



APIC November 14, 2023

Update on *C. auris* in LA County

Zachary Rubin, MD

Medical Epidemiologist

Healthcare Outreach Unit

Acute Communicable Disease Control Program

Los Angeles County Department of Public Health





Today's Objectives

1. Review significance of *Candida auris*
2. Describe local epidemiology of *C. auris*
3. Explain current *C. auris* surveillance and investigation efforts in LA County

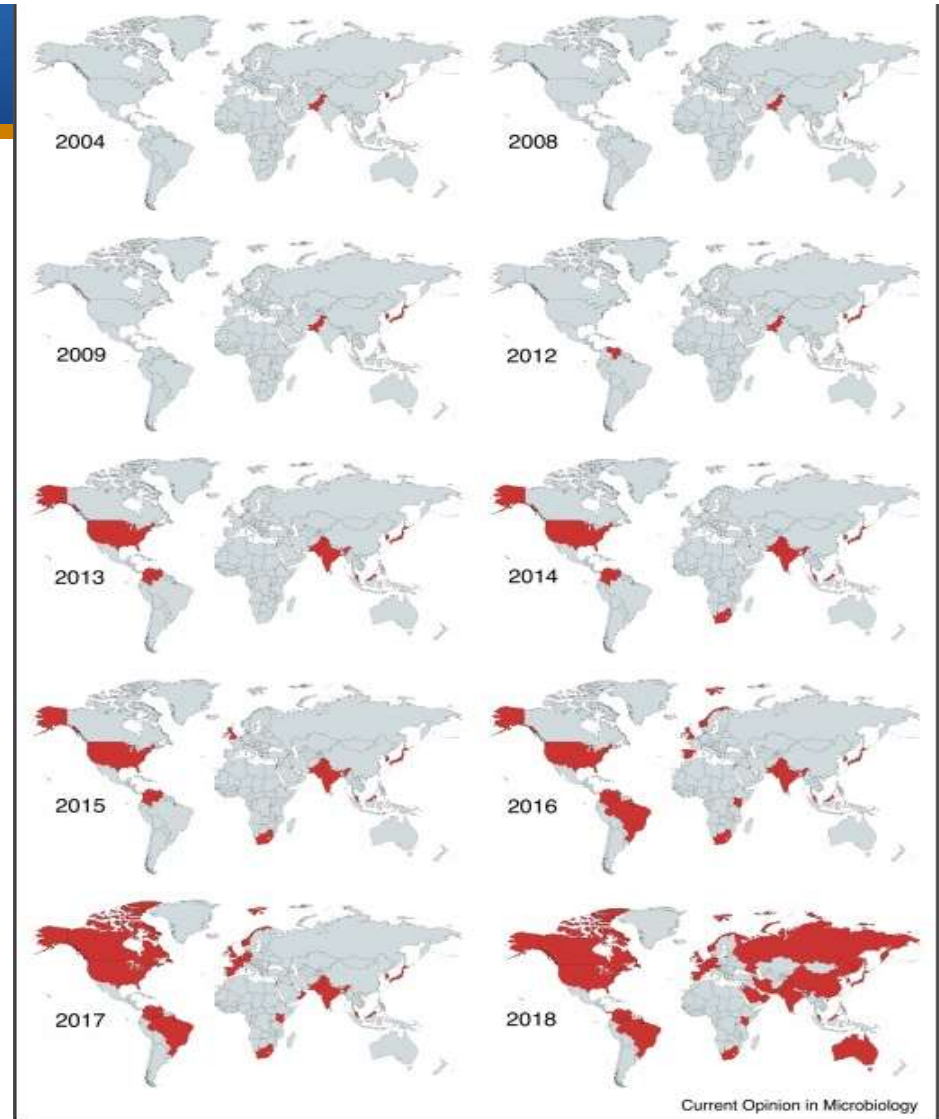


Introduction to *C. auris*



History of *C. auris*

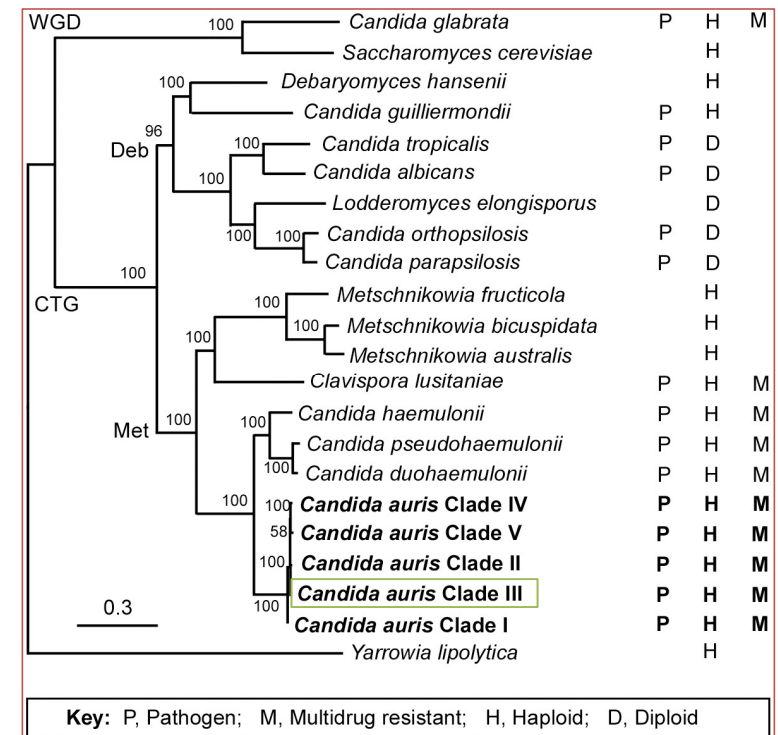
- First identified in Japan in 2009.
- Isolated from patient ear (auris).
- Retrospectively identified in Pakistan. using SCENIC prior to 2009.
- *C. auris* has become significant pathogen worldwide.
- Simultaneous independent emergence in multiple geographic regions.





Spectrum of *Candida* species

- *C. auris* is related to other *Candida* species.
- Automated microbiology identification systems initially misidentified as *C. haemulonii*, but no longer an issue.
- *C. auris* is a skin colonizer.
- GI colonization rare likely due to salivary cationic peptide (Histatin 5)





Spectrum of *C. auris* disease & Clinical Risk factors

Spectrum of Disease

- Immunocompromised patients receiving healthcare
 - Fungemia
 - Intra-abdominal
 - CSF
 - Other sterile sites
- Pediatric cases RARE in US
- Mortality rate: 30-60%

