Antimicrobial Resistance & Microbiology

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Objectives

The learner will be able to…

- Describe the role of the clinical microbiology in infection prevention
- Describe how antimicrobial resistance (AR) impacts skilled nursing facilities.

Antimicrobial Resistance (AR) Overview

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Facts

- Bacteria and fungi exist everywhere
- Many are beneficial or do not cause human disease
- Others are pathogens that can cause harm
- When harm is likely, treatment is often recommended
- These microorganisms have many ways to defend against these treatments
- Sometimes resistance to a particular medicine develops

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https://www.cdc.gov/project-firstline/about/index.html

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Definition- Multidrug-Resistant Organism (MDRO)

Multidrug Resistant Organism (MDRO) Definition:

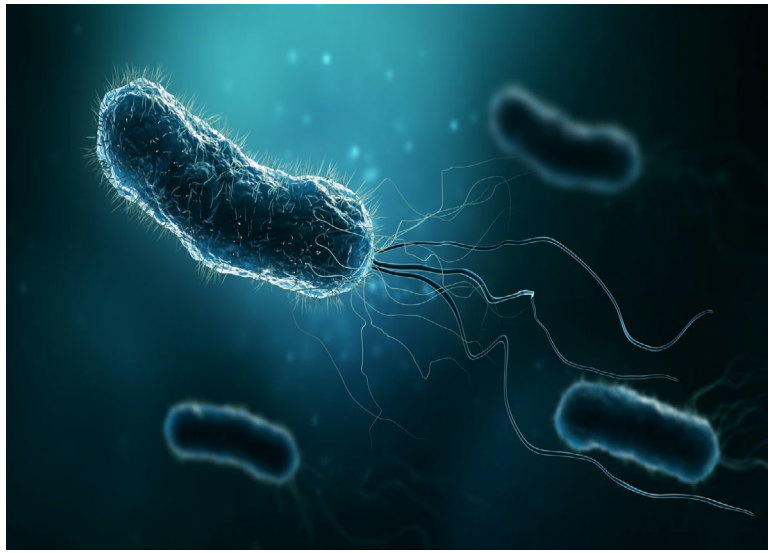
- For epidemiologic purposes, MDROs are defined as microorganisms, predominantly bacteria, that are resistant to one or more classes of antimicrobial agents
- MDRO infections have clinical manifestations that are similar to infections caused by susceptible pathogens. However, options for treating patients with these infections are often extremely limited.

https://www.cdc.gov/infection-control/hcp/mdro-management/background.html

Definition – Antimicrobial Resistant (AR)

Antimicrobial Resistance (AR) Definition:

- Antimicrobial resistance (AR) happens when germs develop the ability to defeat the drugs designed to kill them.
- AR has the potential to affect people at any stage of life, as well as the healthcare, veterinary, and agriculture industries.
- This makes it one of the world's most urgent public health problems.



https://www.cdc.gov/antimicrobial-resistance/about/index.html

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Why should we worry about AR?

United Nations

Antimicrobial resistance is recognized as one of the most urgent global health threats, and demands immediate action to safeguard the ability to treat diseases and enhance food security

ecdc
EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

European Centers for Disease Control (ECDC): The overall poor progress toward the EU targets on AR highlights the urgent need for intensified public health action against AR

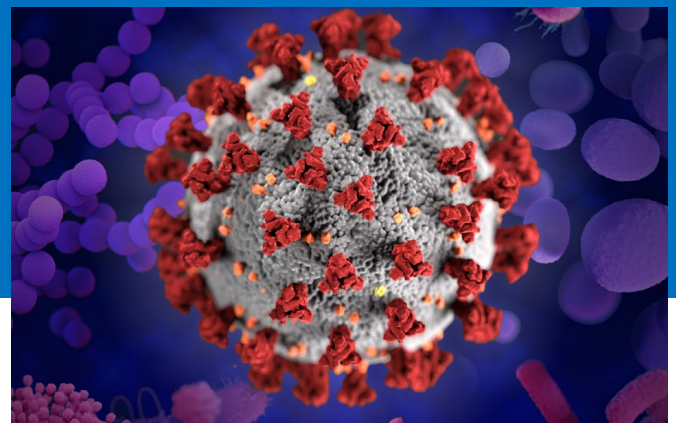
World Health Organization

AR is directly responsible for 1.3 million deaths and contributes to 5 million deaths every year. Many of the organisms discussed today are prioritized as critical

CDC

Urgent Global Threat - Antimicrobial resistance is an urgent global public health threat, killing at least 1.27 million people worldwide and associated with nearly 5 million deaths in 2019.

The COVID Effect & AR



CDC 2022 Special Report

Available data show an alarming increase in resistant infections starting during hospitalization, growing at least 15% from 2019 to 2020.

- Carbapenem-resistant *Acinetobacter* (↑78%)
- Antifungal-resistant *Candida auris* (↑60%)*
- Carbapenem-resistant Enterobacterales (↑35%)
- Antifungal-resistant *Candida* (↑26%)
- ESBL-producing Enterobacterales (↑32%)
- Vancomycin-resistant Enterococcus (↑14%)
- Multidrug-resistant *P. aeruginosa* (↑32%)
- Methicillin-resistant *Staphylococcus aureus* (↑13%)

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https://www.cdc.gov/antimicrobial-resistance/media/pdfs/covid19-impact-report-508.pdf

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2024 CDC AR threats - Updated Report

Key Findings

20%	Bacterial antimicrobial-resistant hospital-onset infections have **increased by a combined 20% during the COVID-19 pandemic** compared to the pre-pandemic period.
5x	The number of reported clinical cases of *C. auris* **increased nearly five-fold from 2019 to 2022.** Clinical cases are identified when specimens collected from patients during routine clinical care test positive for *C. auris*.

