



# Chicago Department of Public Health's Strategy for the Prevention and Containment of *Candida auris*

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Healthcare and Congregate  
Settings**



# Outline

## 1. Background

- *Candida auris* 101
- National and Local Burden

## 2. Traditional Surveillance

- Required Reporting
- Screening and Point Prevalence Surveys (PPS)

## 3. Advanced Testing and Surveillance

- Whole Genome Sequencing
- Waste Water Surveillance

# Background

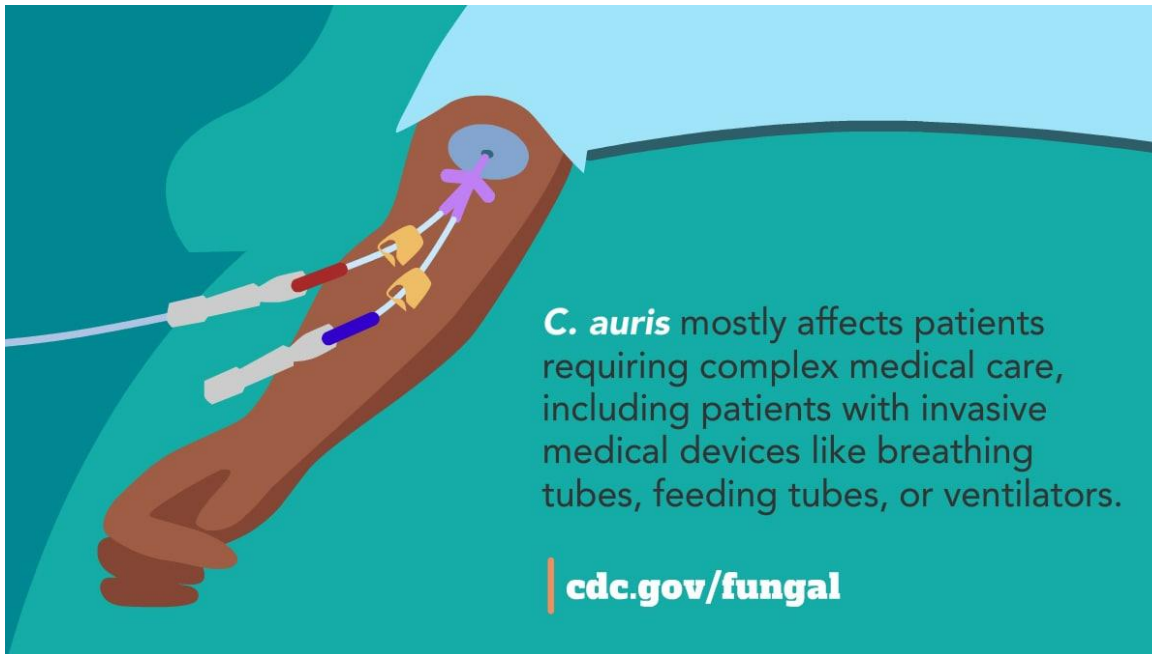
# ★ *Candida auris* (*C. auris*)

- *C. auris* is a type of yeast that can cause severe illness and is easily spread among patients in healthcare facilities.
- Symptoms of *C. auris* depend on the type of infection (i.e., bloodstream or wound).
- *C. auris* is often resistant to one or more antifungals. Some strains are resistant to all three main classes of antifungals.





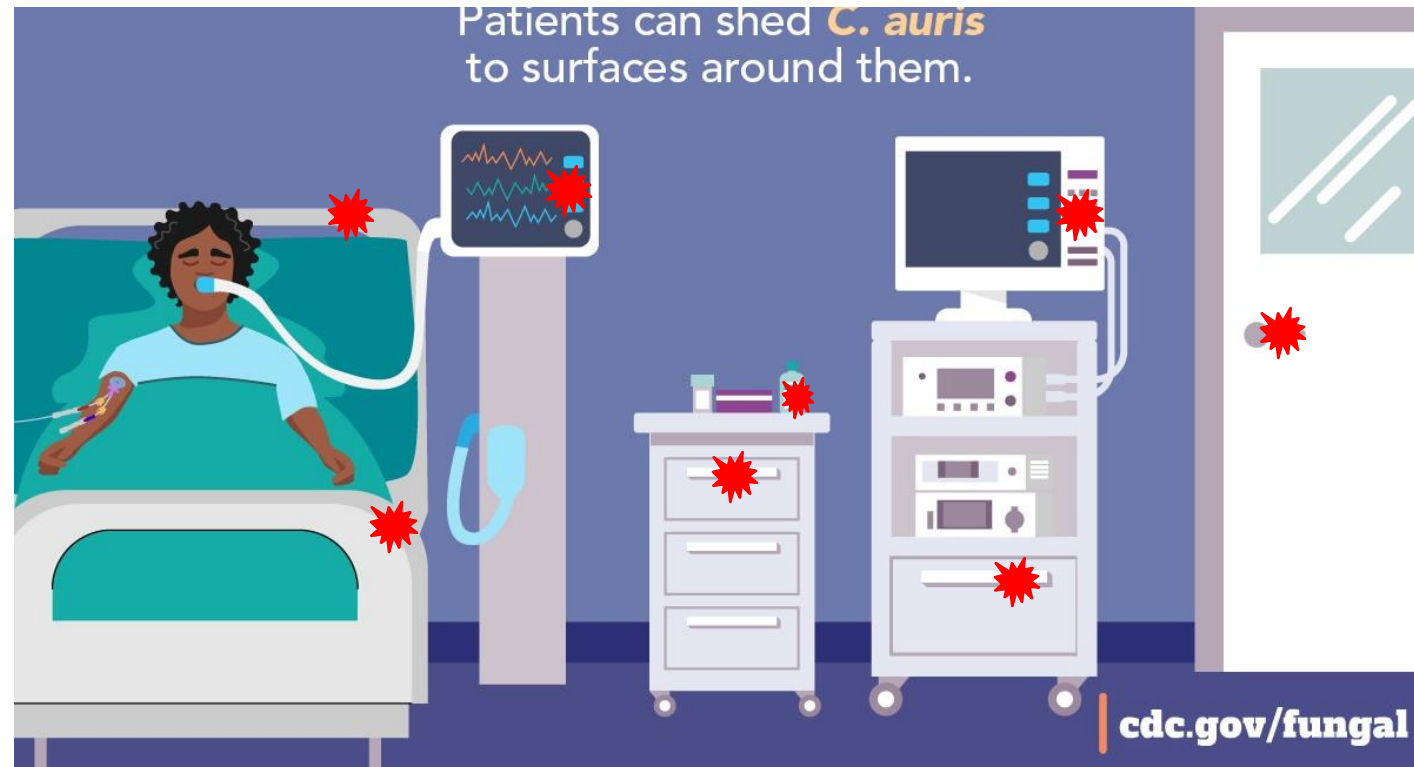
# *C. auris*



- Clinical = invasive infection
- Colonized/Screening = lives on the skin, asymptomatic
- Mortality rate of clinical cases ~ 30% - 50%



# *C. auris* is found on high-touch surfaces



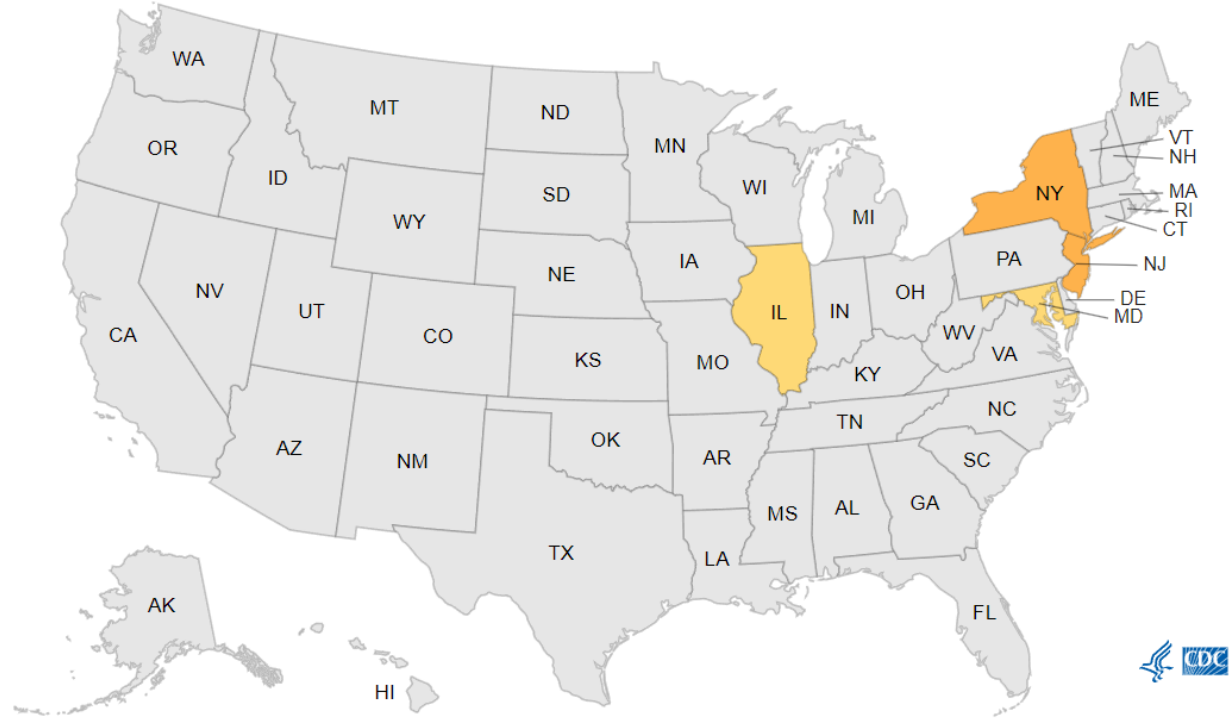


# Clinical cases of *C. auris* 2013-2016

## Clinical Cases of *C. auris* Reported in the U.S.

Make a selection from the filters to change the visualization information.

