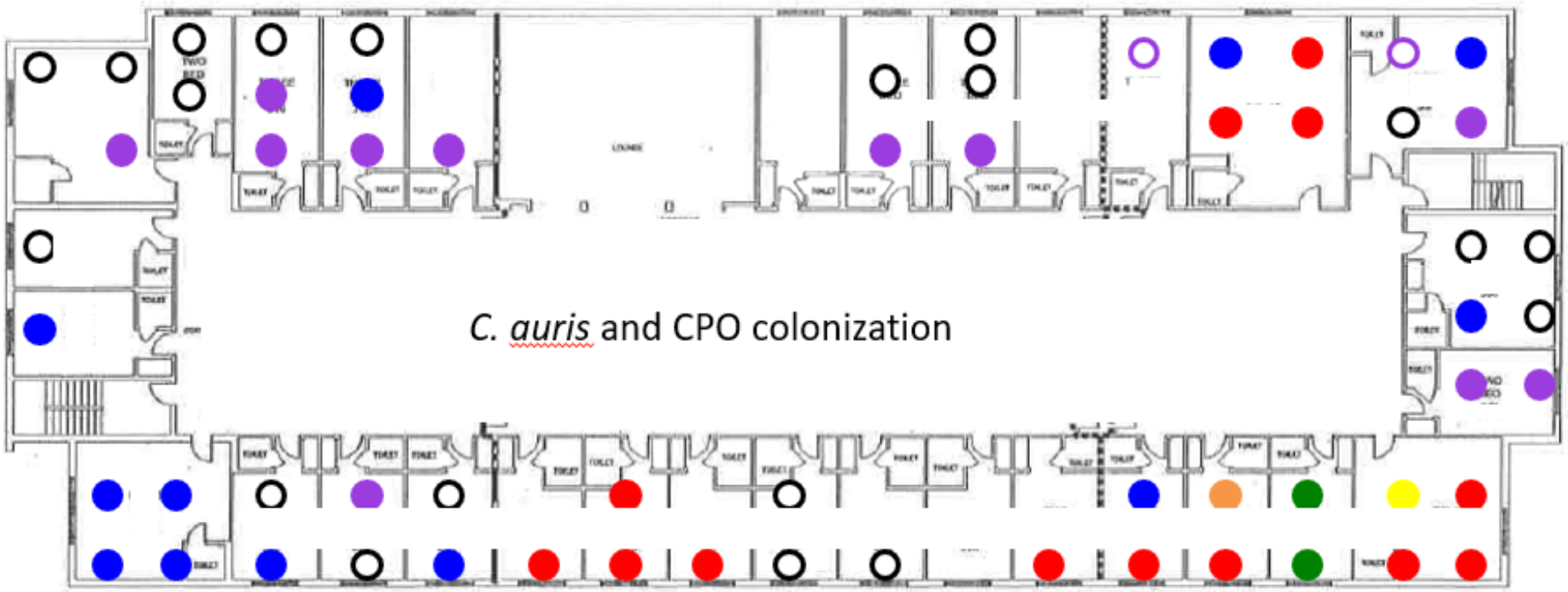
vSNF A Ventilator/Trach Floor
January 2018 *C. auris* PPS Results



- *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.

vSNF A Ventilator/Trach Floor
January 2018 CPO and *C. auris* PPS Results

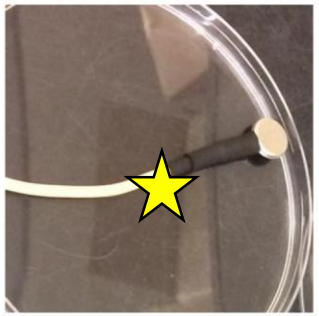


- *C. auris*
- *C. auris* and KPC
- KPC or CRE with unknown mechanism of resistance
- *C . auris*, KPC, and NDM
- *C. auris*, VIM-CRPA, and KPC
- *C. auris* and KPC-CRPA