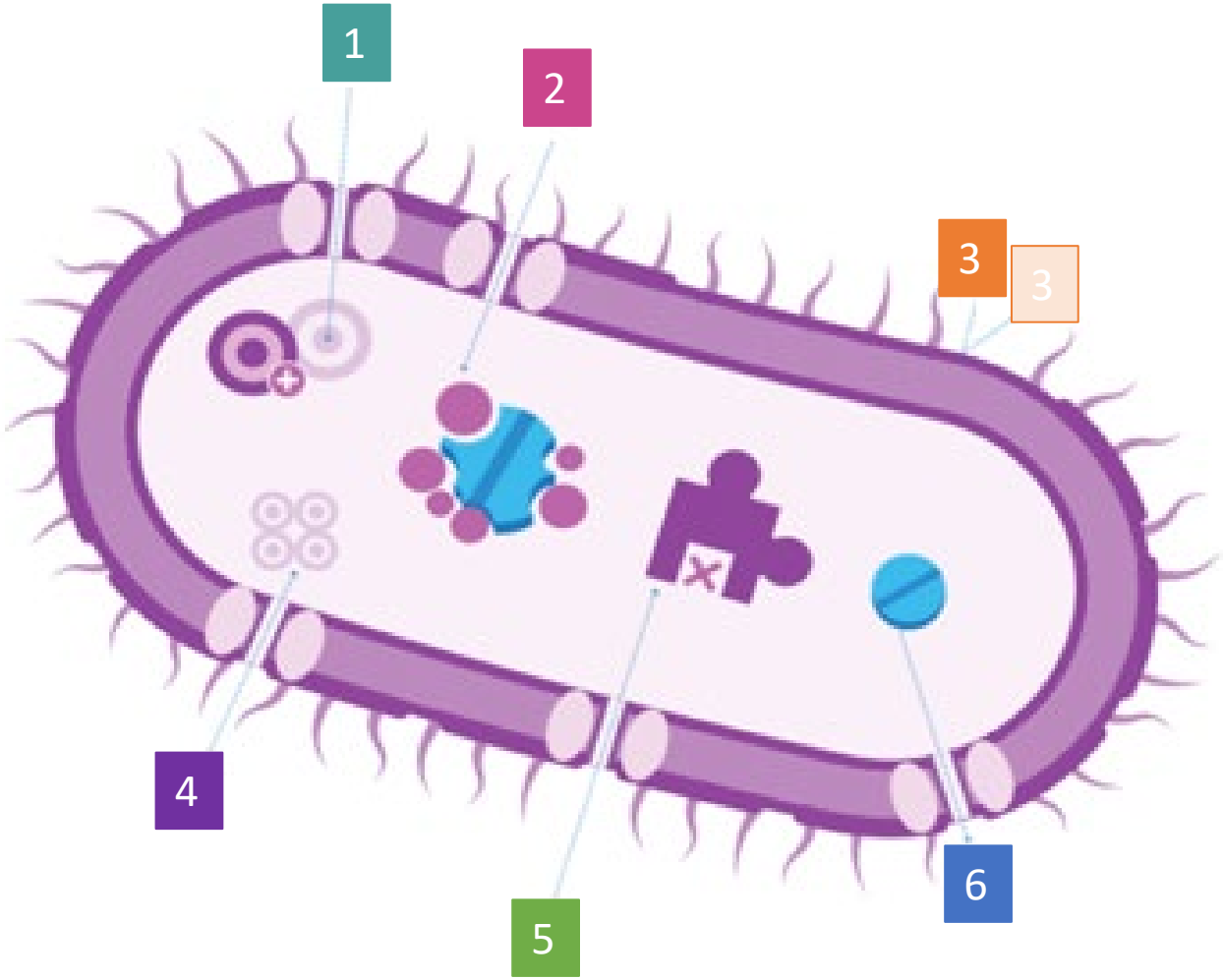
https://www.cdc.gov/antimicrobial-resistance/media/pdfs/antimicrobial-resistance-threats-update-2022-508.pdf

How Germs Fight Back Against Antimicrobials in many ways

1. Germs develop new cell processes to avoid treatments

2. Bacteria can change or destroy with enzymes

3. Germs restrict entry by changing or limiting entryways



4. Germs dilute the drugs by producing more binding targets

5. Germs change the drugs binding target so they can't bind

6. Germs get rid of drugs by using pumps

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https://www.cdc.gov/antimicrobial-resistance/media/pdfs/How-Germs-Fight-Back-Against-Antibiotics-508.pdf

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How Resistance Move from Germ to Germ

Plasmids and other mobile genetic elements can share their DNA with other organisms allowing for resistance to spread quickly.

Mobile Genetic Elements

Plasmids
Circles of DNA that can move between cells.

Transposons
Small pieces of DNA that can go into and change the overall DNA of a cell. These can move from chromosomes (which carry all the genes essential for germ survival) to plasmids and back.

Phages
Viruses that attack germs and can carry DNA from germ to germ.

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https://www.cdc.gov/antimicrobial-resistance/media/pdfs/How-AR-Moves-508.pdf

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Germs Develop Antimicrobial Resistance Over Time

Antibiotic Approved or Released	Year Released	Resistant Germ Identified	Year Identified
Penicillin	1941	Penicillin-resistant *Staphylococcus aureus*[20, 21]	1942
		Penicillin-resistant *Streptococcus pneumoniae*[9,10]	1967
		Penicillinase-producing *Neisseria gonorrhoeae*[11]	1976
Imipenem	1985	*Klebsiella pneumoniae* carbapenemase (KPC)-producing *Klebsiella pneumoniae*[19]	1996
Fluconazole	1990 (FDA approved)	Fluconazole-resistant *Candida*[21]	1988
Extended-spectrum cephalosporins	1980 (Cefotaxime)	Extended-spectrum beta-lactamase- producing *Escherichia coli*[17]	1983

https://www.cdc.gov/antimicrobial-resistance/media/pdfs/AR-Germs-Develop-Resistance-Over-Time-508.pdf

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Carbapenem Resistance (CR)

What is carbapenem resistance?