2013-2016 ▾



### Legend

In 2013-2016, there were 63 clinical cases. There were an additional 14 screening cases not shown on map.

- 0 clinical cases and at least 1 screening case
- 1 to 10
- 11 to 50
- 51 to 100
- 101 to 500
- 501 to 1000
- 1001 or more



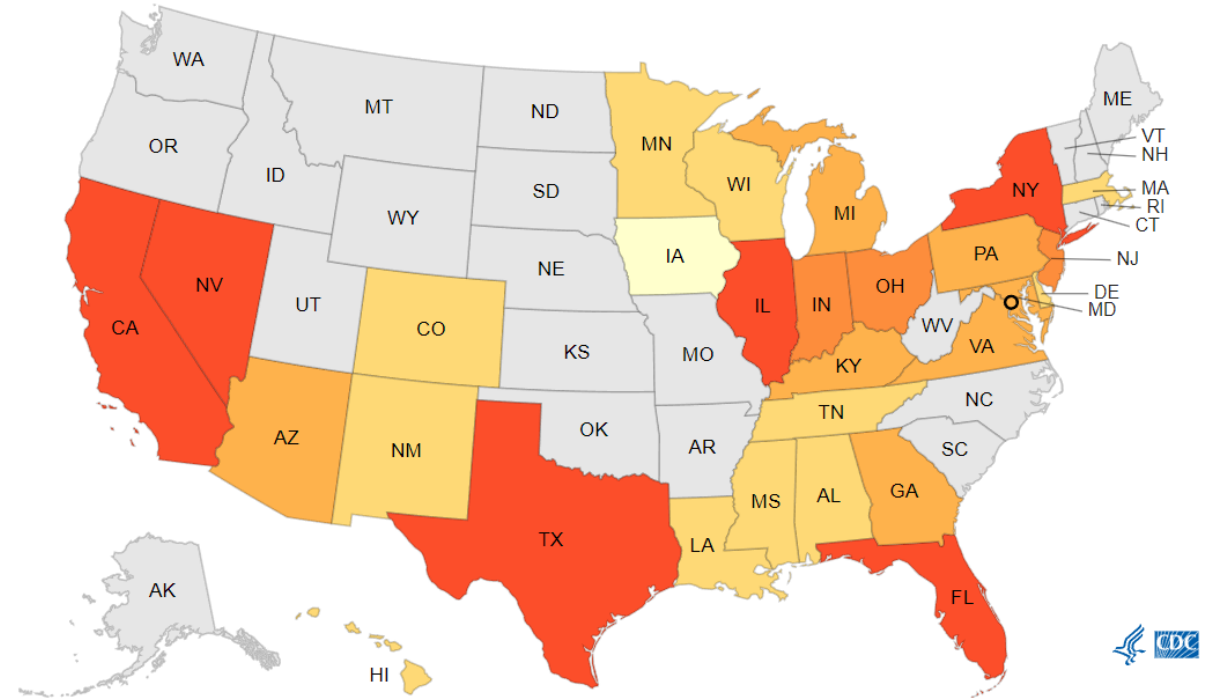


# *C. auris* disease burden has grown steadily in recent years.

## Clinical Cases of *C. auris* Reported in the U.S.

Make a selection from the filters to change the visualization information.

2022



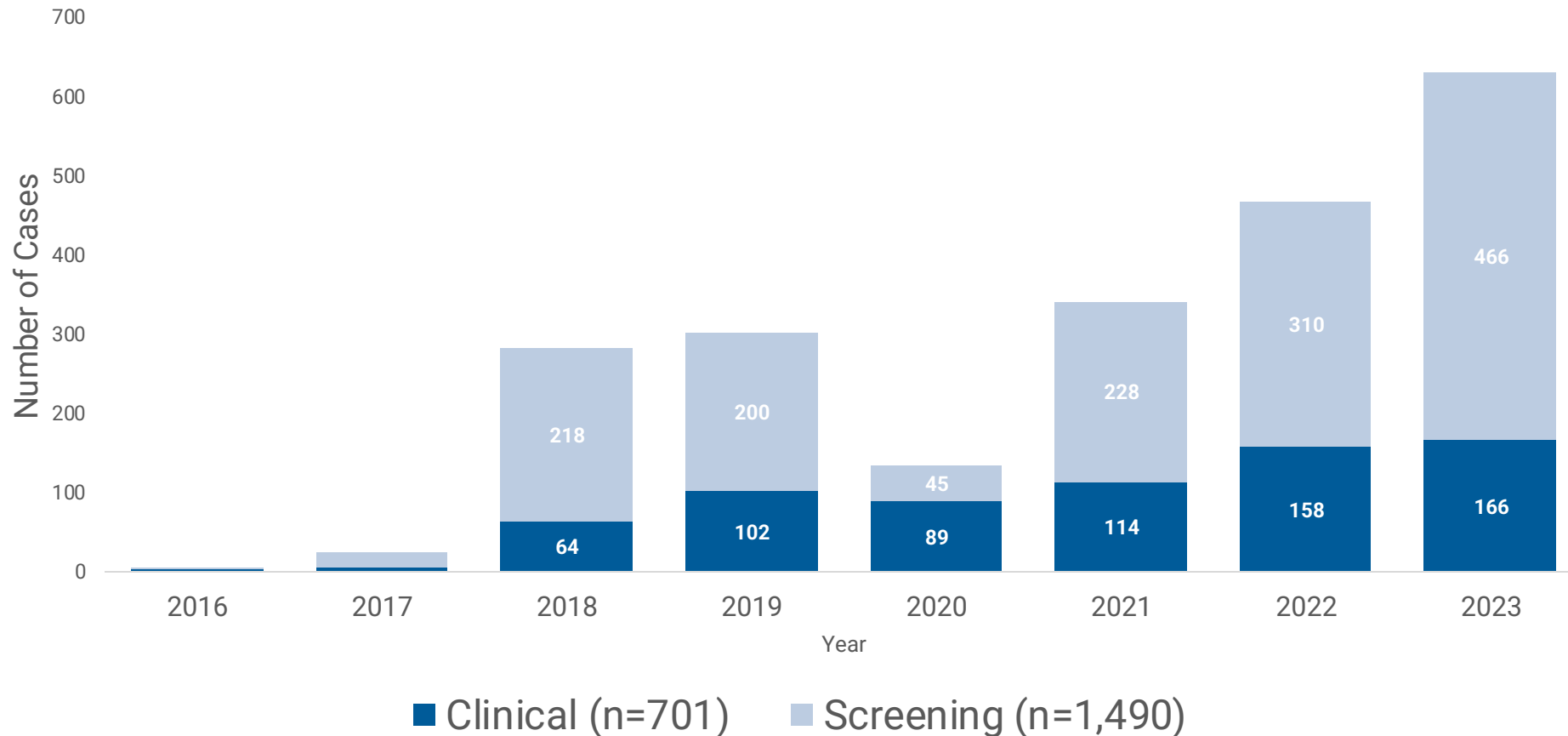
### Legend

From January 1 to December 31, 2022, the most recent full year of data reported, there were 2,377 clinical cases. There were an additional 5,754 screening cases not shown on the map.

- 0 clinical cases and at least 1 screening case
- 1 to 10
- 11 to 50
- 51 to 100
- 101 to 500
- 501 to 1000
- 1001 or more



# *C. auris* (Clade IV) was first identified in Chicago in 2016 and continues to increase



# Traditional Surveillance

# *C. auris* surveillance

Routine and response  
screening

Prevention screening

Admission screening

Reporting by facilities

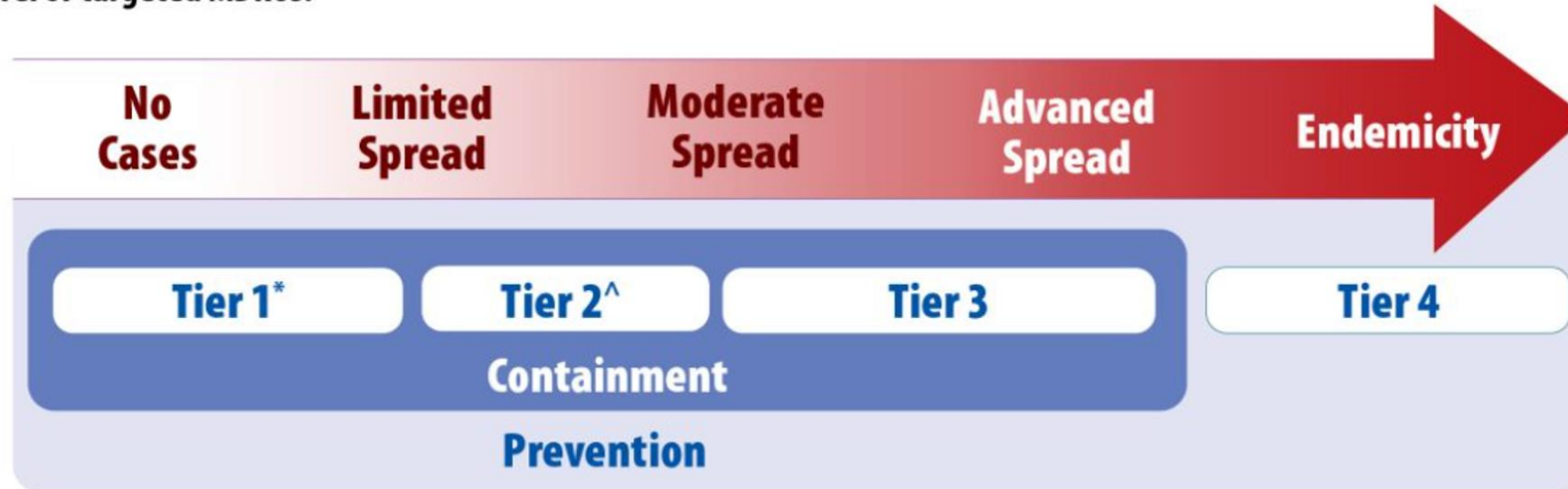
# ★ *C. auris* Surveillance

- The Extensively Drug Resistant Organism (XDRO) Registry
- The purpose of the XDRO registry is to **improve surveillance** and to **facilitate inter-facility communication**



# Strategies to prevent *C. auris* from spreading to low-burden facilities

Figure 1. Relationship between epidemic stages, response tiers, containment response, and prevention activities for novel or targeted MDROs.