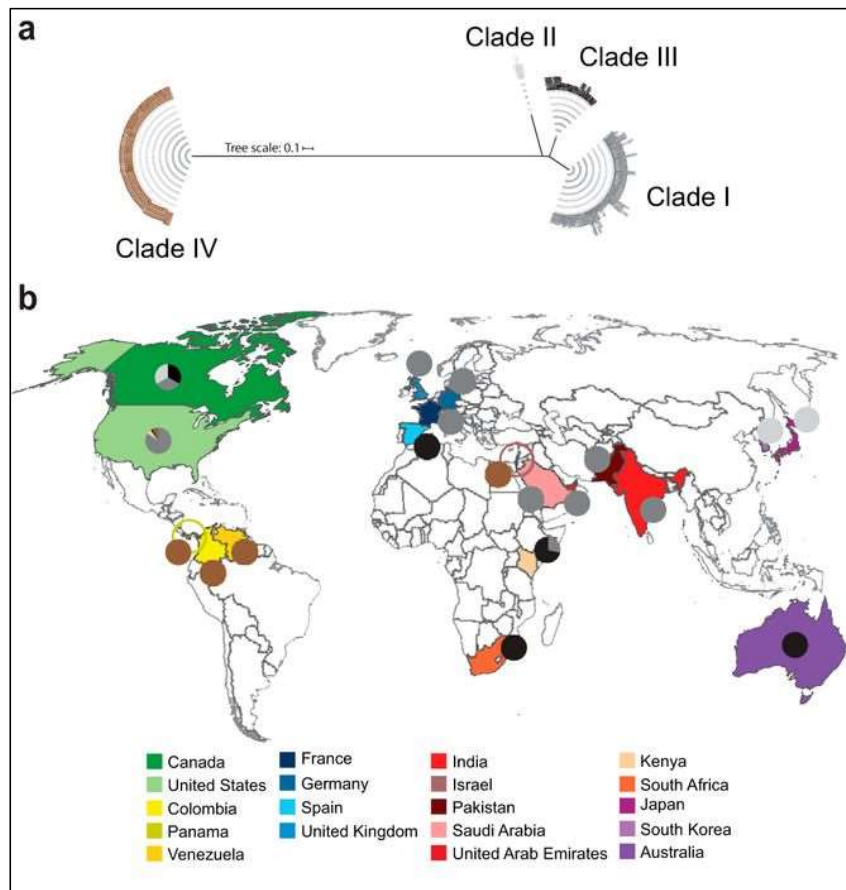


Clinical Risk Factors

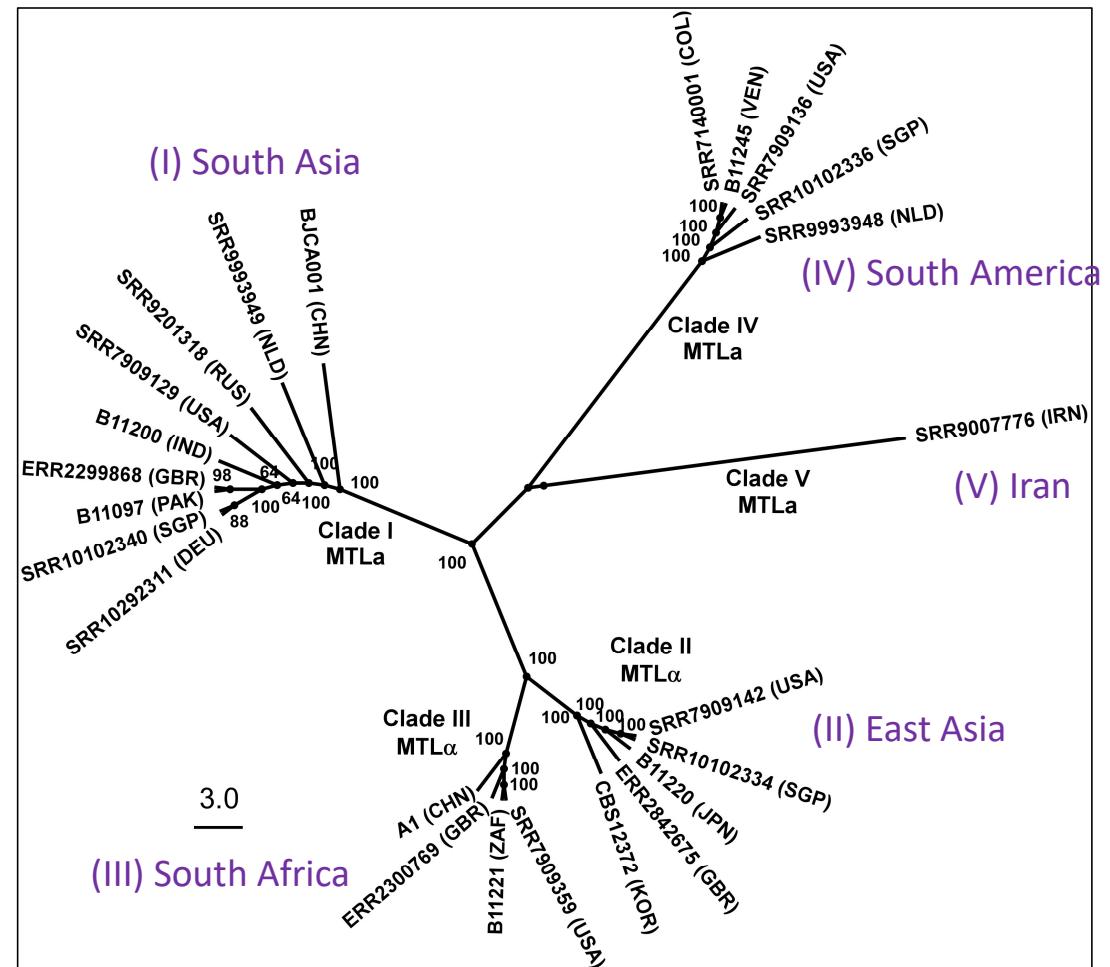
- Hospitalization/LTCF (LTACHs)
- Immunocompromised
- Surgery
- Diabetes
- Support devices (vascular catheters, ventilator, G-tube, etc)
- Other MDROs
- Multiple, prolonged hospital stay

Healthy individuals very unlikely to become infected with *C. auris*

Not all *C. auris* is the same....



Chow mBio. 2020. https://journals.asm.org/doi/10.1128/mBio.03364-19?url_ver=Z39.88-2003&rft_id=ori:rid:crossref.org&rft_dat=cr_pub%20%20pubmed



DU, H. Plos Pathogens. 2018.

<https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1008921#ppat.1008921.ref037>



***Candida auris* susceptibility**

- Generally:
 - 90% resistant to at least one drug
 - 30-40% resistant to 2 drugs
 - 4% pan-resistant
- Resistance to drug classes:
 - 80% resistant to fluconazole
 - 30% resistant to amphotericin
 - 2-10% resistant to echinocandins
- Development of resistance on therapy is possible



Resistance varies by clade

Clade (n)	Frequency (%) of antifungal drug resistance in isolates (n)					
	Susceptible	Fluconazole resistant	Amphotericin B resistant	Micafungin resistant	MDR ^a	XDR ^b
Clade I (118 ^c)	3 (4)	97 (114)	47 (54)	6 (7)	45 (53)	3 (4)
Clade II (7)	86 (6)	14 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Clade III (51)	2 (1)	98 (50)	0 (0)	8 (4)	8 (4)	0 (0)
Clade IV (120)	31 (37)	59 (71)	11 (13)	9 (11)	10 (12)	0 (0)
Total (296)	16 (48)	80 (236)	23 (67)	7 (22)	23 (69)	1 (4)

^a MDR, multidrug resistance to two major antifungal classes.

^b XDR, extensive drug resistance to three major antifungal classes.

^c Complete AFST data for 8 of the 126 clade I isolates were missing.