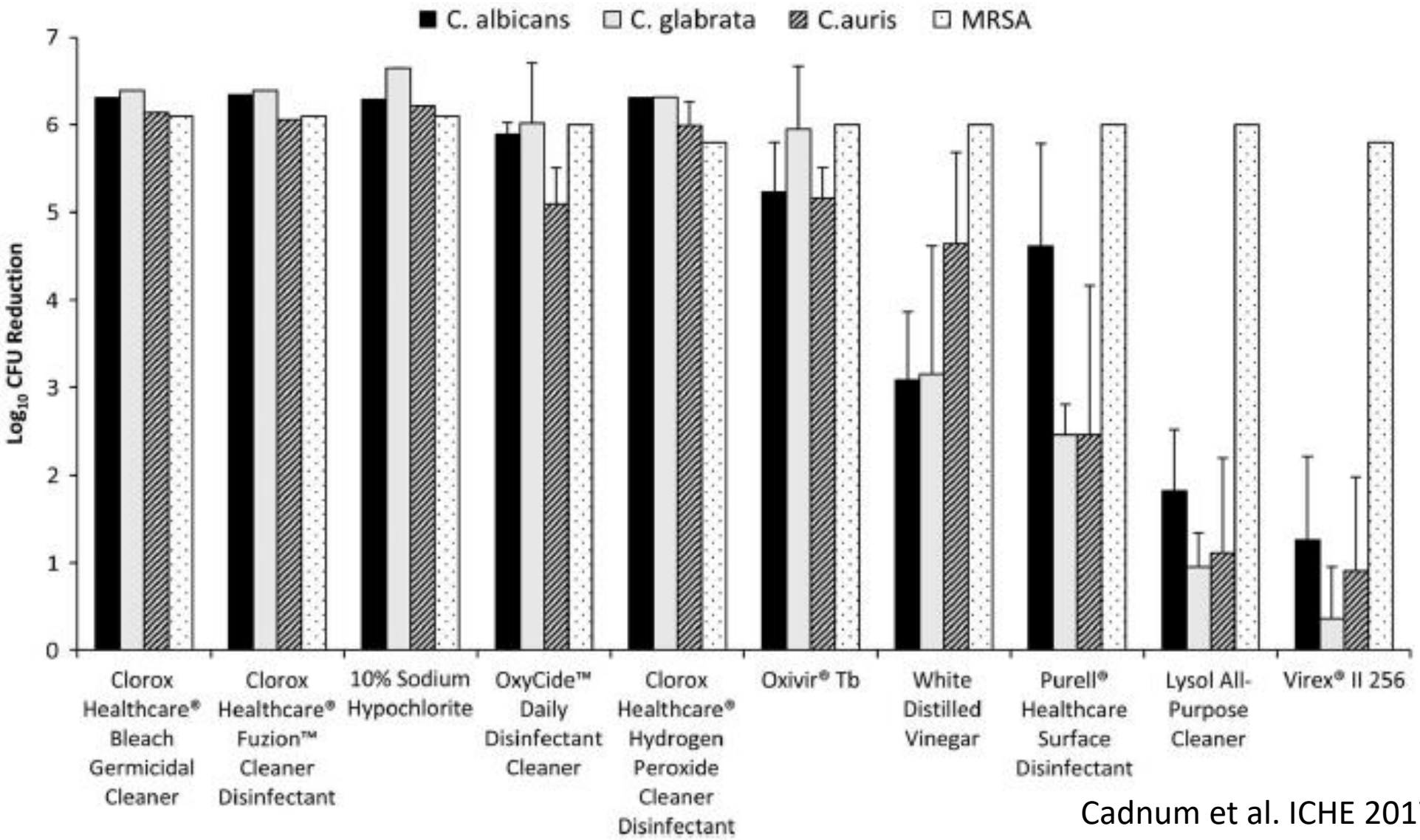
- Screened negative for *C. auris*, but not tested for CRE
- Screened negative for CRE and *C. auris*

Slide courtesy of Chicago Department of Public Health.