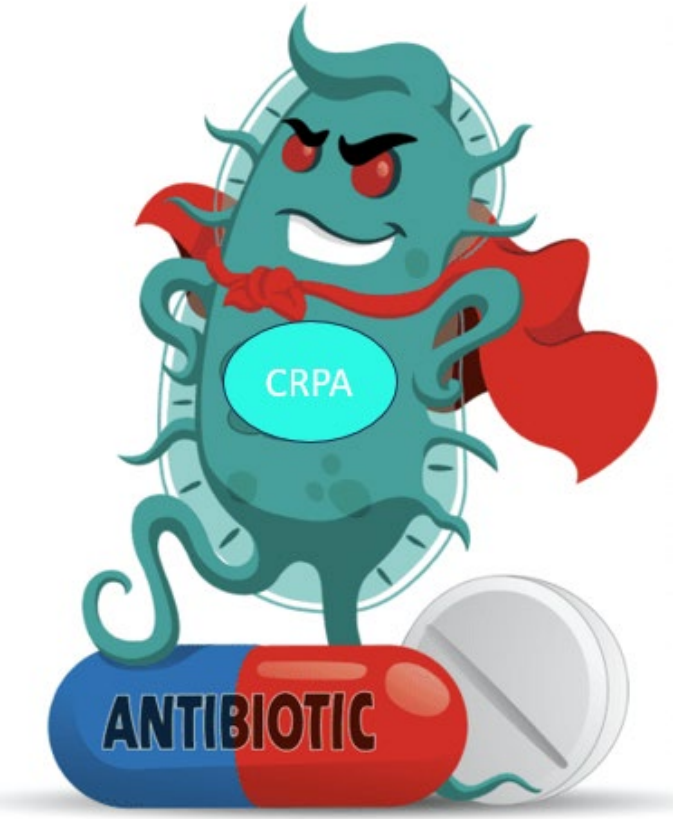
•When a microorganism can grow and thrive in the presence of a carbapenem antibiotic.

What are carbapenems?

•Class of last-line “beta-lactam” antibiotics, related to penicillin

•Specific Carbapenems:

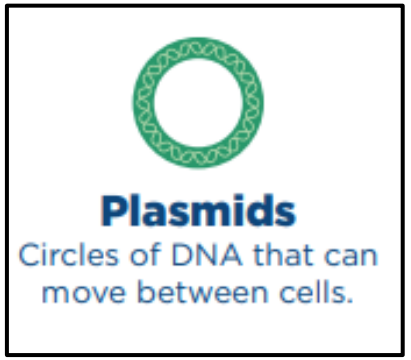
•Imipenem, Doripenem, Ertapenem, Meropenem



Carbapenemase Production (CP)

One type of carbapenem resistance is the production of Carbapenemase.

- Carbapenemase is an **enzyme** that prevents beta-lactam antibiotics from working effectively, like carbapenems
  - There are different segments of DNA that will hold information on the type of carbapenemase.
  - **Plasmids can share their DNA with other organisms allowing for resistance to spread quickly.**

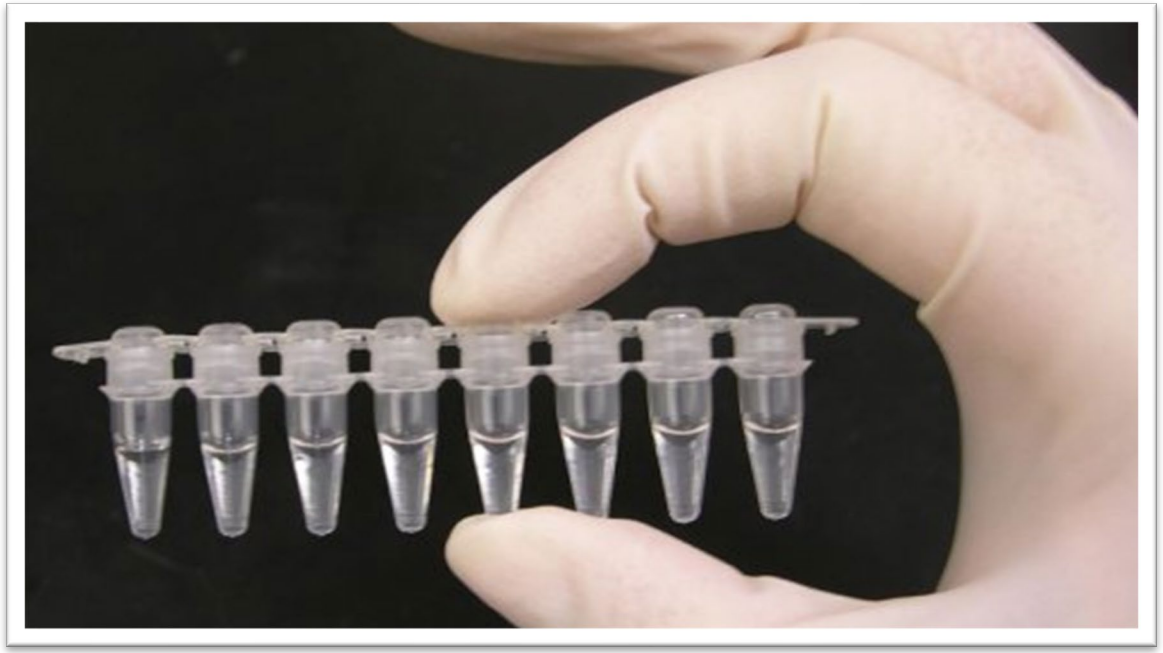


CP that is commonly found in San Diego County

"THE **BIG FIVE** CARBAPENEMASES"

- **NDM** – New Delhi Metallo – ß-lactamases
- **IMP** – Imipenemases
- **VIM** – Verona integrum-encoded Metallo-ß-lactamases
- **OXA 48**– Oxacillinase
- **KPC** – *Klebsiella pneumoniae* carbapenemase

Some others we see here in San Diego County:
OXA 23, **OXA 24/40**, **OXA 235**, **OXA 58**