Chow mBio. 2020. https://journals.asm.org/doi/10.1128/mBio.03364-19?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%20pubmed



Resistance varies by clade

Clade (n)	Frequency (%) of antifungal drug resistance in isolates (n)					
	Susceptible	Fluconazole resistant	Amphotericin B resistant	Micafungin resistant	MDR ^a	XDR ^b
Clade I (1185)	3 (4)	97 (114)	47 (54)	6 (7)	45 (53)	3 (4)
Clade II (7)	86 (6)	14 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Clade III (51)	2 (1)	98 (50)	0 (0)	8 (4)	8 (4)	0 (0)
Clade IV (120)	31 (37)	59 (71)	11 (13)	9 (11)	10 (12)	0 (0)
Total (296)	16 (48)	80 (236)	23 (67)	7 (22)	23 (69)	1 (4)

^a MDR, multidrug resistance to two major antifungal classes.

^b XDR, extensive drug resistance to three major antifungal classes.

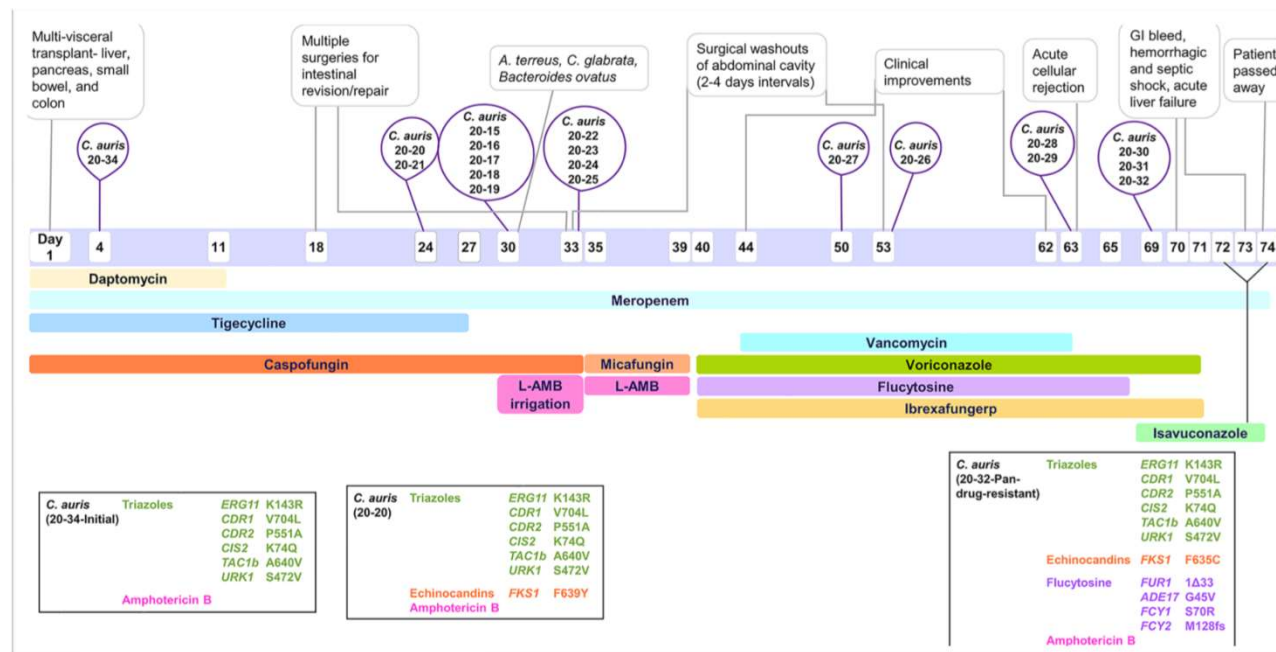
^c Complete AFST data for 8 of the 126 clade I isolates were missing.

Chow mBio. 2020. https://journals.asm.org/doi/10.1128/mBio.03364-19?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%20pubmed



Developing resistance on therapy

- Multiple published reports of *C. auris* isolates developing expanded resistance to antifungals on treatment.
- Jacobs et al. published case in 2021 from NY/NJ Metro area (Clade 1 from S. Asia)
 - Multivisceral transplant patient with 19 isolates collected over 72 days



Jacobs S. Mycology. 2021
https://journals.asm.org/doi/10.1128/aac.00053-22?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%20pubmed



Morbidity and Mortality Weekly Report (MMWR)

Notes from the Field: Transmission of Pan-Resistant and Echinocandin-Resistant *Candida auris* in Health Care Facilities — Texas and the District of Columbia, January–April 2021

Weekly / July 23, 2021 / 70(29);1022–1023

Meghan Lyman, MD¹; Kaitlin Forsberg, MPH¹; Jacqueline Reuben, MHS²; Thi Dang, MPH³; Rebecca Free, MD¹; Emma E. Seagle, MPH¹; D. Joseph Sexton, PhD¹; Elizabeth Soda, MD⁴; Heather Jones, DNP⁴; Daryl Hawkins, MSN²; Adonna Anderson, MSN²; Julie Bassett, MPH³; Shawn R. Lockhart, PhD¹; Enyinnaya Merengwa, MD, DrPH³; Preetha Iyengar, MD²; Brendan R. Jackson, MD¹; Tom Chiller, MD¹ ([VIEW AUTHOR AFFILIATIONS](#))

[View suggested citation](#)



New National Estimate*

Each year, antibiotic-resistant bacteria and fungi cause at least an estimated:



2,868,700
infections



35,900 deaths



*Clostridioides difficile*** is related to antibiotic use and antibiotic resistance:



223,900
cases



12,800 deaths

New Antibiotic Resistance Threats List

Updated urgent, serious, and concerning threats—totaling 18

5 urgent threats

2 new threats

NEW:
Watch List with **3** threats





DRUG-RESISTANT **CANDIDA AURIS**

THREAT LEVEL **URGENT**

**323**
Clinical cases
in 2018

**90%** Isolates resistant to at least **one** antifungal
30% Isolates resistant to at least **two** antifungals

Candida auris (*C. auris*) is an emerging multidrug-resistant yeast (a type of fungus). It can cause severe infections and spreads easily between hospitalized patients and nursing home residents.

WHAT YOU NEED TO KNOW

- *C. auris*, first identified in 2009 in Asia, has quickly become a cause of severe infections around the world.
- *C. auris* is a concerning drug-resistant fungus:
 - Often multidrug-resistant, with some strains (types) resistant to all three available classes of antifungals
 - Can cause outbreaks in healthcare facilities
 - Some common healthcare disinfectants are less effective at eliminating it
 - Can be carried on patients' skin without causing infection, allowing spread to others

Data represents U.S. cases only. Isolates are pure samples of a germ.