Candida auris Can Persist in the Environment



Routine Disinfectants Not as Effective



Cadnum et al. ICHE 2017; 38:1240-1243

Candida auris Reporting and Response

- Healthcare facilities/Infection Prevention

- Local Health Departments

Candida auris is Now a Reportable Condition

- June 2018 - CSTE position statement for standardized *C. auris* case definition and national notification of cases was passed

https://cdn.ymaws.com/www.cste.org/resource/resmgr/ps/2018ps/18-ID-05_Dec2018_Update.pdf

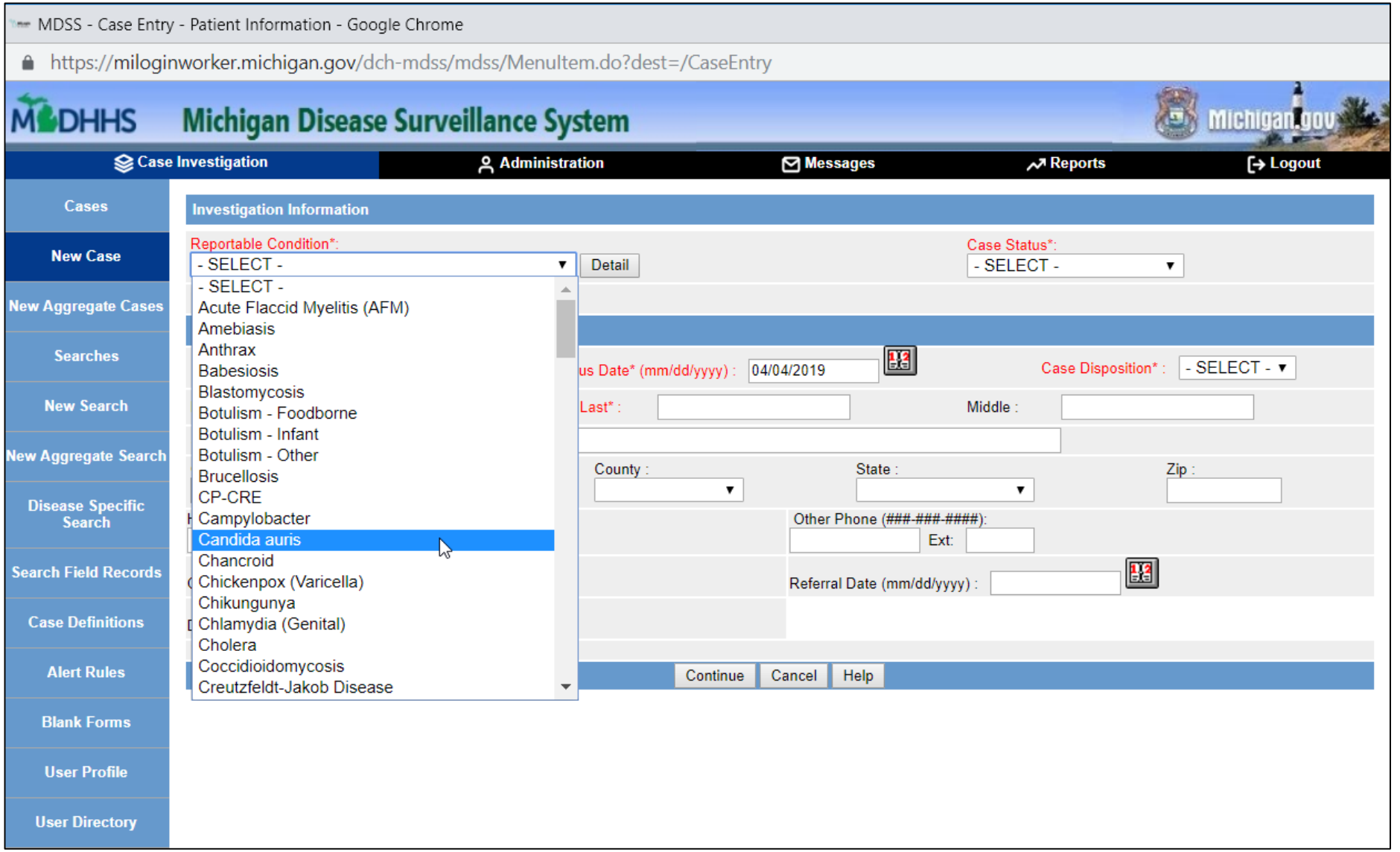
- January 1, 2019 - *C. auris* was made a reportable condition in Michigan