Organism or resistant mechanism that have

\*Never (or very rarely) been identified **in the United States** and for which experience is extremely limited are Tier 1.

^Never (or very rarely) been identified **in a public health jurisdiction but are more common in other parts of the U.S.** are Tier 2.

# ★ Point Prevalence Surveys (PPS) of *C. auris*

- A testing event used to determine the proportion of patients in a facility that are infected or colonized by a certain organism.
- CDPH Supported PPSs

## Routine

Bi-annual at each ventilator-capable skilled nursing facility (vSNF) and long-term acute care hospital (LTACH)

## Response

During an outbreak response (e.g., hospital ICU) or when *C. auris* is identified in a new setting (e.g., skilled nursing facility)

## Prevention

Skilled nursing facilities (SNFs) are selected based on patient transfer network analysis.

# ★ CDPH partners with public and academic organizations to maintain our robust screening and outbreak response efforts

## Laboratory Support



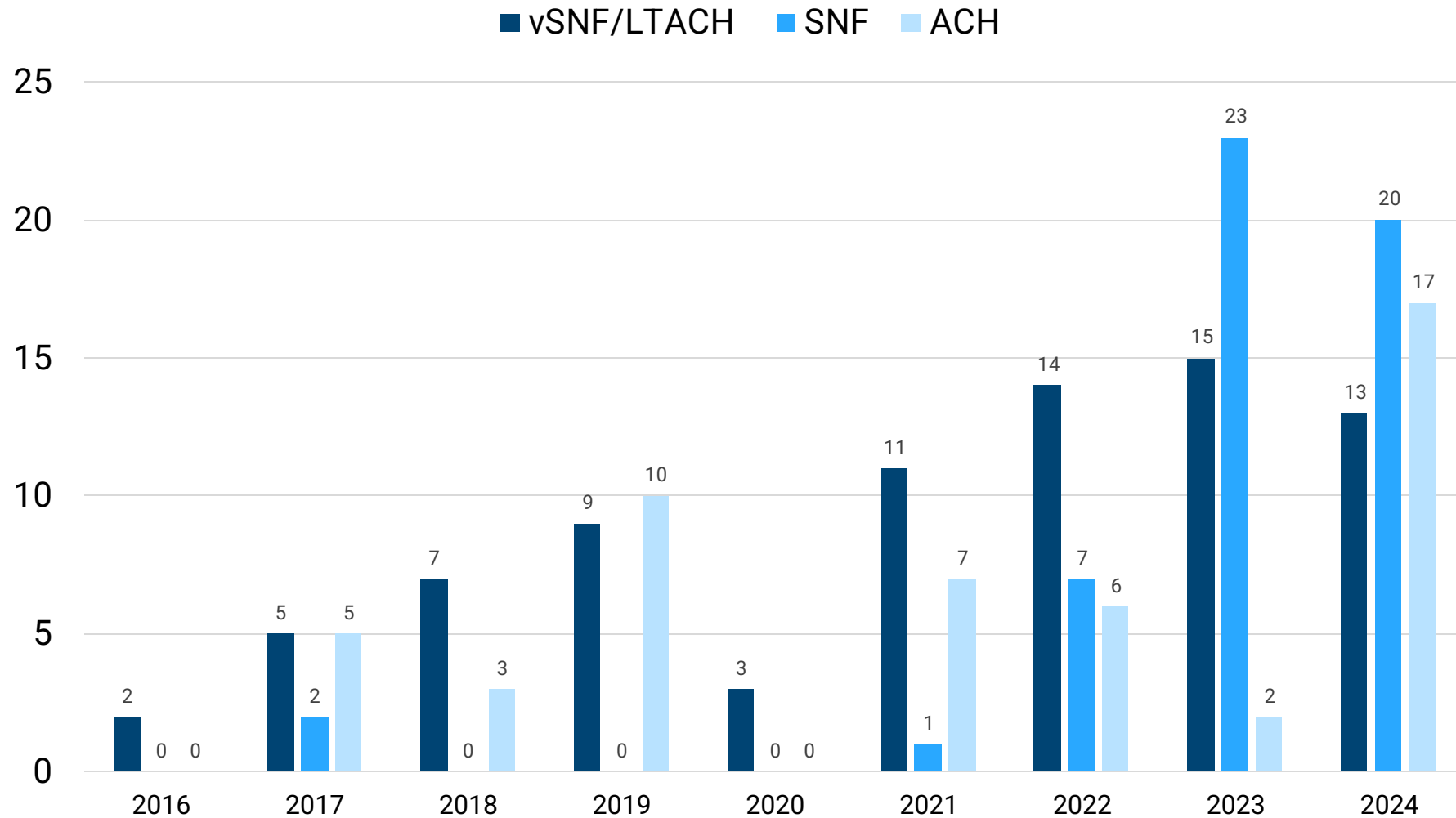
Wisconsin State  
Laboratory of Hygiene  
UNIVERSITY OF WISCONSIN-MADISON



## Clinical & Logistical Support



# CDPH Supported PPSs by Facility Type from 2016-2024







# Advanced Testing and Surveillance

**Kelly Walblay, MPH**

**Senior Epidemiologist**

**Chicago Department of Public Health (CDPH) – Healthcare and Congregate Settings**

**Hannah Barbian**

**Genomic Epidemiologist, RIPHL**

**Assistant Professor, RUSH**



**RIPHL** | REGIONAL INNOVATIVE PUBLIC HEALTH LABORATORY



**Wisconsin State Laboratory of Hygiene**  
UNIVERSITY OF WISCONSIN-MADISON



# ★ Whole Genome Sequencing (WGS)



## What is WGS?

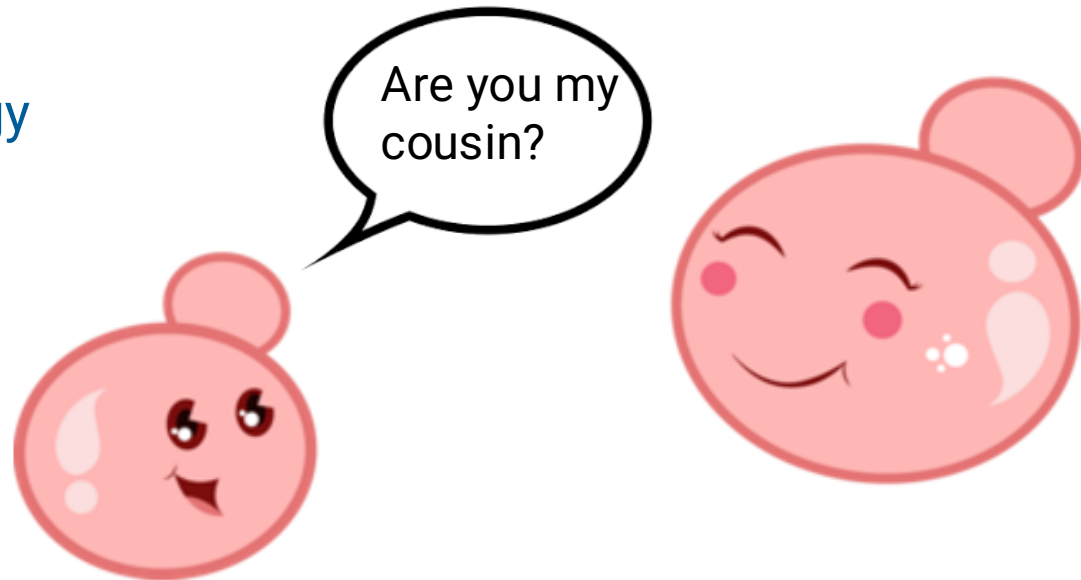
All organisms have a unique genetic code (aka DNA). WGS is a technology that identifies those unique sequences.