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

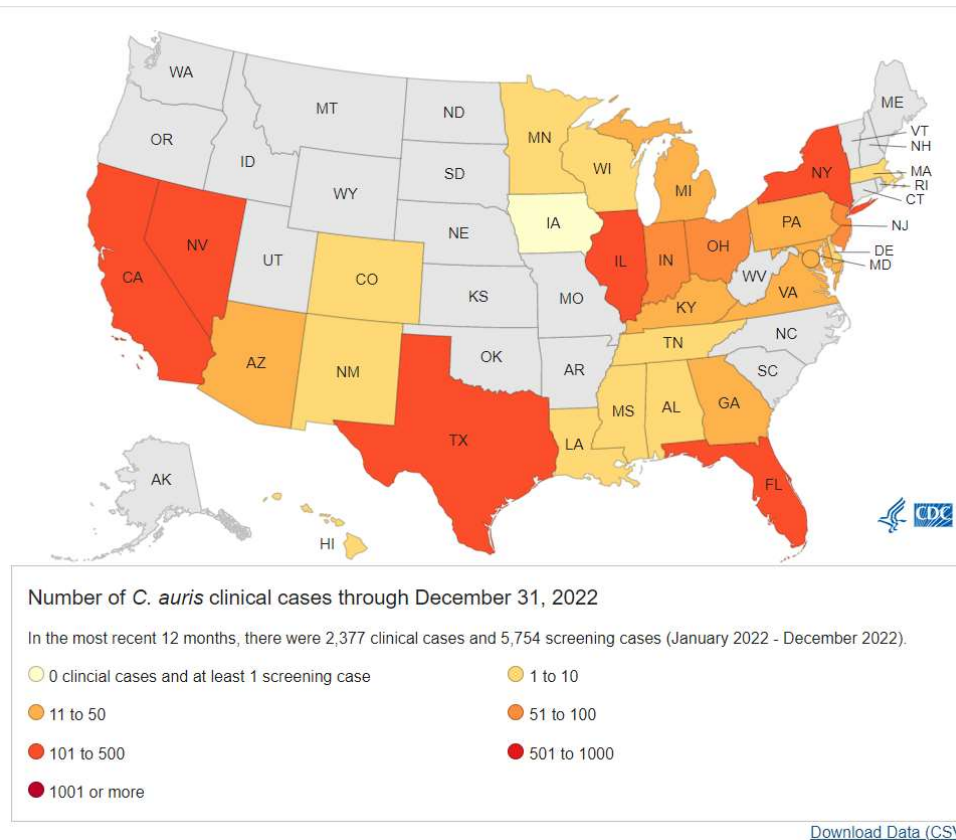
CASES OVER TIME

C. auris began spreading in the United States in 2015. Reported cases increased 318% in 2018 when compared to the average number of cases reported in 2015 to 2017.





Candida auris in the United States, 2022

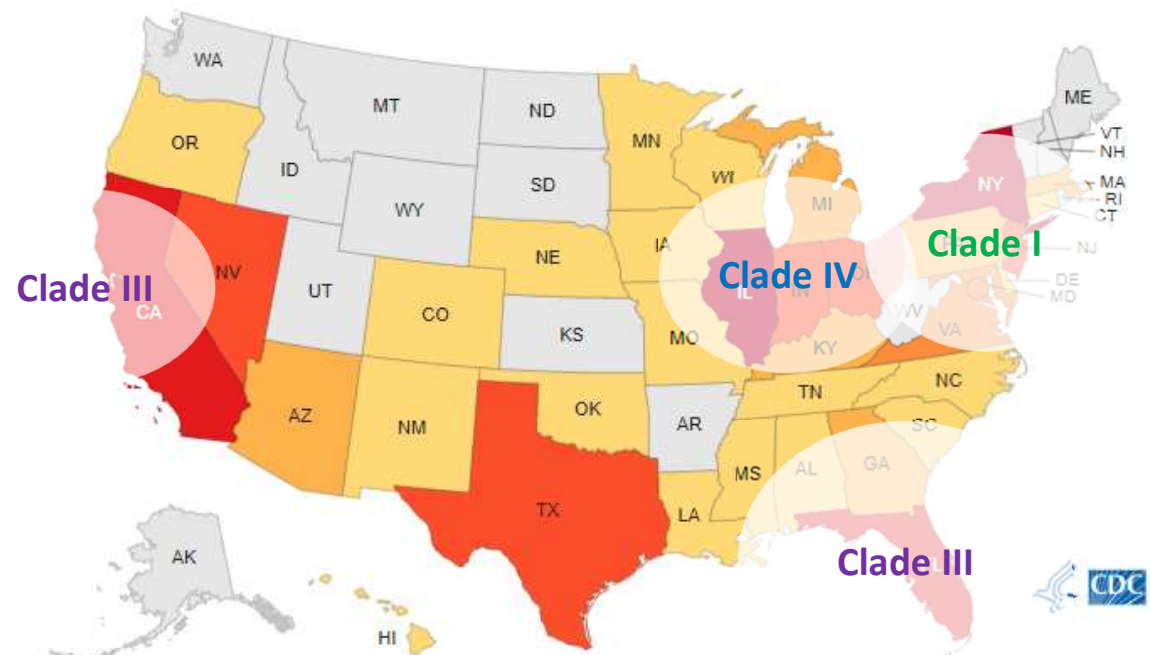


<https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html>



Predominant *C. auris* clades in the US

- Clade I (South Asian)
- Clade III (African)
- Clade IV (South American)



Now, seeing multiple clades circulating in some areas

Slide courtesy
of Meghan
Lyman, CDC



C. auris in LA County





LA County's *C. auris* Story

1 clinical case at LTAC reported to LACDPH



7 ex-roommates swabbed -> 1 positive



Facility-wide point prevalence survey (PPS)
-> 21 new positives in the facility (28%)