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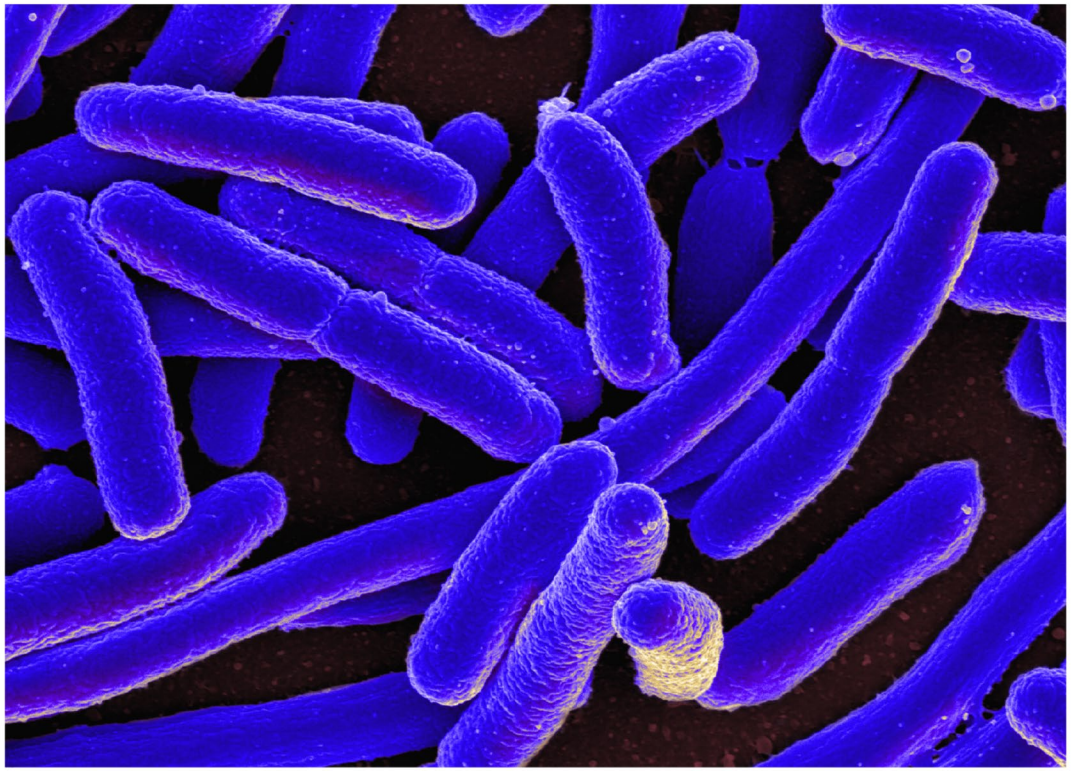
Carbapenemase Producing Organism (CPO)

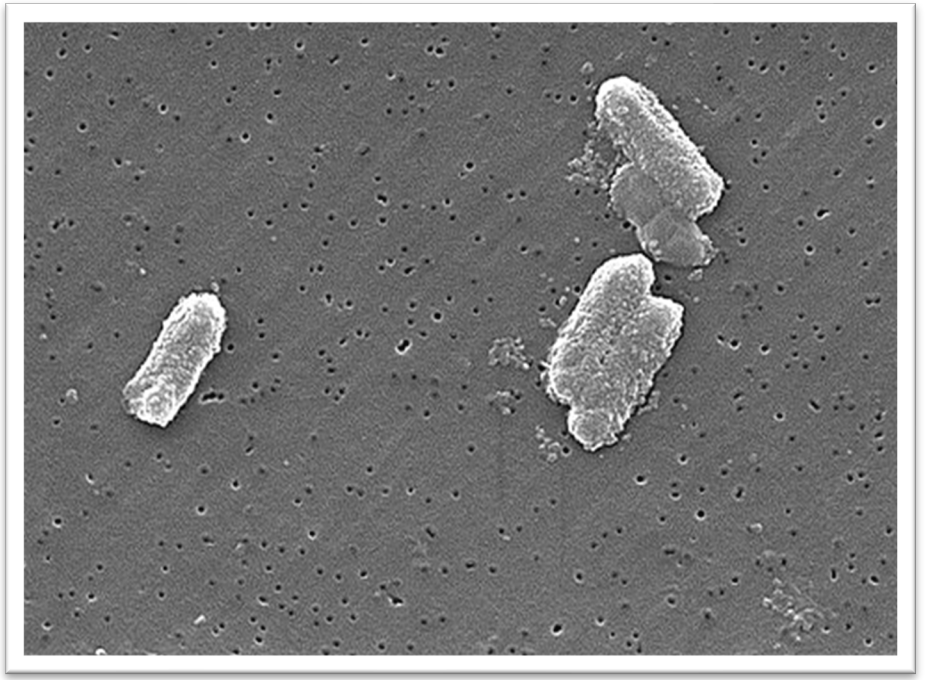
- CPOs are a group of bacteria that produce an enzyme called Carbapenemase, which breaks down Carbapenem antibiotics, rendering them ineffective.
- We use this term when we have an identified Carbapenemase Production (CP) but there is no organism linked to it.



Enterobacterales and CRE

Most common types seen in humans:

- *Escherichia coli*
- *Klebsiella pneumoniae*
- *Enterobacter*
- *Citrobacter*
- *Hafnia*
- *Morganella*
- *Proteus*
- *Providencia*
- *Serratia*



Carbapenemase gene mechanisms found most often in CP-CRE:

- KPC, NDM, VIM
- IMP, OXA-48

Reservoirs:

- GI tract
- Water sources

https://www.cdc.gov/cre/about/index.html

Pseudomonas and CRPA

Most common types seen in humans:

- *P. aeruginosa*
- *P. maltophilia*

Carbapenemase gene mechanisms found most often in CP-CRPA

- VIM, NDM, IMP, GES

Reservoirs

- commonly found in the environment, like soil, water.

https://www.cdc.gov/pseudomonas-aeruginosa/about/index.html

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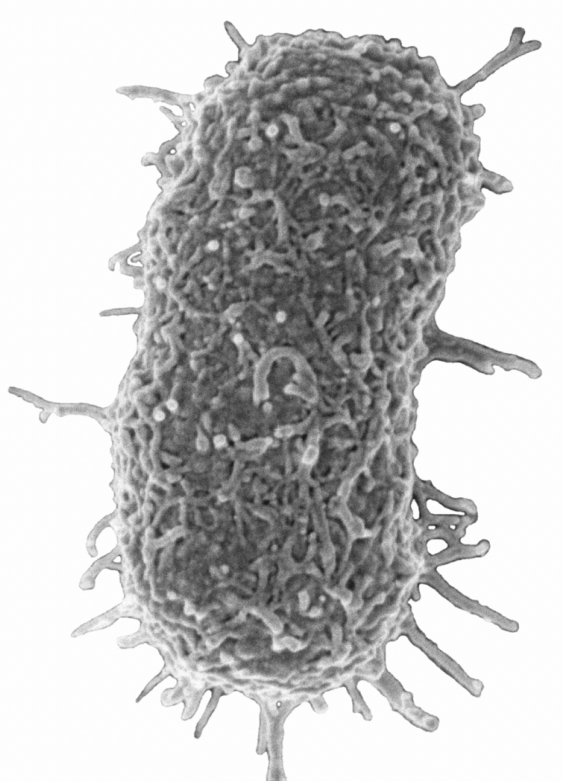
Acinetobacter and CRAB



Most common types seen in humans:

- ***Acinetobacter calcoaceticus-Acinetobacter baumannii* complex:**
  - *Acinetobacter calcoaceticus*
  - *Acinetobacter baumannii*
  - *Acinetobacter pittii*
  - *Acinetobacter nosocomialis*
- **Carbapenemase gene mechanisms found most often in CRAB?**
  - OXA-23, OXA-24/40, OXA-235 like, NDM
- **Reservoirs:** soil, water, humans, and animals.

https://communities.springernature.com/posts/giving-acinetobacter-baumannii-a-choice-death-by-phage-or-death-by-antibiotic

Candida auris (aka Candidozyme auris)

- Candida auris (C. auris) is a type of yeast that a cause severe illness and spread easily very sick patient in healthcare facilities.
- Symptoms depend on the site of infection (i.e., bloodstream, wounds, respiratory, urines).
- Often resistant to antifungal medications

https://www.cdc.gov/candida-auris/about/index.html

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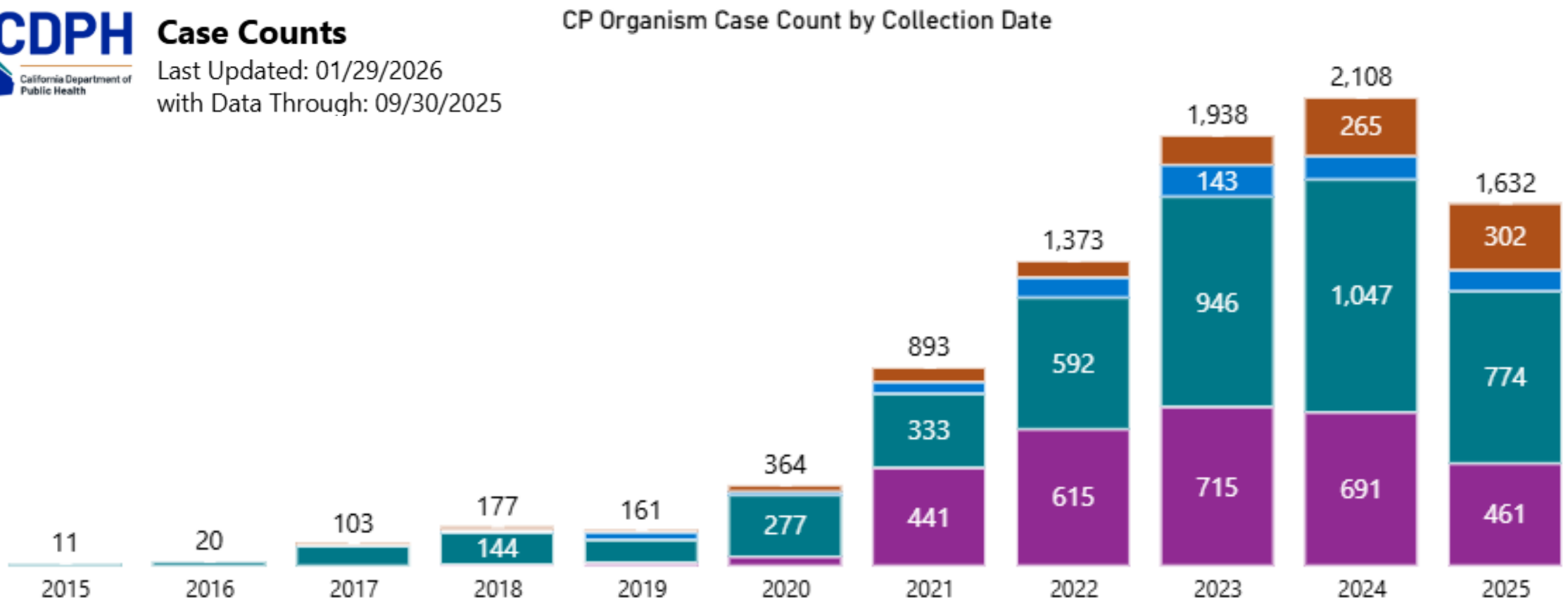
CDPH Data For California – CP organisms

CP Acinetobacter spp.	CP Enterobacterales	CP Pseudomonas spp.	No Organism Identified

CDPH California Department of Public Health

Case Counts

Last Updated: 01/29/2026
with Data Through: 09/30/2025



• CP-Enterobacterales were made reportable in 2019; all CP organisms were made reportable in 2022

https://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ARDataReporting.aspx

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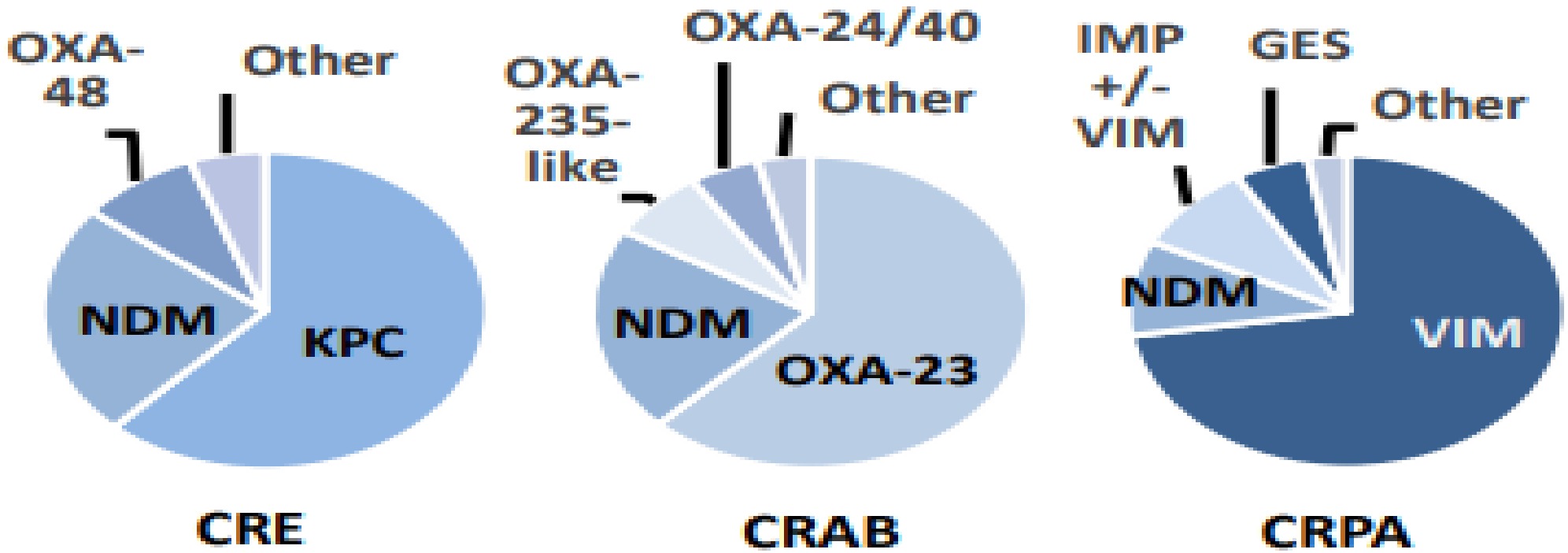
CDPH Data For California Carbapenemases