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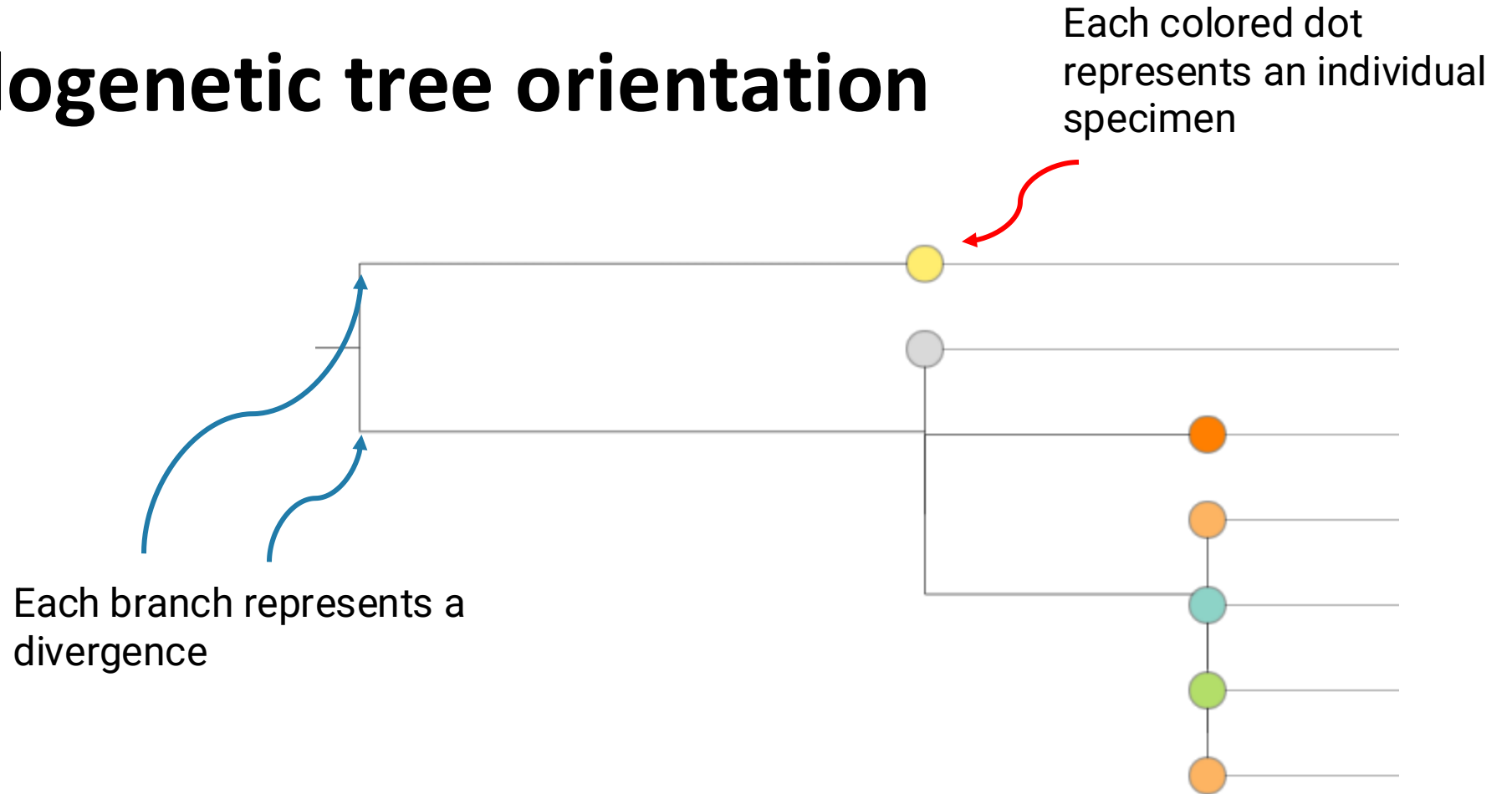
# ★ Whole Genome Sequencing (WGS)



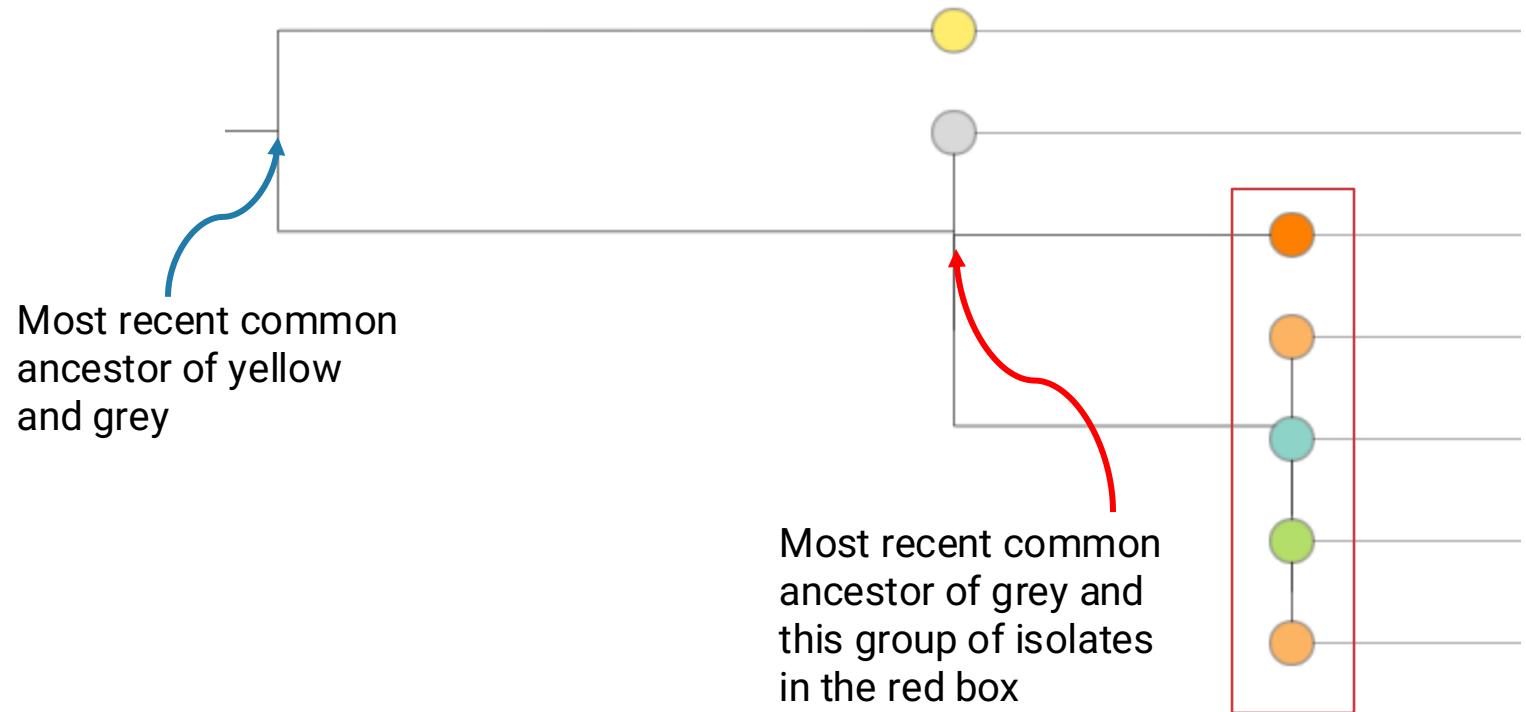
## Why Sequence *C. auris*?

- Describe the genomic evolution of *C. auris* in Chicago
- Provides evidence for intrafacility vs. interfacility transmission