Candida auris Reporting Requirements

- Please report any patient or laboratory finding to MDHHS that meets either of the following criteria:
  - Detection of *C. auris* in a specimen using either culture or a culture-independent diagnostic test (CIDT) (e.g., Polymerase Chain Reaction [PCR])
  - Detection of an organism that commonly represents a *C. auris* misidentification in a specimen by culture (i.e., *Candida haemulonii*): https://www.cdc.gov/fungal/diseases/candidiasis/pdf/Testing-algorithm-by-Methodtemp.pdf

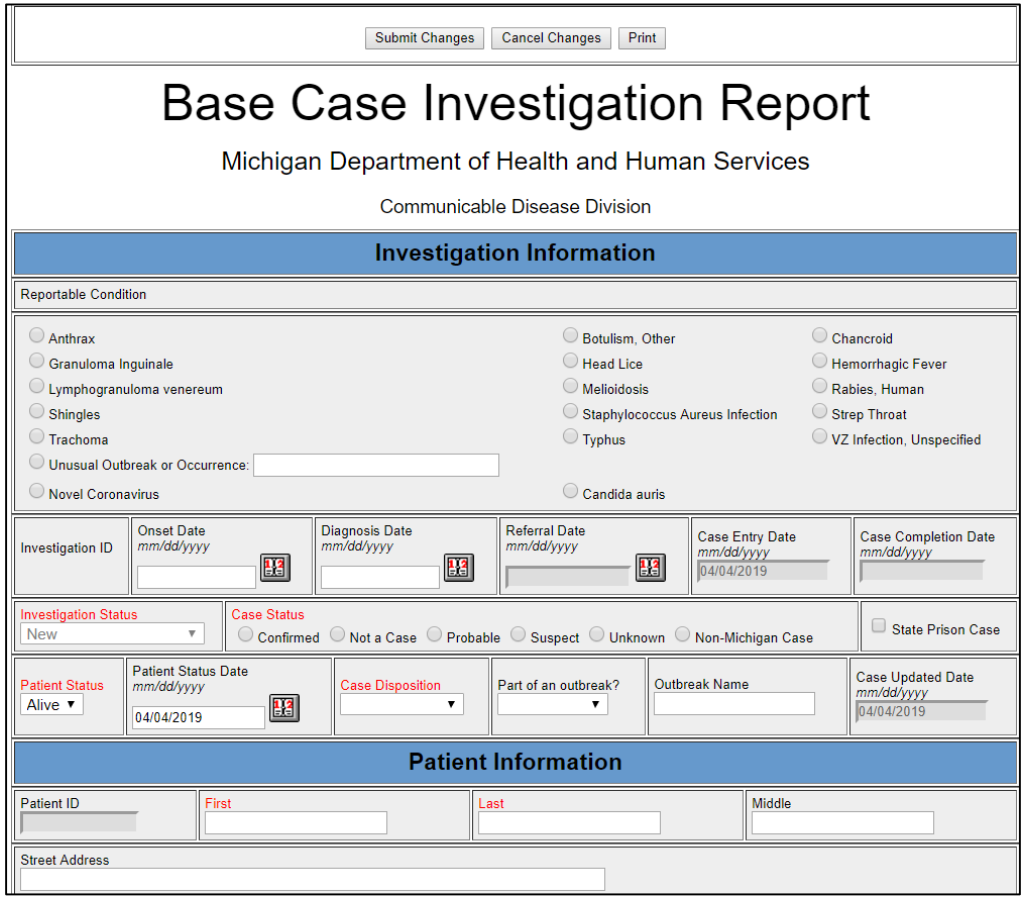
- Laboratories shall immediately submit **confirmed or suspect *C. auris*** isolates, subcultures, or specimens from the patient being tested to the MDHHS Lansing laboratory

Candida auris Reporting in MDSS



Candida auris Reporting in MDSS

- At this time, base case form is available
  - Expecting to have a *C. auris* specific form by late 2019/early 2020
- Important information to collect:
  - Demographics
  - Laboratory testing results
  - Where specimen was collected
  - Healthcare facility exposures
    - Long-term care residence
  - Tracheostomy/ventilator use
  - Travel history
  - MDRO status