Fig. 2. Carbapenemases Identified in CRE, CRAB and CRPA Isolates, 2019–2023



https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPOQuicksheet_Only.pdf

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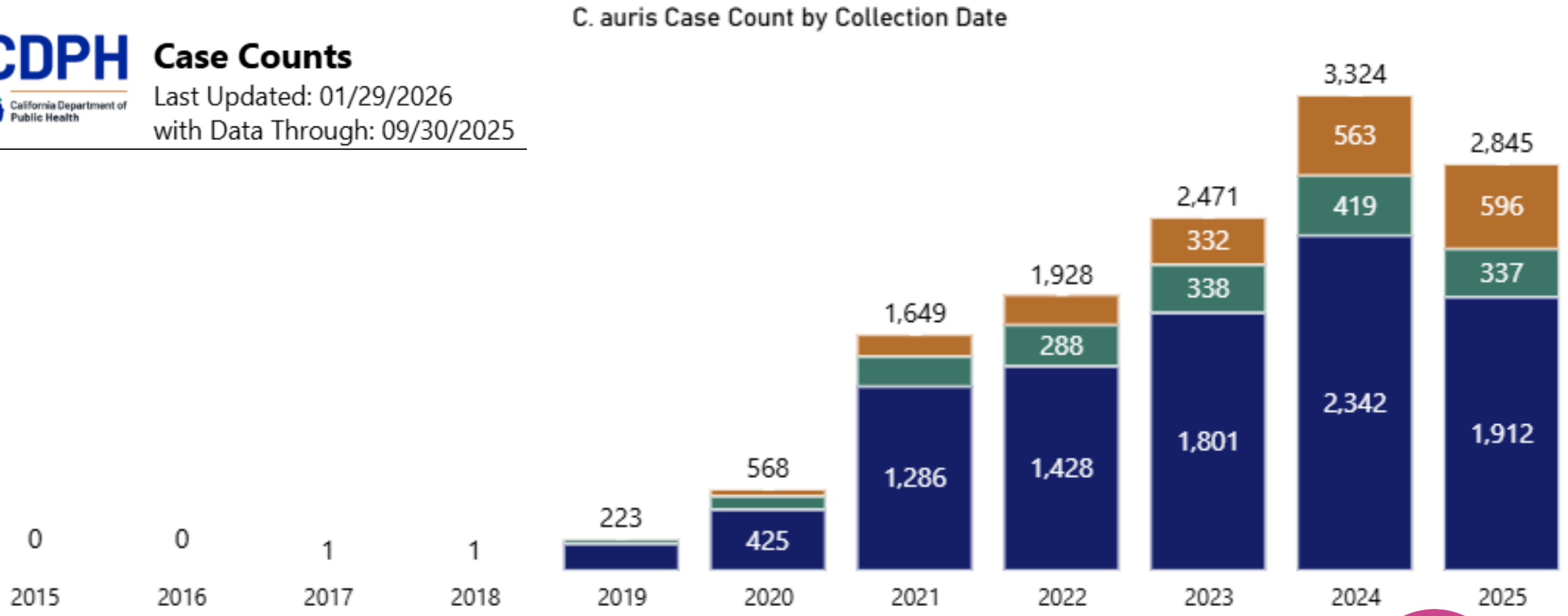
Candida auris – State Data

Screening	Screening-to-Clinical	Clinical

CDPH California Department of Public Health

Case Counts

Last Updated: 01/29/2026
with Data Through: 09/30/2025



https://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ARDataReporting.aspx

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Candida auris – Over the years

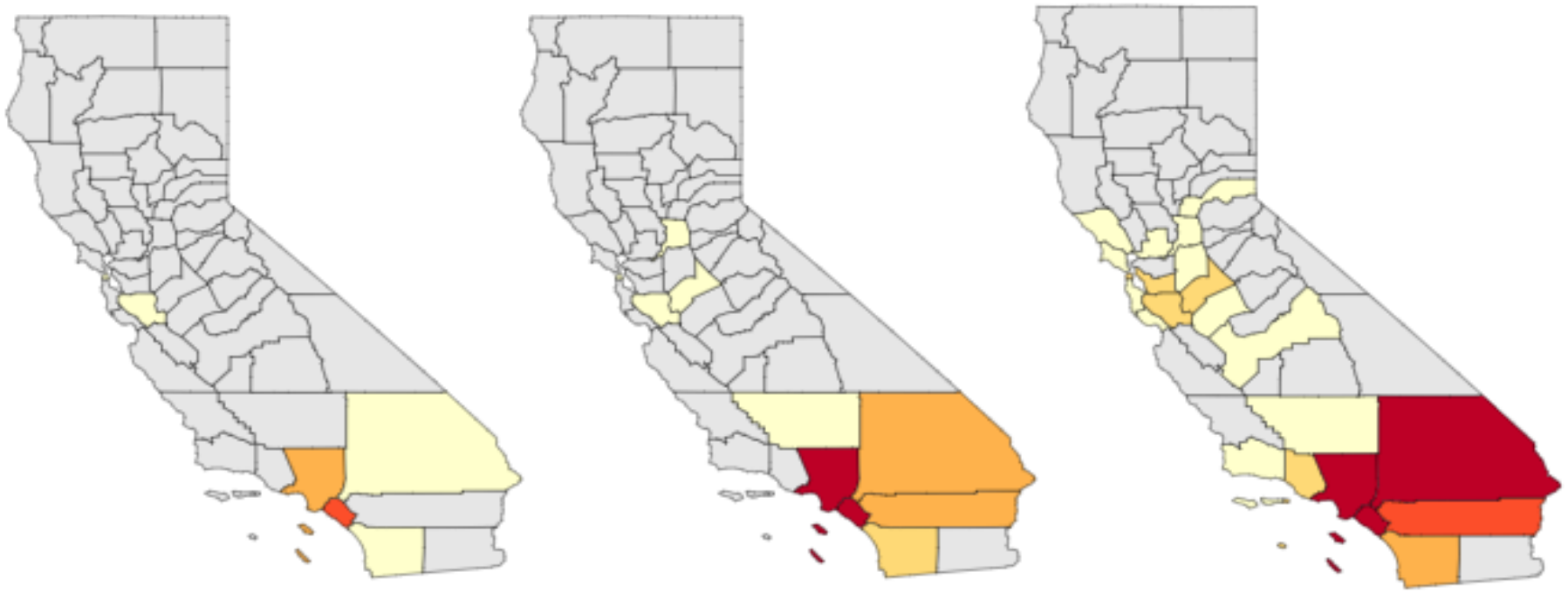
Cumulative Maps
Last Updated: 01/29/2026
with Data Through: 09/30/2025