# ★ Quick phylogenetic tree orientation

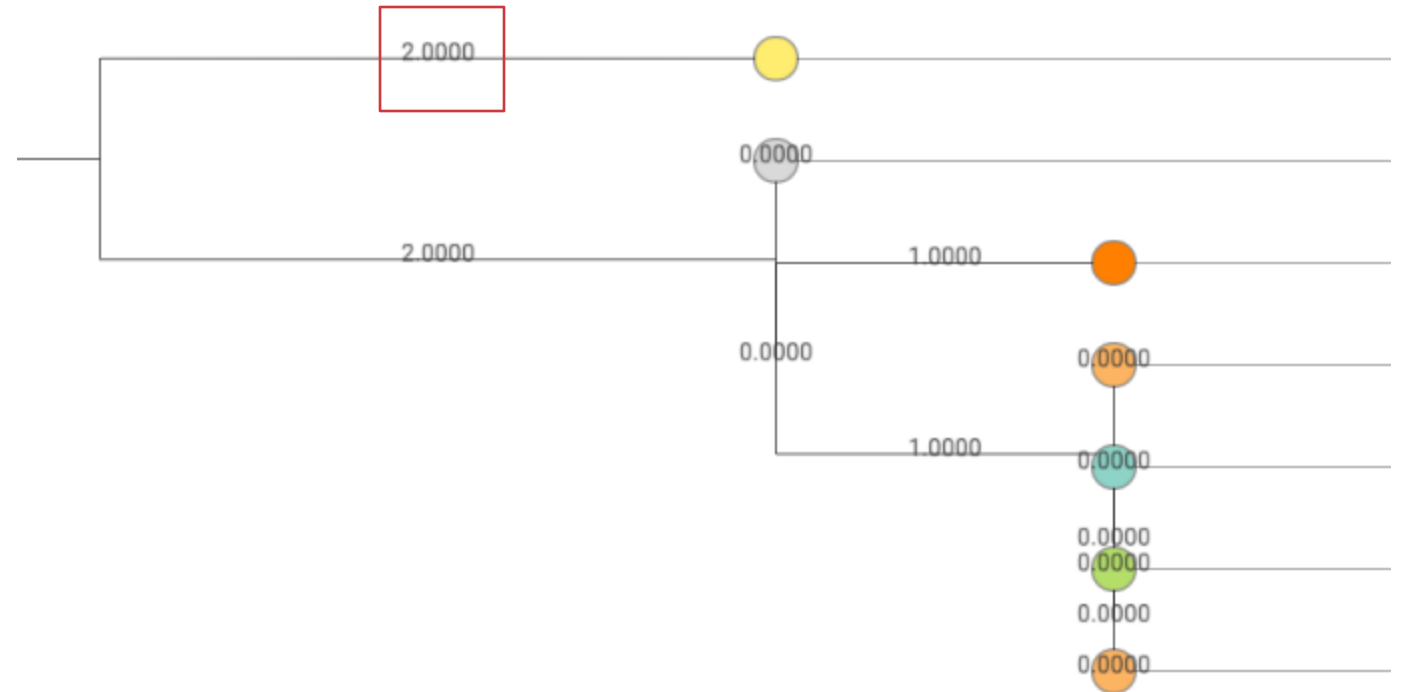


# ★ Quick phylogenetic tree orientation



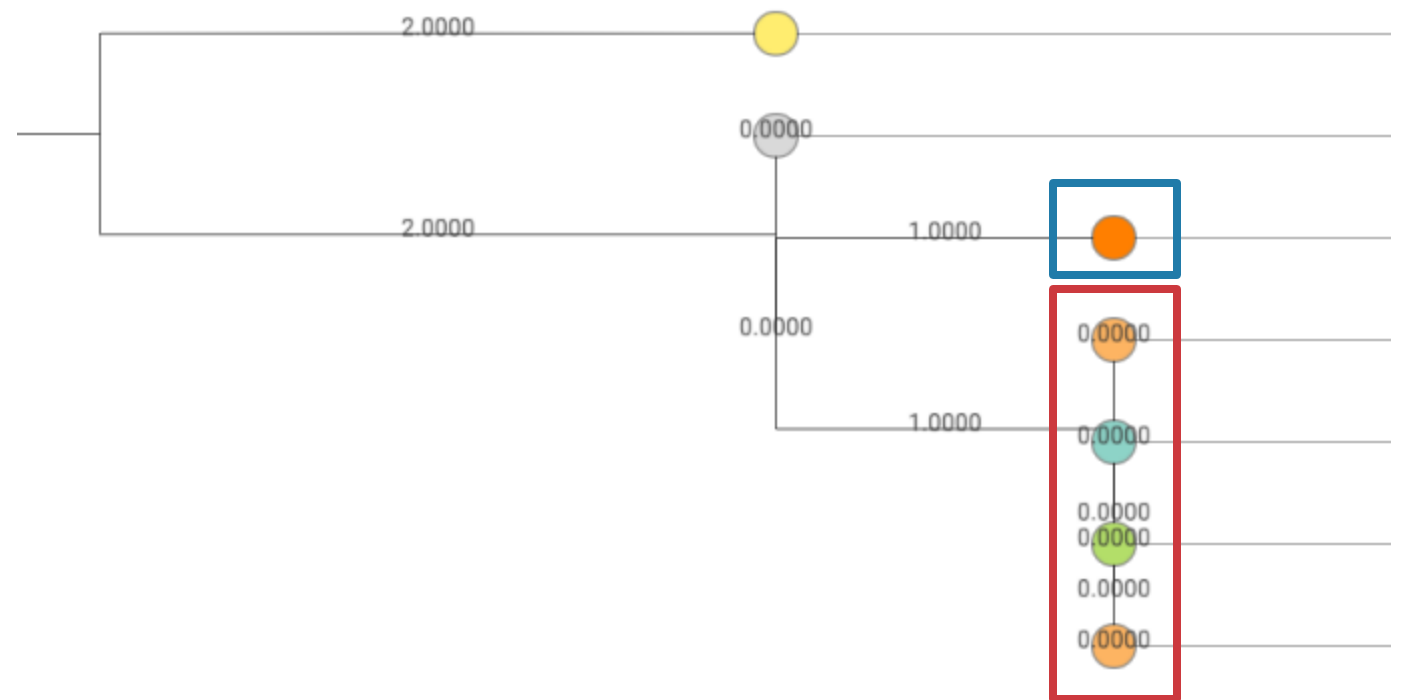
# ★ Quick phylogenetic tree orientation

- SNP differences represent the number of mutations between specimens
- Length of the horizontal line indicates the number of SNP differences



# ★ Quick phylogenetic tree orientation

- All the specimens in the red box are identical (i.e., zero SNP differences)
- There are two mutations (i.e., two SNP differences) between the specimen in the blue box and the specimens in the red box

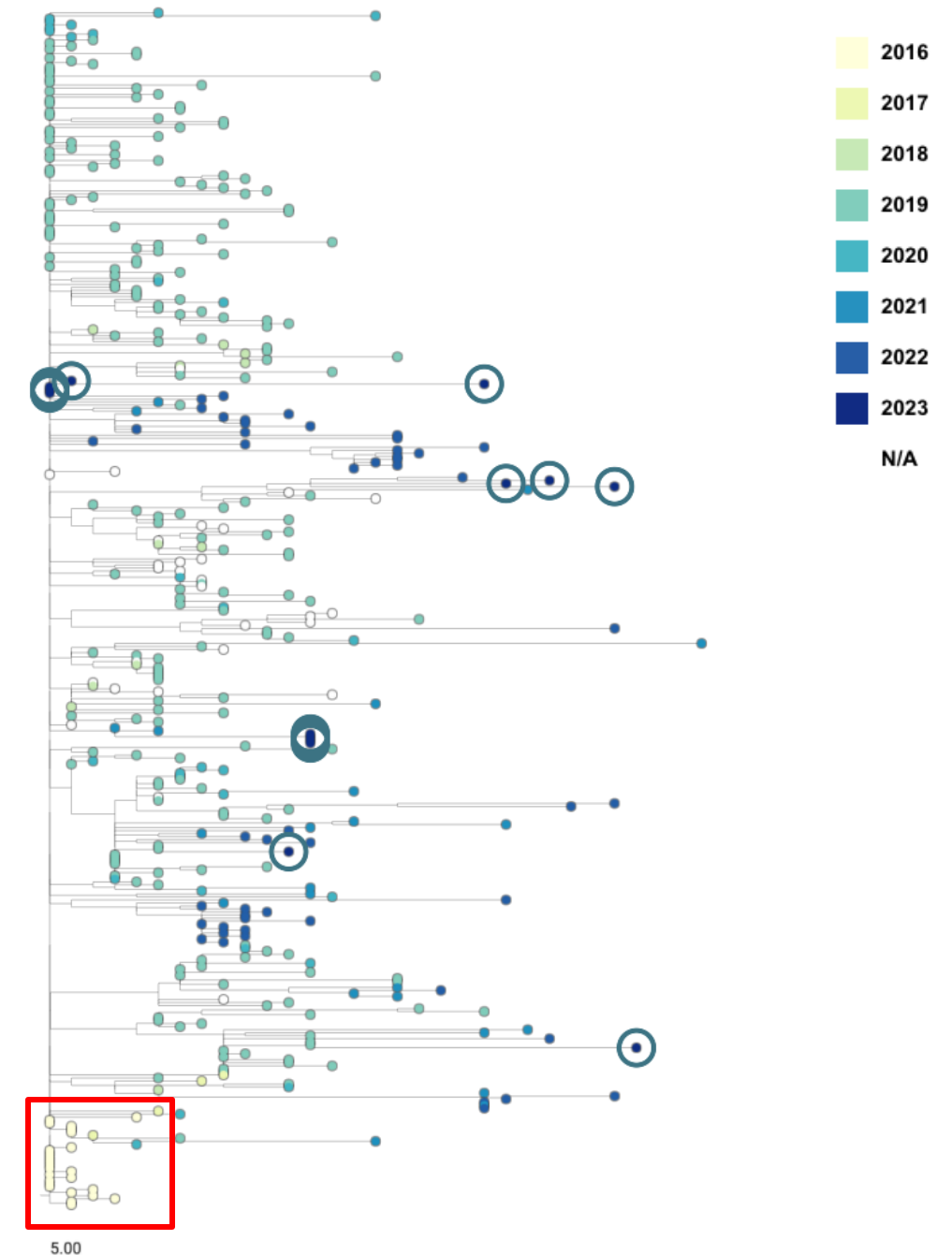






# The Genomic Evolution of *C. auris* in Chicago

- All Chicago specimens fall in a single clade (Clade IV) consistent with a **single introduction** of *C. auris* to Chicago.
- All Chicago specimens are within 123 SNPs from the first specimen that was sequenced in 2016 and subsequent specimens are within 20-30 SNPs of each other.