Submit Changes | Cancel Changes | Print

Base Case Investigation Report

Michigan Department of Health and Human Services

Communicable Disease Division

Investigation Information

Reportable Condition

Anthrax; Botulism, Other; Chancroid
Granuloma Inguinale; Head Lice; Hemorrhagic Fever
Lymphogranuloma venereum; Melioidosis; Rabies, Human
Shingles; Staphylococcus Aureus Infection; Strep Throat
Trachoma; Typhus; VZ Infection, Unspecified
Unusual Outbreak or Occurrence:
Novel Coronavirus; Candida auris

Investigation ID	Onset Date mm/dd/yyyy	Diagnosis Date mm/dd/yyyy	Referral Date mm/dd/yyyy	Case Entry Date mm/dd/yyyy	Case Completion Date mm/dd/yyyy
				04/04/2019	

Investigation Status: New

Case Status: Confirmed; Not a Case; Probable; Suspect; Unknown; Non-Michigan Case

State Prison Case

Patient Status	Patient Status Date mm/dd/yyyy	Case Disposition	Part of an outbreak?	Outbreak Name	Case Updated Date mm/dd/yyyy
Alive	04/04/2019				04/04/2019

Patient Information

Patient ID	First	Last	Middle

Street Address

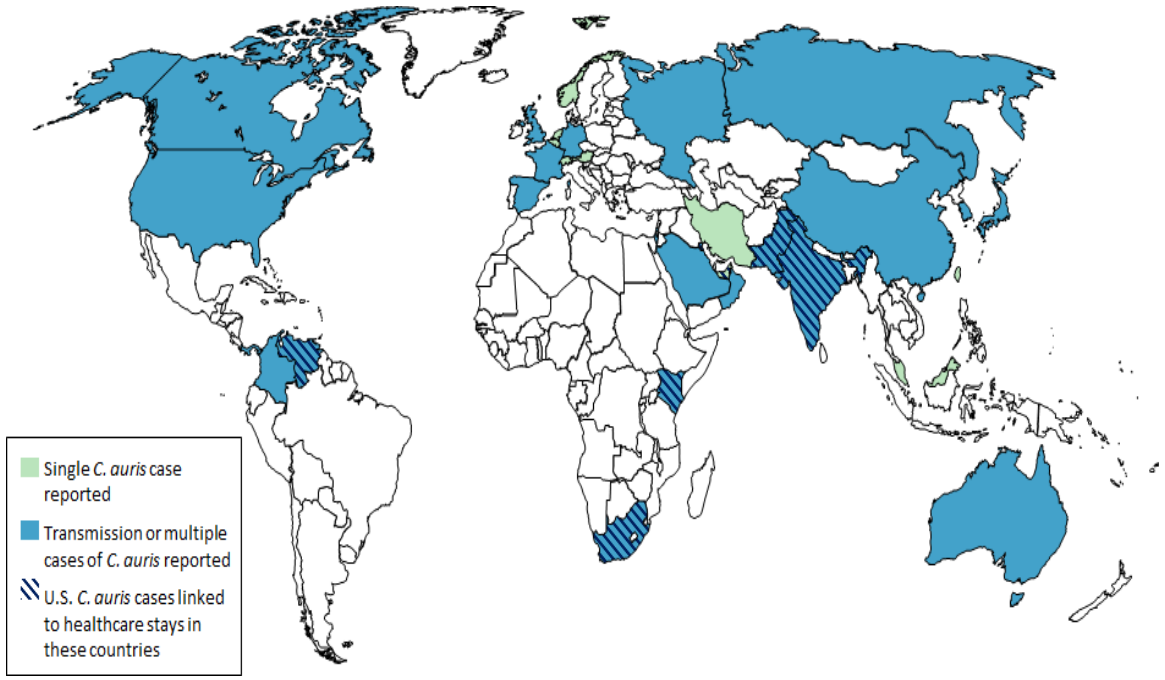
CDC Guidance for Novel MDRO Containment

- Response to single cases of resistance
- Goal to slow the spread of novel or unusual MDROs or resistance mechanisms
- Contact Investigation
  - Screening roommates
  - Screening broader healthcare contacts
  - Prospective and retrospective lab surveillance
  - Assessment of infection control practices