Pre-emptive PPS at epi-linked vSNFs/LTACs

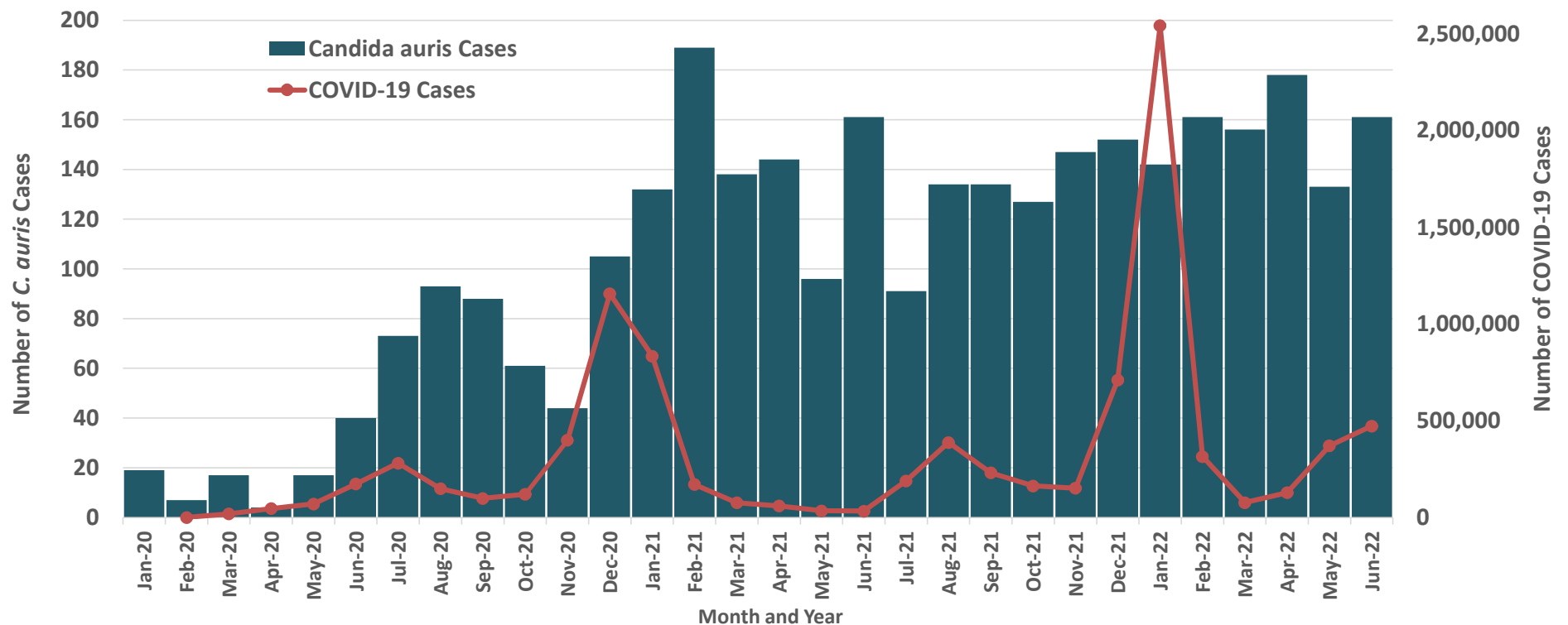


Pre-emptive PPS & ICAR at all vSNFs/LTACs





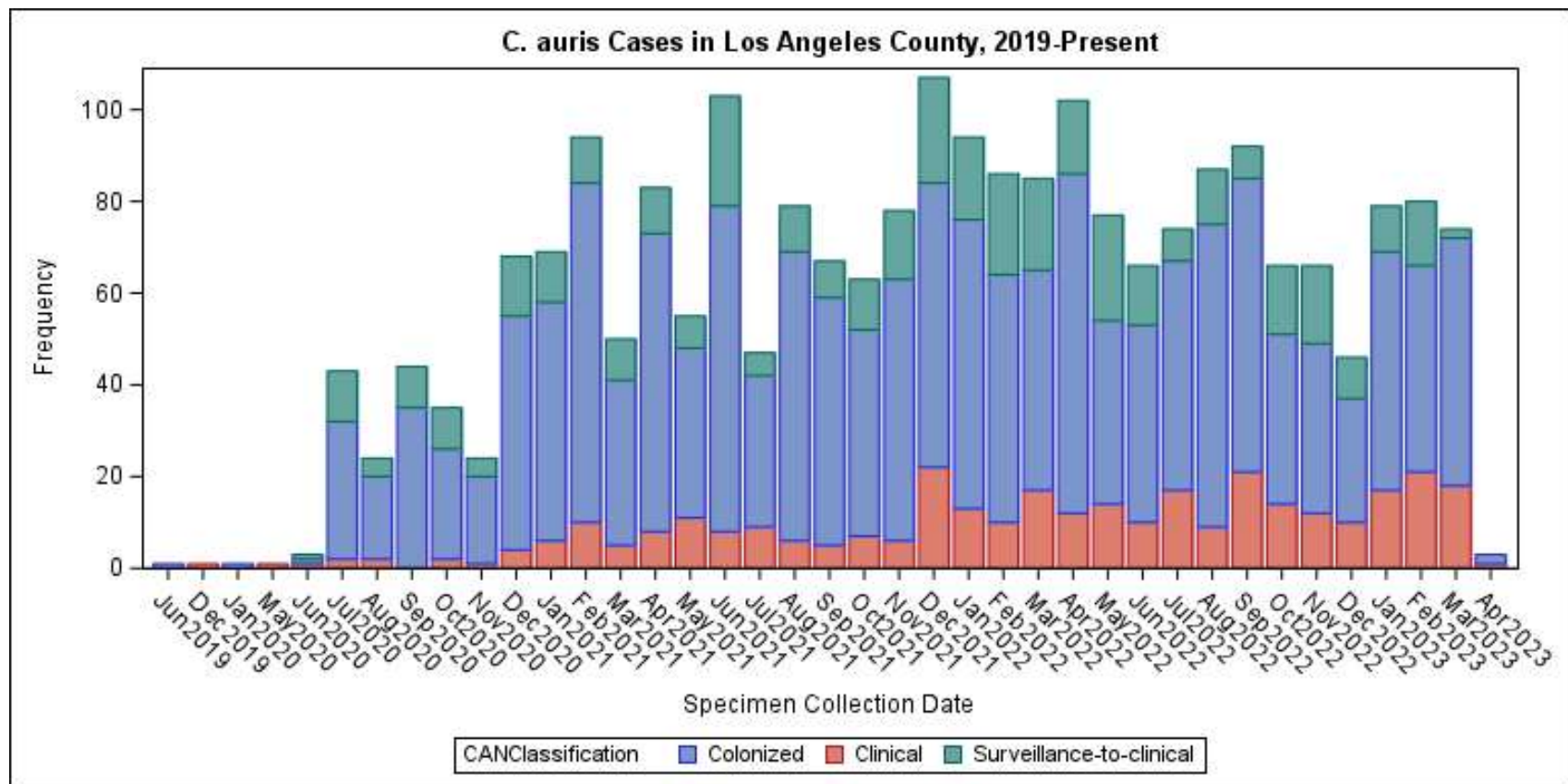
C. auris and COVID-19 Cases in California through 6/30/22



Slide Credit: CDPH



C. auris in LA County (2019-Present)



<http://publichealth.lacounty.gov/NMDRORReportDashboard.htm>



C. *Auris* by facility type, LA County (April, 2023)

HCF Type	Clinical [^]	Surveillance-to-clinical [†]	Surveillance [*]	Total
General Acute Care Hospital (GACH)	223	79	175	477
Long Term Acute Care Hospital (LTACH)	104	310	1340	1754
Skilled Nursing Facility (SNF)	3	10	69	82
Other	3	0	1	4
Total	333	399	1585	2317

Note that all cases are counted by case and facility type at time of first positive specimen collection.

*Swab collected for the purpose of screening for *C. auris* colonization.