# ★ WGS for Outbreak Response

- **Intrafacility transmission = within the facility**

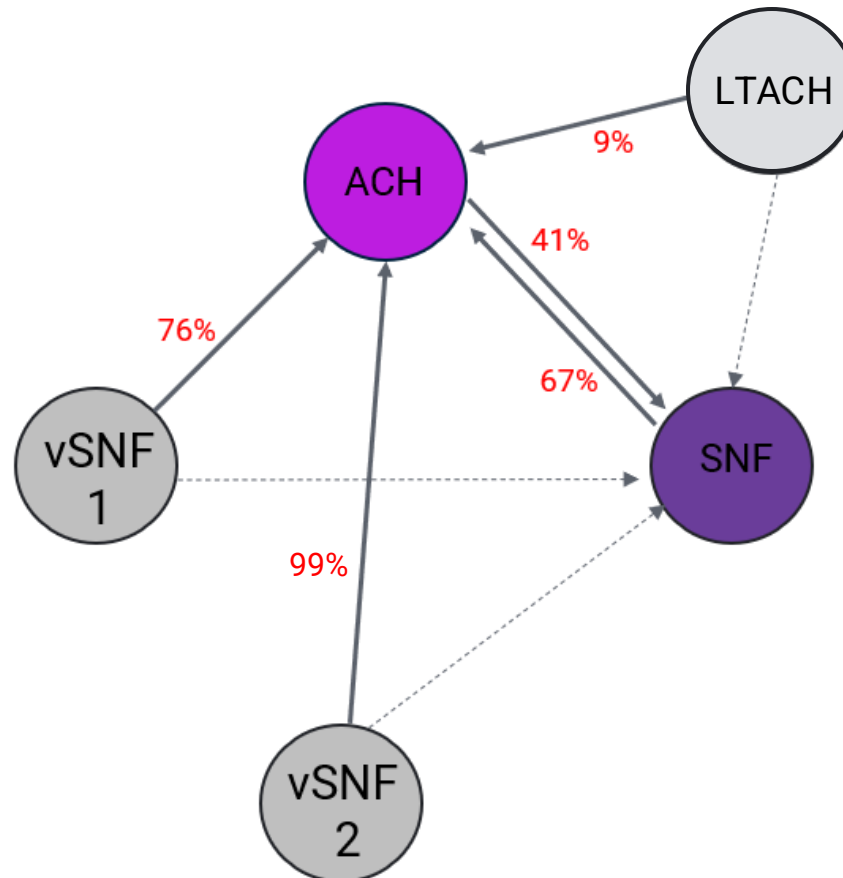


and/or



- **Interfacility transmission = facility to facility**






# ★ Patient Transfer Network

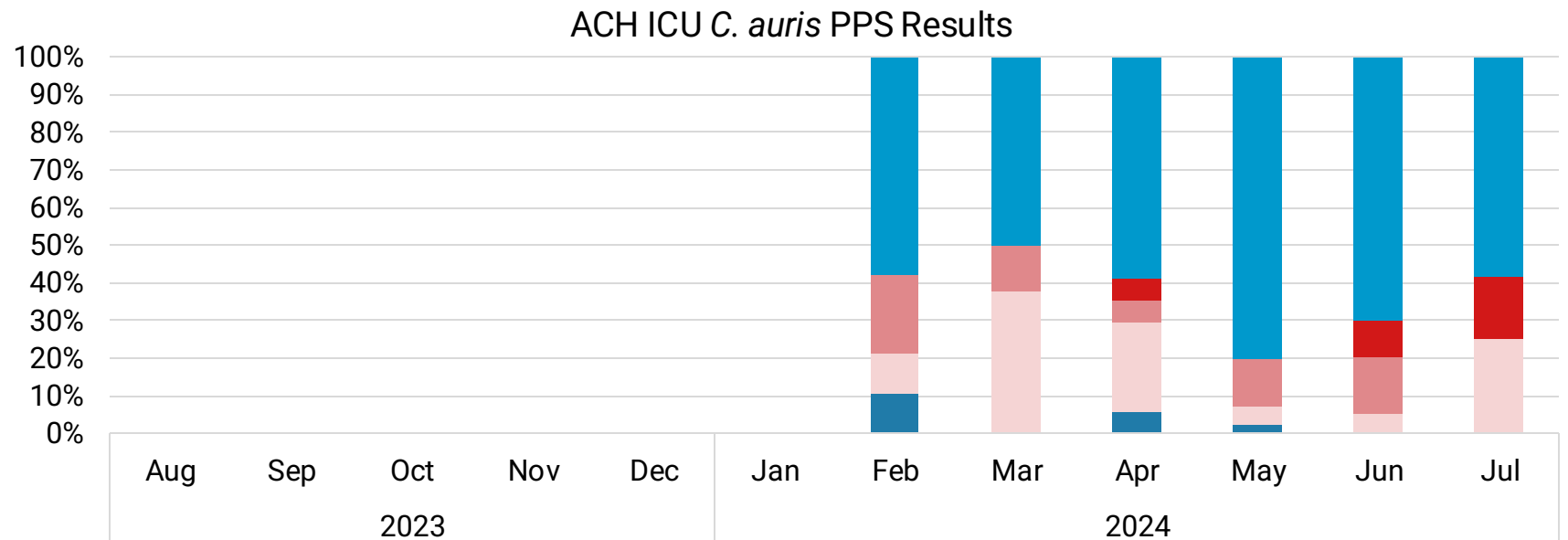
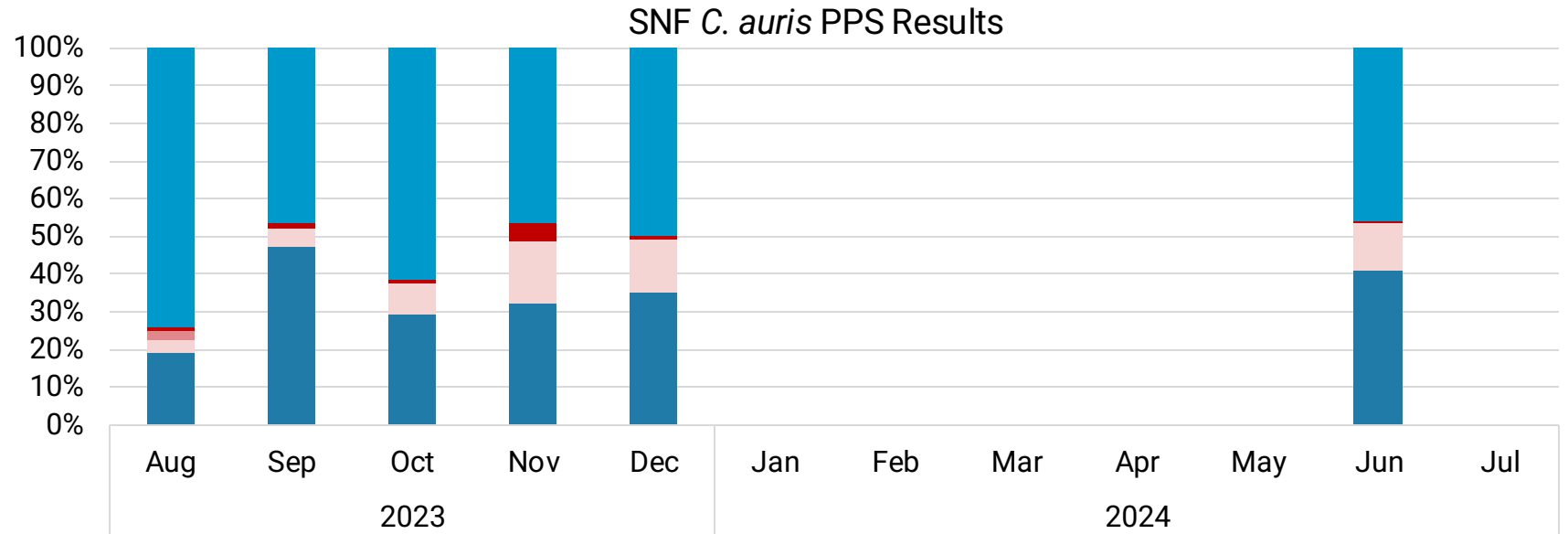


\*Not all facilities in the network are represented in this figure.

# Ongoing transmission after multiple PPSs



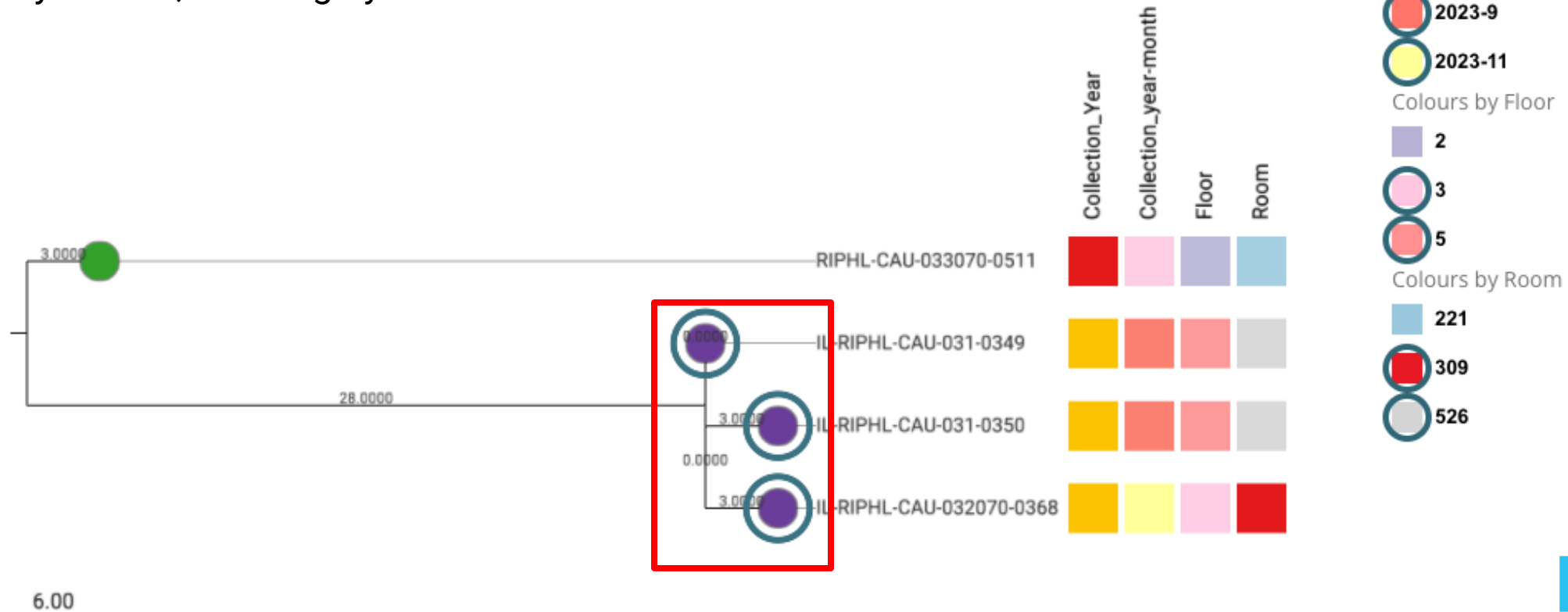
-  Negative
-  Newly identified positive with a previously negative test
-  Newly identified positive without a previously negative test
-  Previously known positive
-  Unknown colonization status