https://www.cdc.gov/hai/containment/guidelines.html

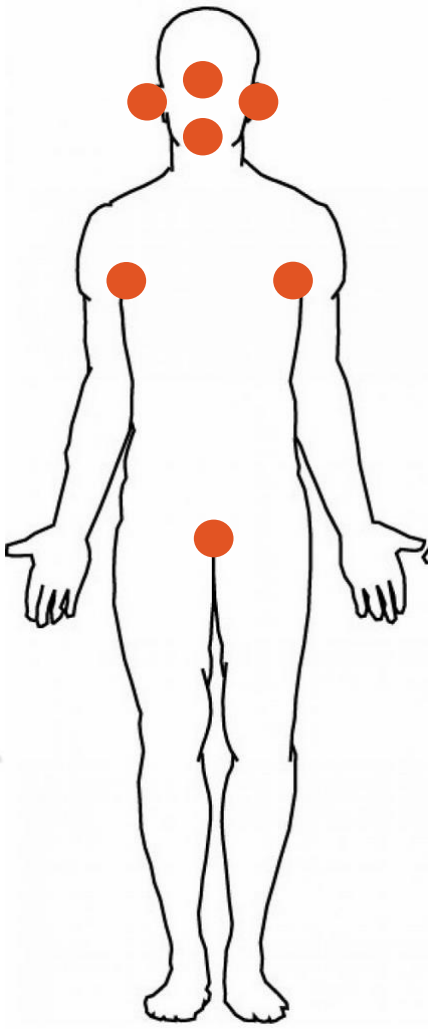
Screening Recommendations

- Close contacts of *C. auris* patients
- Patients with overnight stay in a healthcare facility outside the U.S. in past 12 months
- Patients in high-acuity long-term care facilities (e.g., care for ventilated patients), especially those with CP-CRE or other MDROs



Candida auris Colonization Testing

- Testing done through ARLN
- Axilla/groin swab most sensitive
  - ARLN can provide testing supplies
- Must be approved by SHARP unit



Infection Prevention for *Candida auris*

- Place patients in a single-patient room, using Standard and Contact Precautions
- Emphasize adherence to hand hygiene
- Clean and disinfect patient care environment and reusable equipment (daily and terminal cleaning) with EPA List K products active against *C. difficile*
- Inter-facility communication at transfer to another healthcare facility
- Conduct surveillance to detect new cases and ongoing transmission

How Healthcare Facilities Can Prepare for *C. auris*

- Work with your laboratory to ensure your yeast identification method can identify *C. auris*.
  - If it cannot, know when to suspect *C. auris* and send suspected isolates to the Bureau of Laboratories for testing through ARLN
- Establish a surveillance protocol with your lab for prompt notification and reporting of confirmed or suspect *C. auris* isolates to infection prevention and public health
- Know which patients in your facility are at higher risk for *C. auris*
  - Request colonization screening for high-risk patients through ARLN
- Develop a facility response plan for prompt implementation of infection prevention and control measures

How Local Health Departments Can Respond

- Work with laboratories, healthcare facilities and providers in your jurisdiction for prompt notification and reporting of confirmed or suspect *C. auris* cases
- Facilitate submission of confirmed or suspect isolates to the MDHHS Bureau of Labs
- Enter case into MDSS and collect needed laboratory and clinical information
- Support implementation of Novel MDRO Containment strategies to reduce transmission of *C. auris* in healthcare facilities
- **SHARP Unit can guide you through this process…**

Thank You

Surveillance for Healthcare Associated and Resistant Pathogens (SHARP) Unit
Michigan Department of Health and Human Services (MDHHS)
(517) 335-8165

Sara McNamara, MPH, MT(ASCP)
Antimicrobial Resistance Epidemiologist
(517) 284-4953
McNamaraS5@michigan.gov