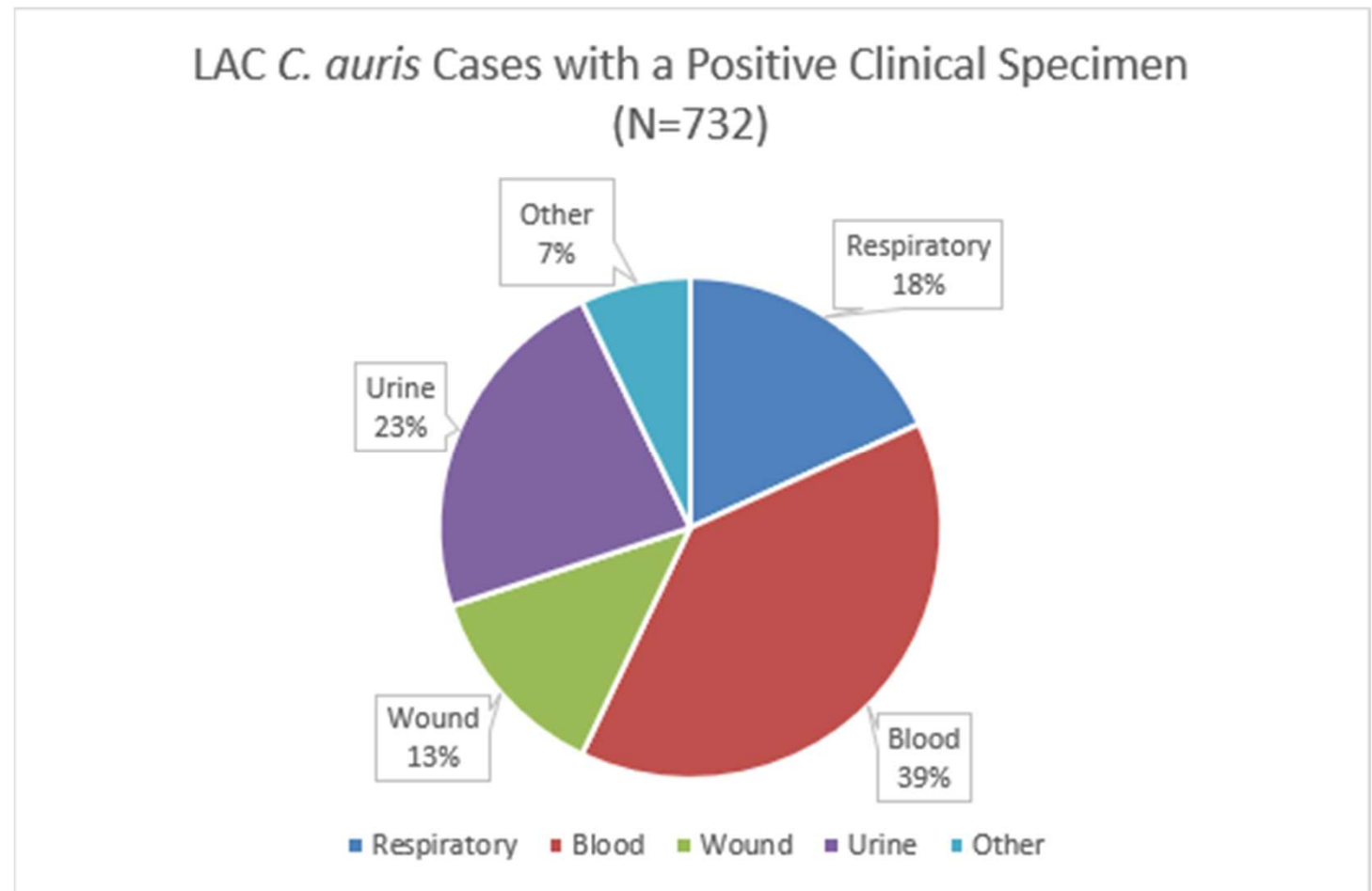
[^] Specimen collected for clinical purposes.

[†] Cases who were first identified via screening swab and later had one or more positive clinical specimen(s).



LAC *C. auris* Cases with a Positive Clinical Specimen (April, 2023)

- 2317 total cases
- 732 clinical isolates
- 285 blood isolates (12%)





Minimum Inhibitory Concentrations (MICs) and resistance (R) of clinical *C. auris* isolates to antifungal agents

Los Angeles County isolates, June 2020-Sept 2021 (N=36)

Antifungals		% R	Minimum Inhibitory Concentration (µg / mL) MIC at or above tentative breakpoint values in red*														
Class	Drug		0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
Polyenes	Amphotericin B (n = 35)	2.8%				3 (8.6%)	25 (71.4%)	6 (17.1%)	1 (2.9%)								
Echinocandins	Anidulafungin (n = 35)	0.0%	1 (2.9%)	6 (17.1%)	8 (22.9%)	9 (25.7%)	9 (25.7%)	1 (2.9%)	1 (2.9%)								
	Caspofungin (n = 35)	0.0%	4 (11.4%)	10 (28.6%)	13 (37.1%)	7 (20.0%)	1 (2.9%)										
	Micafungin (n = 31)	0.0%	1 (3.2%)	9 (29.0%)	13 (41.9%)	6 (19.4%)	2 (6.5%)										
Azoles	Fluconazole (n = 35)	100%												1 (2.9%)	3 (8.6%)	25 (71.4%)	6 (17.1%)
	Itraconazole [†] (n = 35)	N/A			4 (11.4%)	11 (31.4%)	19 (54.3%)	1 (2.9%)									
	Posaconazole [†] (n = 35)	N/A		8 (22.9%)	14 (40.0%)	11 (31.4%)	2 (5.7%)										
	Voriconazole [†] (n = 35)	N/A						5 (14.3%)	28 (80.0%)	2 (5.7%)							
	Isavuconazole [†] (n = 35)	N/A		2 (5.7%)	17 (48.6%)	14 (40.0%)	2 (5.7%)										

*Tentative breakpoint values, see <https://www.cdc.gov/fungal/candida-auris/c-auris-antifungal.html>

[†]No breakpoints available. Consider using fluconazole susceptibility as a surrogate for second generation triazole susceptibility assessment. However, isolates that are resistant to fluconazole may respond to other triazoles occasionally.



Where we stand today



**OVER 14,731 SWABS
COLLECTED FROM 112
DIFFERENT FACILITIES**



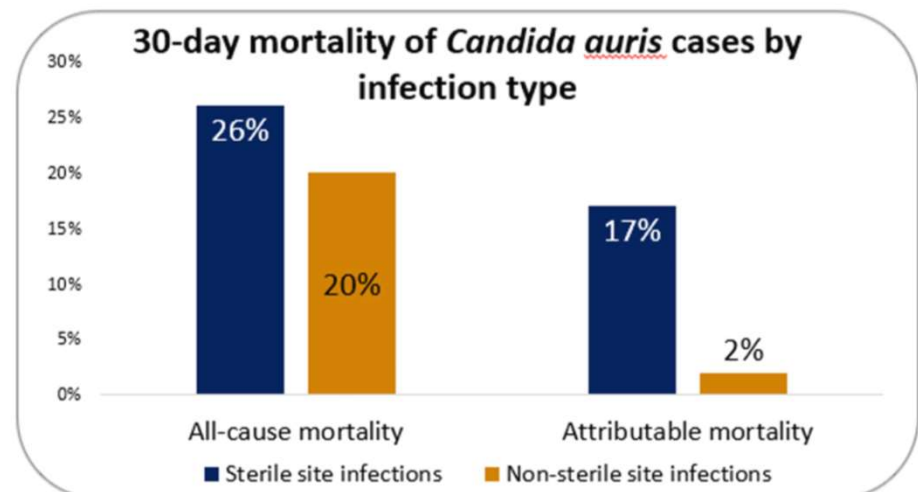
**OVER 100 SITE VISITS
COMPLETED**



**2,800+ TOTAL CASES IN LAC,
MOST FROM 28 OUTBREAKS**

Attributable mortality and cause of death of *Candida auris* cases, Los Angeles County

- 2,055 total cases between January 2020 and March 2023
- 1080 cases (52%) had death certificate as of March 2023
- Attributing mortality to *C. auris*:
 - 70 deaths had sterile site cultures for *C. auris* (mortality rate 3% total cases)
 - 960 deaths had non-sterile site cultures (colonized)



17% of cases with sterile site infections died within 30 days due to their infection.



Why is *Candida auris* spreading so quickly?