# Intrafacility Transmission

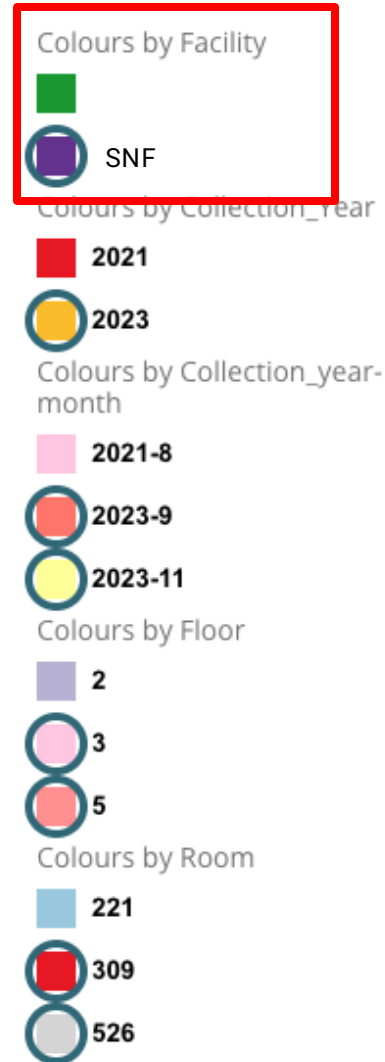
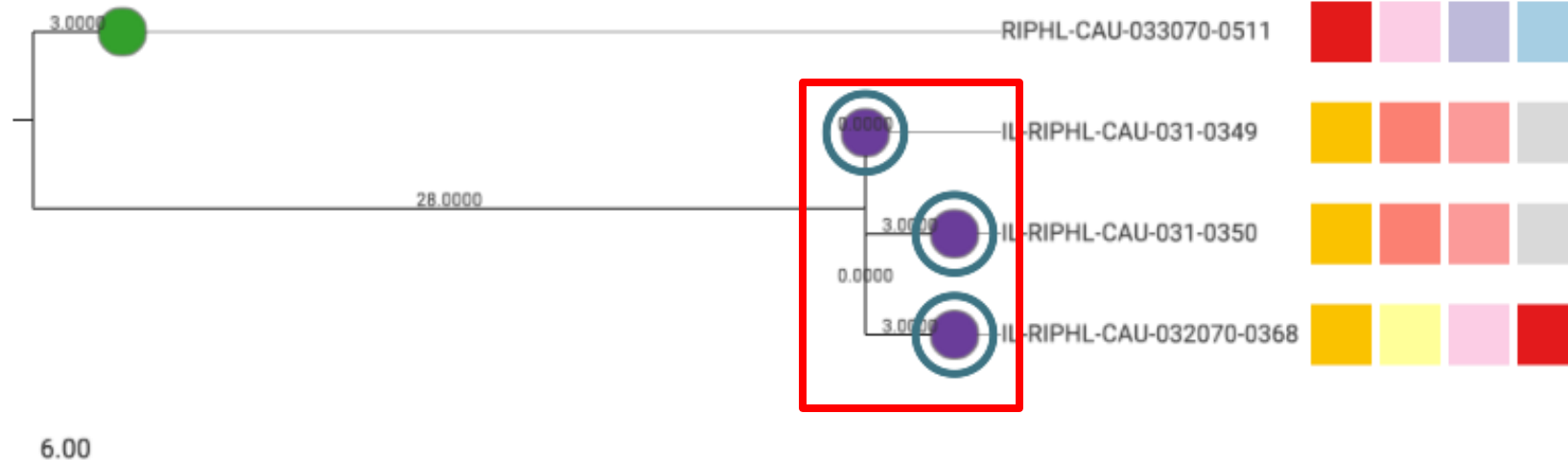
Three specimens from the SNF fall in a cluster and are closely related, differing by 3-6 SNPs





# Intrafacility Transmission

Three specimens from the SNF fall in a cluster and are closely related, differing by 3-6 SNPs





# Intrafacility Transmission



Collection_Year	Collection_year-month	Floor	Room
2021	2021-8	2	221
2023	2023-9	5	309
2023	2023-11	5	526
2023	2023-11	3	526