To compare cumulative case counts, select the organism type and county(ies) to display for up to 3 maps, then select the corresponding years.

Organism Type
- Candida auris
- CPOs
  - Acinetobacter spp.
  - Enterobacterales
  - Pseudomonas spp.
  - No Organism Identi...

Facility County: All

Year 1	Cumulative Case Count 1	Year 2	Cumulative Case Count 2	Year 3	Cumulative Case Count 3
2020	793	2022	4369	2025	12969



https://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ARDataReporting.aspx

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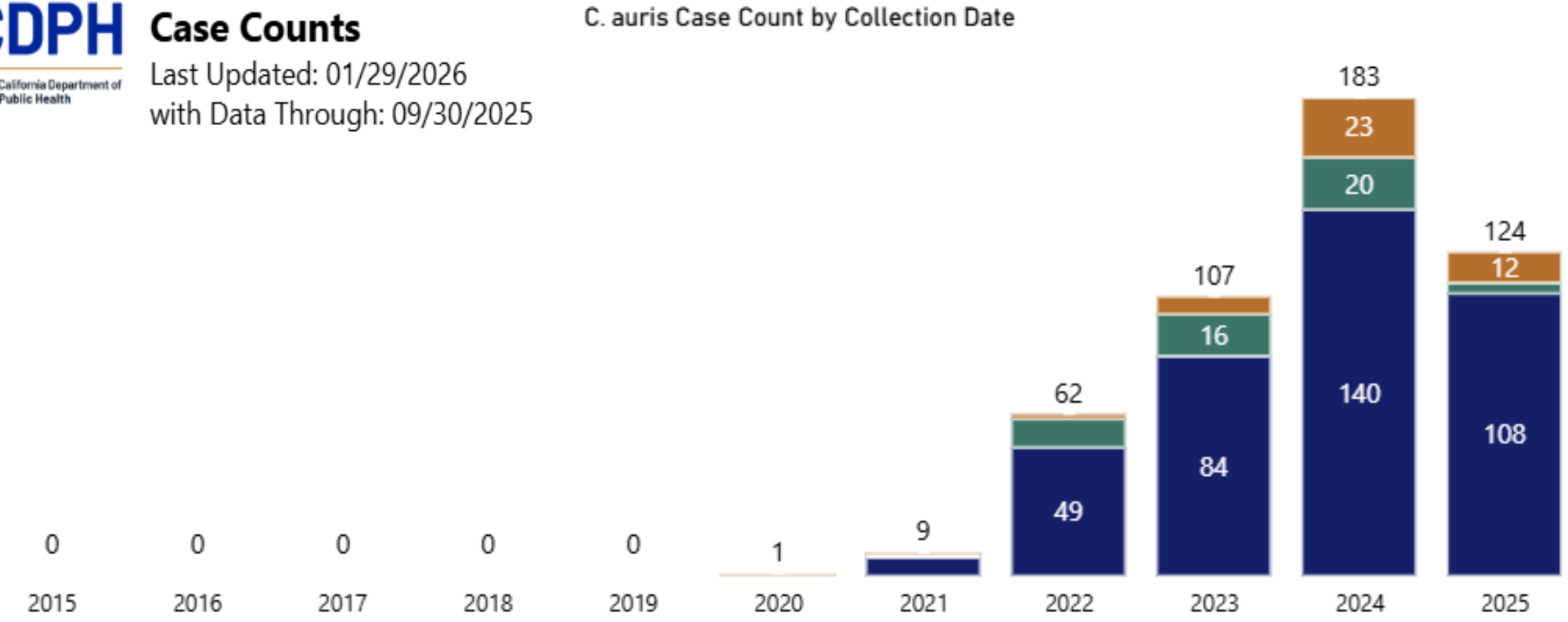
Candida auris – County Data

Screening	Screening-to-Clinical	Clinical

CDPH California Department of Public Health

Case Counts

Last Updated: 01/29/2026
with Data Through: 09/30/2025



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https://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ARDataReporting.aspx

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Testing for Resistance
&
Practice reading lab results

Types Of Testing

Not all relevant tests or information included

Test Name	Information Gained
Gram Stain	Used detect and classify bacteria into Gram Negative or Gram Positive
Antimicrobial Susceptibility	How resistant vs. susceptible pathogen is to specific antimicrobial treatments
Carbapenemase Testing • **Ex: mCIM, StarCarba**	Depending on the type of test: • Is there carbapenemase production detected • Is there a specific carbapenemase gene detected

Antimicrobial Susceptibility Testing - StatPearls - NCBI Bookshelf

EX: Antimicrobial Susceptibility Testing for bacteria

	P. aeruginosa		
ANTIBIOTICS	MIC mcg/mL	INT	
Amikacin	<=8	S	D1
Aztreonam	8	S	D1
Ceftazidime	2	S	D2
Ciprofloxacin	<=0.5	S	D2
Cefepime	2	S	D2
Gentamicin	<=2	S	D1
Meropenem	4	I	D2
Tobramycin	<=2	S	D1
Piperacillin/Tazobactam	4/4	S	D3