Spread of *C. auris* in healthcare settings

- Skin colonization of patients
 - 12% of close long-term care contacts of cases (ie. shared room) tested positive for *C. auris*¹ (21% in India).
 - Colonization can happen after just a few hours or days.²
 - 2% CHG bathing unreliable for eradication.
- Poor infection control
 - Environmental contamination
 - Hand hygiene (hands + in 2.8% of HCW in India OB)
- Poor communication between facilities

1. Tsay MMWR 2017. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5657645/>

2. Biswal M. J Hosp Infect. <https://www.sciencedirect.com/science/article/pii/S0195670117305133>

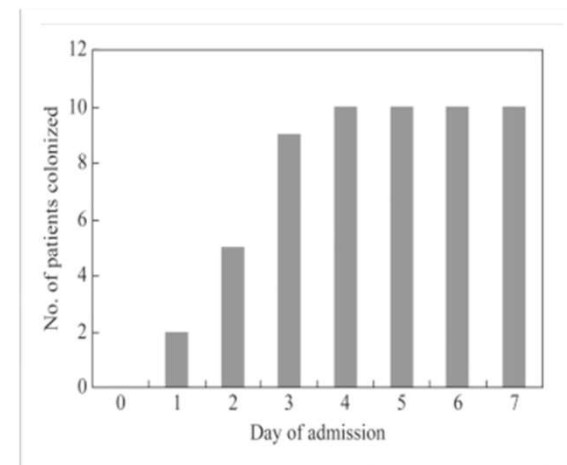


Figure 3. Time to *Candida auris* acquisition after intensive care unit admission.



Environmental contamination

- Environmental contamination common in environmental sampling
 - hallways outside patient rooms
 - Beds
 - Shared mobile equipment
 - Shared thermometers
- Organism persists
 - Persists on moist surfaces, linen, dry metal disks x 7 days
 - Persists on dry plastic coupons x 14 days



Poor infection control practices

- Poor screening/identification of cases
- Poor hand hygiene compliance in facilities
- Poor environmental cleaning
 - Bad processes
 - Wrong disinfectants
 - No plan to clean shared equipment
- Poor interfacility communication



Prevention of *Candida auris*





Institutional actions to prevent *C. auris* transmission for LA County

- Reporting all cases of *C. auris* (true for CDPH also)
- Laboratory surveillance
- Admission screening from high-risk facilities:
 - High-risk facilities: LTACHs, vSNFs
 - Facilities experiencing outbreaks
- Infection prevention strategies
 - Transmission-based precautions (contact precautions)
 - EPA List P disinfectants
 - Contact precautions for hospitals, LTACHs, other facilities with outbreaks
 - Improve general infection control practices
 - Interfacility communication



Pesticide Registration

List P: Antimicrobial Products Registered with EPA for Claims Against Candida Auris

On this page:

- [Products on List P](#)
- [How to use List P products effectively](#)
- [How to check if a product is on List P](#)
- [Additional Resources](#)

Products on List P

The following products are registered for use with *Candida auris* (*C. auris*). EPA has reviewed laboratory testing data demonstrating that these products kill *C. auris*.

[C. auris](#)  is a fungus that can cause severe infections and spreads easily between patients. *C. auris* infections tend to occur in health care settings and can be resistant to antifungal drugs.

Prior to these products being registered, there were no antimicrobial pesticides registered specifically for use against *C. auris*.

How to Use List P Products Effectively

A product's effectiveness can change depending on how you use it. Disinfectants may have different directions for different pathogens. Follow the label directions for *C. auris*, including the contact time.

How to Check if a Product is on List P

Disinfectant products may be marketed and sold under different brand and product names. To determine whether EPA expects a given product to kill *C. auris*, determine whether its primary registration number is on this list:



Current *C. auris* Screening Recommendations

Required

- Report *C. auris* identified from any specimen source to local DPH
- Screen contacts when transmission is suspected or confirmed
- If your yeast identification system cannot reliably detect *C. auris*¹, send suspect isolates to LAC DPH PHL for confirmation

1. <https://www.cdc.gov/fungal/candida-auris/identification.html>

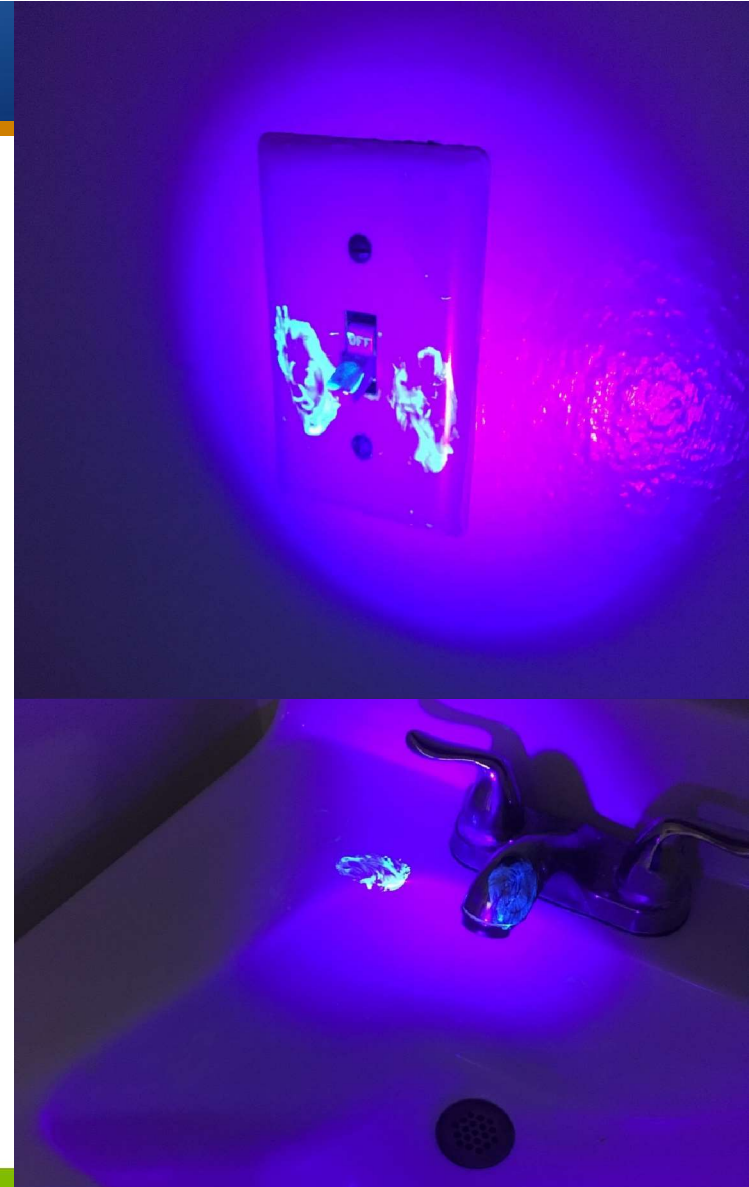
Recommended

- Perform admission screening
- Increase passive surveillance (speciate non-sterile *Candida* isolates)
- Identify a reliable, cost-effective yeast identification method
- Perform antifungal susceptibility testing

Environmental Assessments

1. Identify a few rooms that have not been cleaned
2. Place fluorescent marker on several high touch surfaces in those rooms, such as:
 - Bed rail
 - Bedside table
 - Doorknob
 - Lightswitch
 - Sink
3. Have staff perform routine cleaning
4. Return prior to exit interview to see where the fluorescent marker remains after cleaning

Slide Credit: Ellora Karmarkar





Monthly LA County MDRO Newsletters



MDRO UPDATE FOR IPs LOS ANGELES COUNTY DEPARTMENT OF PUBLIC HEALTH 5/3/23

PURPOSE

This update informs Los Angeles County (LAC) healthcare staff as to which healthcare facilities' (HCFs) admissions should be monitored for multi-drug resistant organism (MDRO) transmission, and provides links to more guidance.