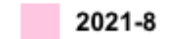
Colours by Facility



Colours by Collection\_Year



Colours by Collection\_year-month



Colours by Floor

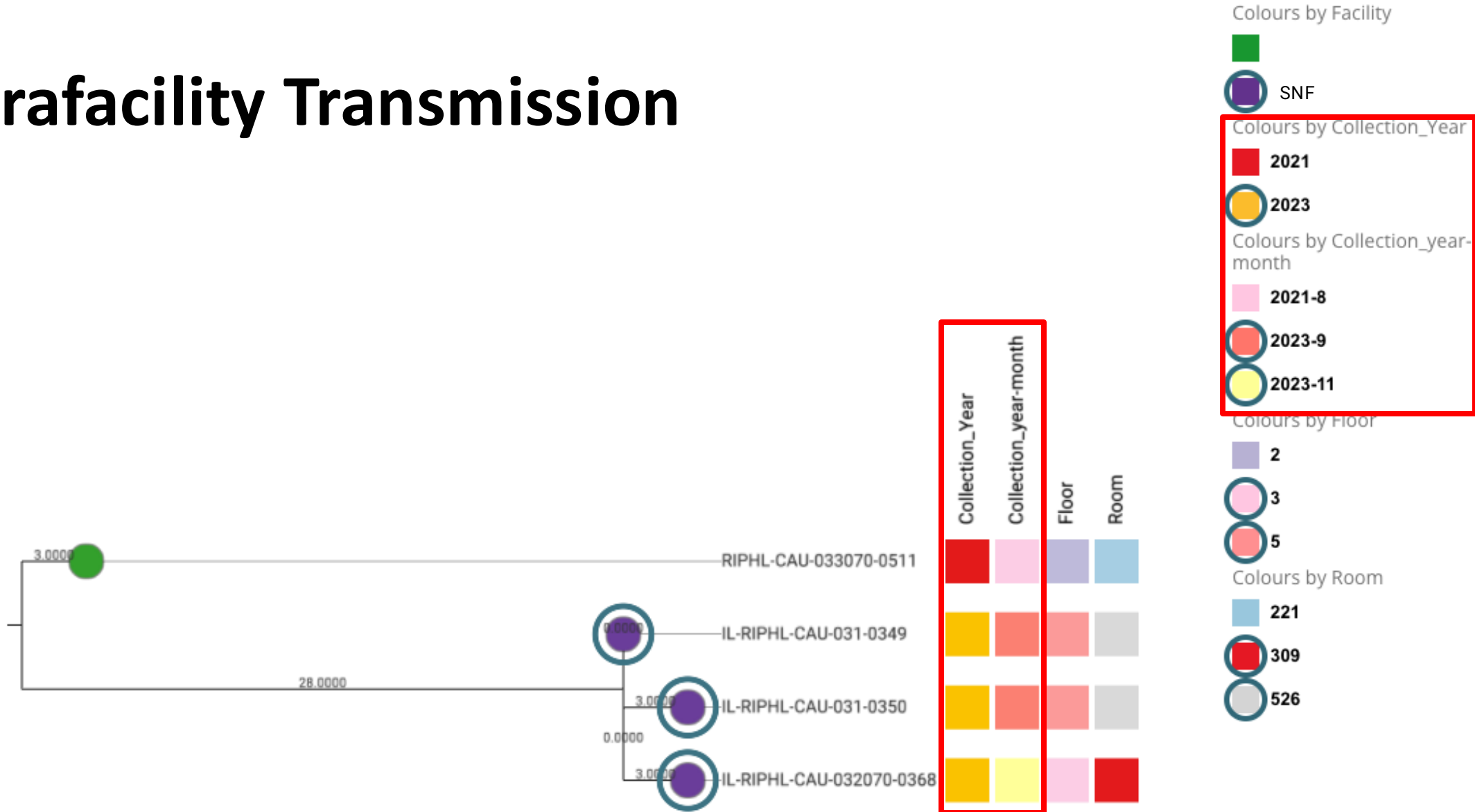


Colours by Room





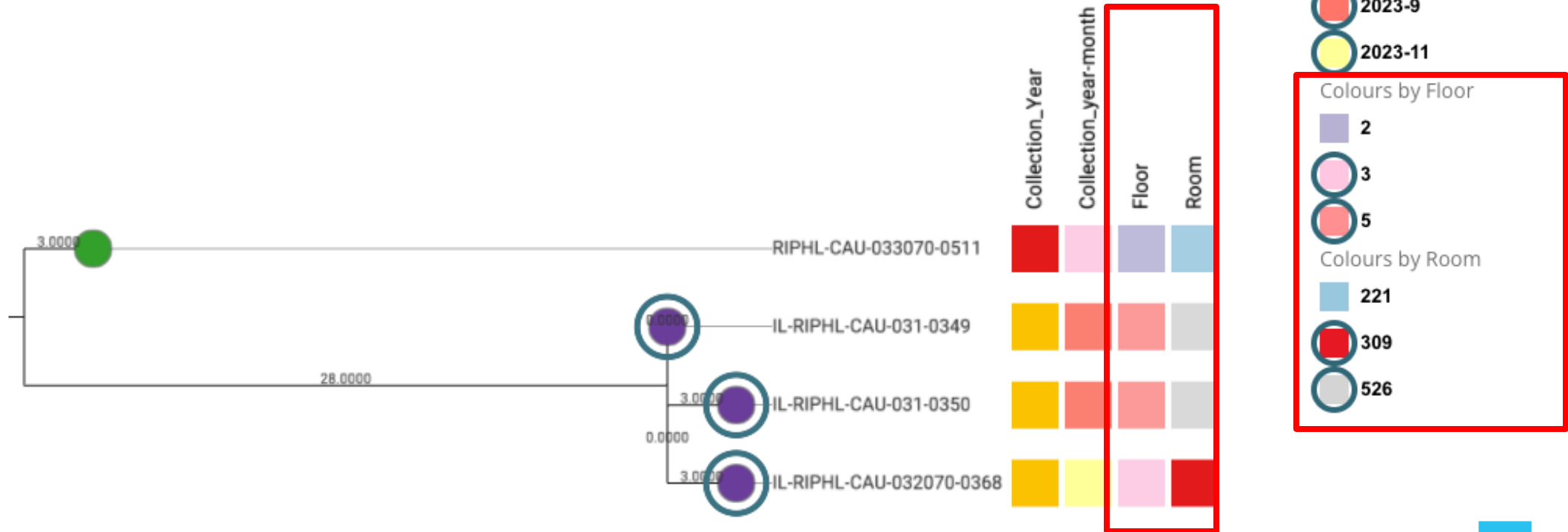
# Intrafacility Transmission







# Intrafacility Transmission



Colours by Facility

- Green square
- SNF (purple circle)

Colours by Collection\_Year

- 2021 (red square)
- 2023 (yellow circle)

Colours by Collection\_year-month

- 2021-8 (pink square)
- 2023-9 (red circle)
- 2023-11 (yellow circle)

Colours by Floor

- 2 (purple square)
- 3 (pink circle)
- 5 (red circle)

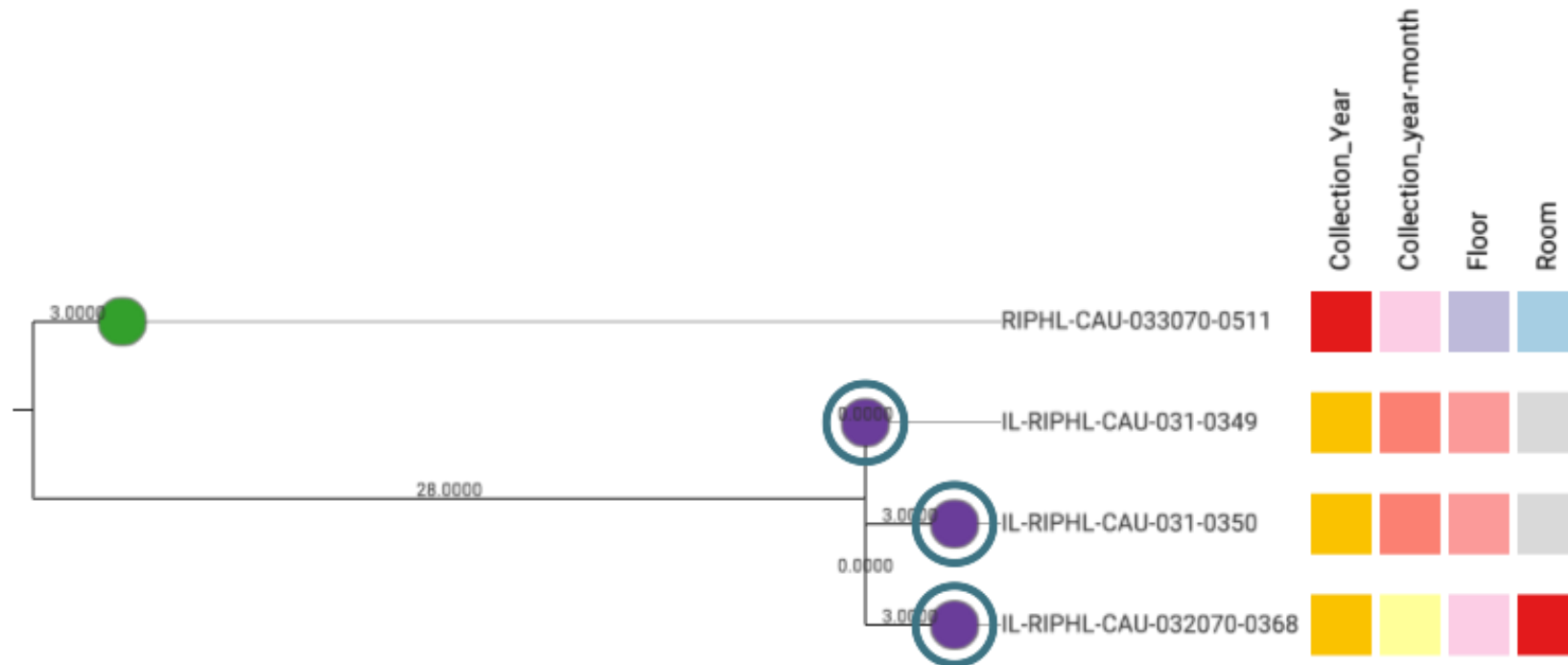
Colours by Room

- 221 (blue square)
- 309 (red circle)
- 526 (grey circle)



# Intrafacility Transmission

There are no close relatives to these 3 specimens



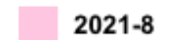
Colours by Facility



Colours by Collection\_Year



Colours by Collection\_year-month



Colours by Floor

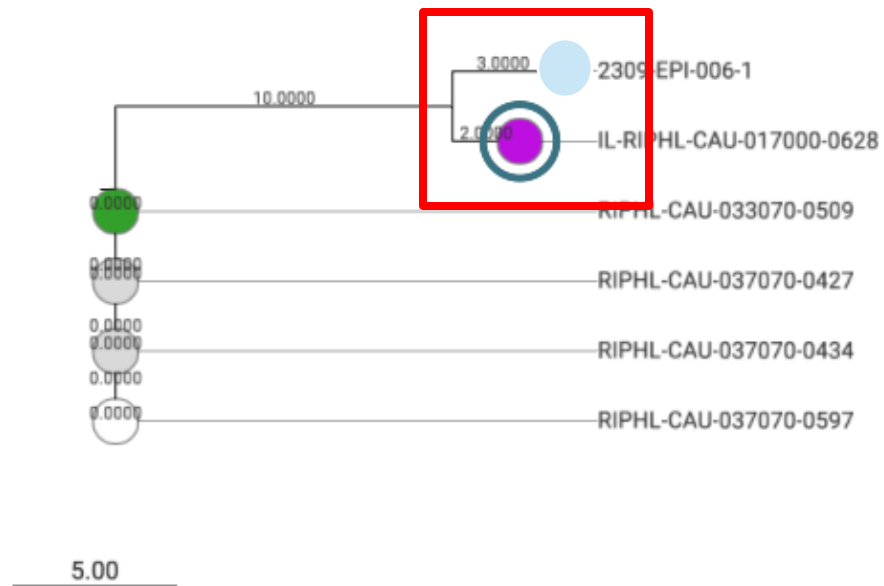


Colours by Room



# Interfacility Transmission

One specimen from ACH A is relatively closely related to a specimen from ACH-B, differing by 5 SNPs



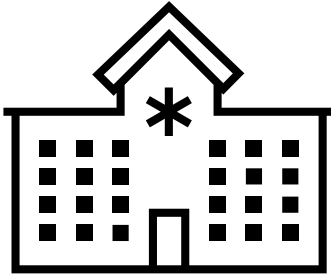
# ★ CDPH Partners with Private and Academic Organizations for Wastewater Surveillance (WWS)



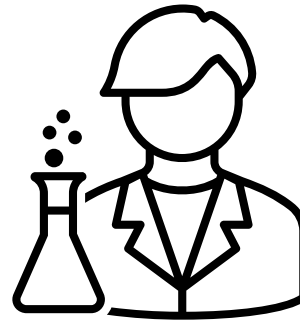
## Sewer Monitoring for Antimicrobial Resistance Trends (SMART) Project

Rush University Medical Center, University of Illinois at Chicago, Discovery Partners Institute, Chicago Department of Public Health, and Centers for Disease Control and Prevention

# ★ Wastewater Surveillance at the facility level



Healthcare facilities caring for vulnerable patients are at risk for outbreaks of multidrug-resistant organisms (MDROs)



However, routine surveillance of MDROs is labor-intensive and infrequent



Healthcare facility wastewater may be a more effective method for identifying the emergence of novel organisms and tracking trends of established organisms

# Acknowledgements



- Dr. Hira Adil
- Dr. Stephanie Black
- Dr. Michelle Funk
- Cashe McGowan
- CeCe Pigozzi
- Elizabeth Shane
- Kelly Walblay
- HCS EPI Team



**RIPHL**

REGIONAL  
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PUBLIC HEALTH  
LABORATORY

- Hannah Barbian
- Erin Newcomer



- Dr. Michael Lin

***And their respective teams!***

# Thank you!



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