This document is meant for internal purposes only and should not be shared externally.

HEALTHCARE FACILITIES TO MONITOR

The following HCFs are currently experiencing transmission of the specified MDRO*. In addition, LACDPH considers all patients discharged from any long-term acute care hospital (LTACH) or skilled nursing facility (SNF) subacute unit to be at high-risk for *C. auris* or other MDRO colonization. A list of these facilities can be found [here](#). For persons discharged from any of these locations, verify their MDRO status and screen if needed. *Note that inclusion on the facility list below does not necessarily reflect the quality of care delivered on-site.

YIM-CRPA
Granada Post Acute

Multiple-CPOs
Western Convalescent

NDM-CRAB IN LAC

LACDPH identified the first case of NDM-producing carbapenem-resistant *Acinetobacter baumannii* (CRAB) in Los Angeles County. In addition, CDPH has identified cases of NDM-CRAB in neighboring Southern California jurisdictions. Investigations are underway to determine if transmission is ongoing. In response to this, LACDPH recommends that HCFs implement admission screening for carbapenemase-producing organisms (CPOs). As a reminder, please report CP-CRAB and other CPOs within 1 working day. See attached [CPO FAQs](#) and the original CDPH [CAHAN regarding the NDM-CRAB outbreak in 2021](#) for more details.

REMINDERS

All carbapenemase-producing organisms (CPOs) and suspect pan-resistant (pan-R) gram-negative organisms are [laboratory reportable](#) conditions and should be reported to DPH within one working day. Please verify with your laboratory that these identifications are being reported via electronic laboratory report (ELR) and if not, please report via [REDCap](#) until ELR transmission is implemented.

QUESTIONS? CONTACT THE LACDPH HEALTHCARE OUTREACH UNIT AT HAIPH@LACOUNTY.GOV OR 213-240-7941



QUARTERLY MDRO UPDATE #8 LOS ANGELES COUNTY DEPARTMENT OF PUBLIC HEALTH 11/01/21

HIGHLIGHTED IN THIS ISSUE

- CP-CRPA
- LAC MDRO Reporting (pg. 8)
- *Candida auris* update (pg. 9)

SUMMARY

Management of all CRPA infections can be challenging. It is particularly important to know when and how to identify CP-CRPA in order to contain their spread.

KEY RESOURCES

[LA County N-MDRO Home Page](#)

[LA County Reportable Disease List](#)

[CDPH CRAB&CRPA Quicksheet](#)

[CDC MDR *P. aeruginosa* data](#)

[CDC CRPA data](#)

[CDC Urgent AR Threats Report \(2019\)](#)

[CDC HAI Lab Resources Home Page](#)

Note: When calling 213-240-7941 to report MDROs (which is currently routed to a COVID-19 Call Center), please state that you are calling to report an MDRO.

MESSAGE FOR CLINICAL LABORATORIES

This issue focuses on a specific MDRO, carbapenem-resistant *Pseudomonas aeruginosa* (CRPA). Like other carbapenem-resistant gram-negative bacilli, CRPA are often resistant to many other antimicrobial agents and treatment of patients with CRPA infections can be challenging. In addition, carbapenemase-producing (CP)-CRPA is considered to be an urgent public health threat. It is important to use reliable antimicrobial susceptibility test (AST) methods to detect and report CRPA, and to take appropriate measures to contain the spread of CRPA.

We welcome feedback on this Newsletter, previous Newsletters or any other issue related to MDROs (mail hai@ph.lacounty.org).

Previous Newsletters can be found by clicking the links below:

Issue	Featured Content
1 (link)	• Identifying and Reporting <i>C. auris</i> • Resources for testing for <i>C. auris</i>
2 (link)	• Antifungal susceptibility testing of <i>C. auris</i> • Validating MALDI-TOF for <i>C. auris</i>
3 (link)	• Case Study: A team approach to containing <i>C. auris</i> • The Antibiotic Resistance Lab Network
4 (link)	• Passive surveillance systems for <i>C. auris</i> • Updated resources for testing for <i>C. auris</i>
5 (link)	• Multi-Drug Resistant Organisms
6 (link)	• Carbapenem-resistant <i>A. baumannii</i> (CRAB) • NDM-CRAB outbreak in Northern California • Testing methods for carbapenemases
7 (link)	• <i>C. auris</i> update

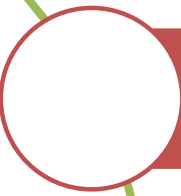


Investigation of *C. auris* in LA County

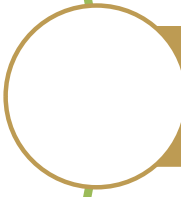




What the HOU Investigates



Outbreaks/clusters in any setting



Single cases of “atypical” *C. auris*



Single cases from high-risk facilities



What to expect from LACDPH during a *C. auris* outbreak

What we will do:

- Conduct an on-site infection control assessment to identify gaps & make recommendations
- Conduct serial PPS until transmission controlled
- Require use of an inter-facility transfer form
- Provide guidance, resources, sample policies & templates
- Identify epidemiological links between cases

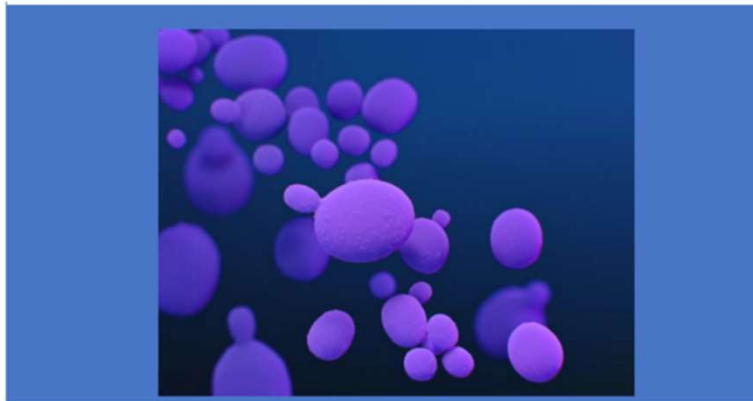
What we will NOT do:

- Close facilities to admissions

1. <https://www.cdc.gov/drugresistance/ar-lab-networks/domestic.html>



Mitigating the Spread of *Candida auris* in Los Angeles County





Resources





Additional Resources

- LACDPH
 - Healthcare Outreach Unit (HOU): <http://publichealth.lacounty.gov/acd/HOU.htm>
- CDPH Healthcare-Associated Infections (HAI) Program
 - Antimicrobial Resistance (AR) page:
<https://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/AntimicrobialResistanceLandingPage.aspx>
- CDC
 - Novel MDRO Containment Guidance: <https://www.cdc.gov/hai/containment/guidelines.html>
 - Laboratory Outreach Communication System (LOCS) for Outbreak & Response:
https://www.cdc.gov/csels/dls/preparedlabs/outbreak_and_response.html



Questions?

Email us anytime! hai@ph.lacounty.gov
Healthcare Outreach Unit
Acute Communicable Disease Control Program
Los Angeles County Department of Public Health