EX: Antimicrobial Susceptibility Testing (AST) for bacteria

	P. aeruginosa		
ANTIBIOTICS	MIC mcg/mL	INT	
Amikacin	<=8	S	D1
Aztreonam	8	S	D1
Ceftazidime	2	S	D2
Ciprofloxacin	<=0.5	S	D2
Cefepime	2	S	D2
Gentamicin	<=2	S	D1
Meropenem	4	I	D2
Tobramycin	<=2	S	D1
Piperacillin/Tazobactam	4/4	S	D3

EX: Antimicrobial Susceptibility Testing (AST) for bacteria

	P. aeruginosa		
ANTIBIOTICS	MIC mcg/mL	INT	
Amikacin	<=8	S	D1
Aztreonam	16	I	D1
Ceftazidime	>16	R	D2
Ciprofloxacin	2	R	D2
Cefepime	8	S	D2
Gentamicin	<=2	S	D1
Meropenem	>8	R	D2
Tobramycin	<=2	S	D1
Piperacillin/Tazobactam	>64/4	R	D3

EX: Antimicrobial Susceptibility Testing (AST) for bacteria

	P. aeruginosa		
ANTIBIOTICS	MIC mcg/mL	INT	
Amikacin	<=8	S	D1
Aztreonam	16	I	D1
Ceftazidime	>16	R	D2
Ciprofloxacin	2	R	D2
Cefepime	8	S	D2
Gentamicin	<=2	S	D1
Meropenem	>8	R	D2
Tobramycin	<=2	S	D1
Piperacillin/Tazobactam	>64/4	R	D3

EX: Testing Result

Final - June 03, 2023 9:26 PDT -
Sparse growth of Klebsiella pneumoniae

--- Multiple Drug Resistant Organism (MDRO).

Confirmatory tests indicate resistance due to carbapenemase production.

The clinical efficacy of carbapenems has not been established

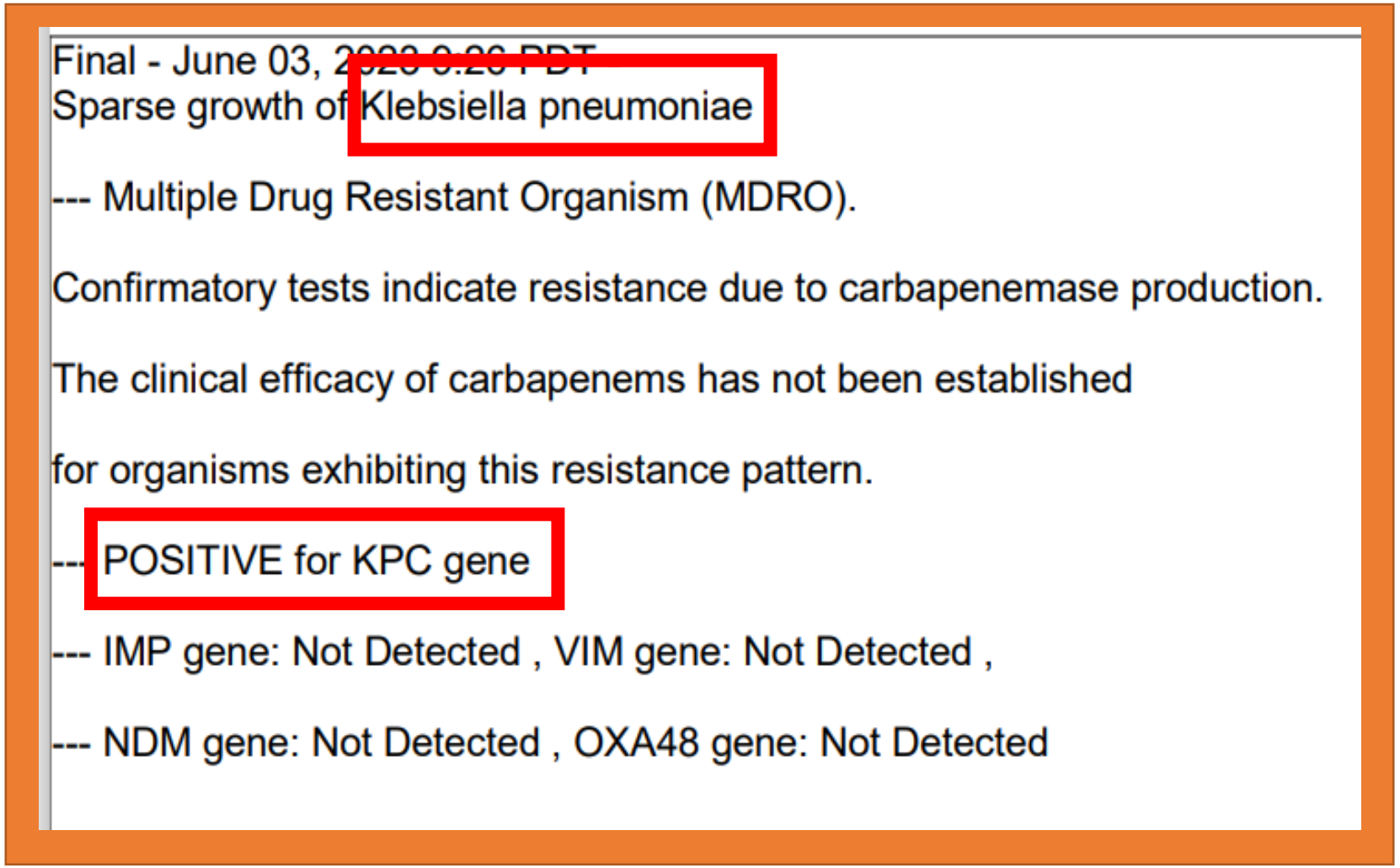
for organisms exhibiting this resistance pattern.

--- POSITIVE for KPC gene

--- IMP gene: Not Detected , VIM gene: Not Detected ,

--- NDM gene: Not Detected , OXA48 gene: Not Detected

EX: Testing Result



Final - June 03, 2023 0:20 PDT
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--- POSITIVE for KPC gene

--- IMP gene: Not Detected , VIM gene: Not Detected ,

--- NDM gene: Not Detected , OXA48 gene: Not Detected

EX: Testing Result for CP-CRO

Pre - January 21, 2019 11:40 PST -
Aerobic bottle: Pseudomonas aeruginosa

--- Multiple Drug Resistant Organism (MDRO).

Confirmatory tests indicate resistance due to carbapenemase production.

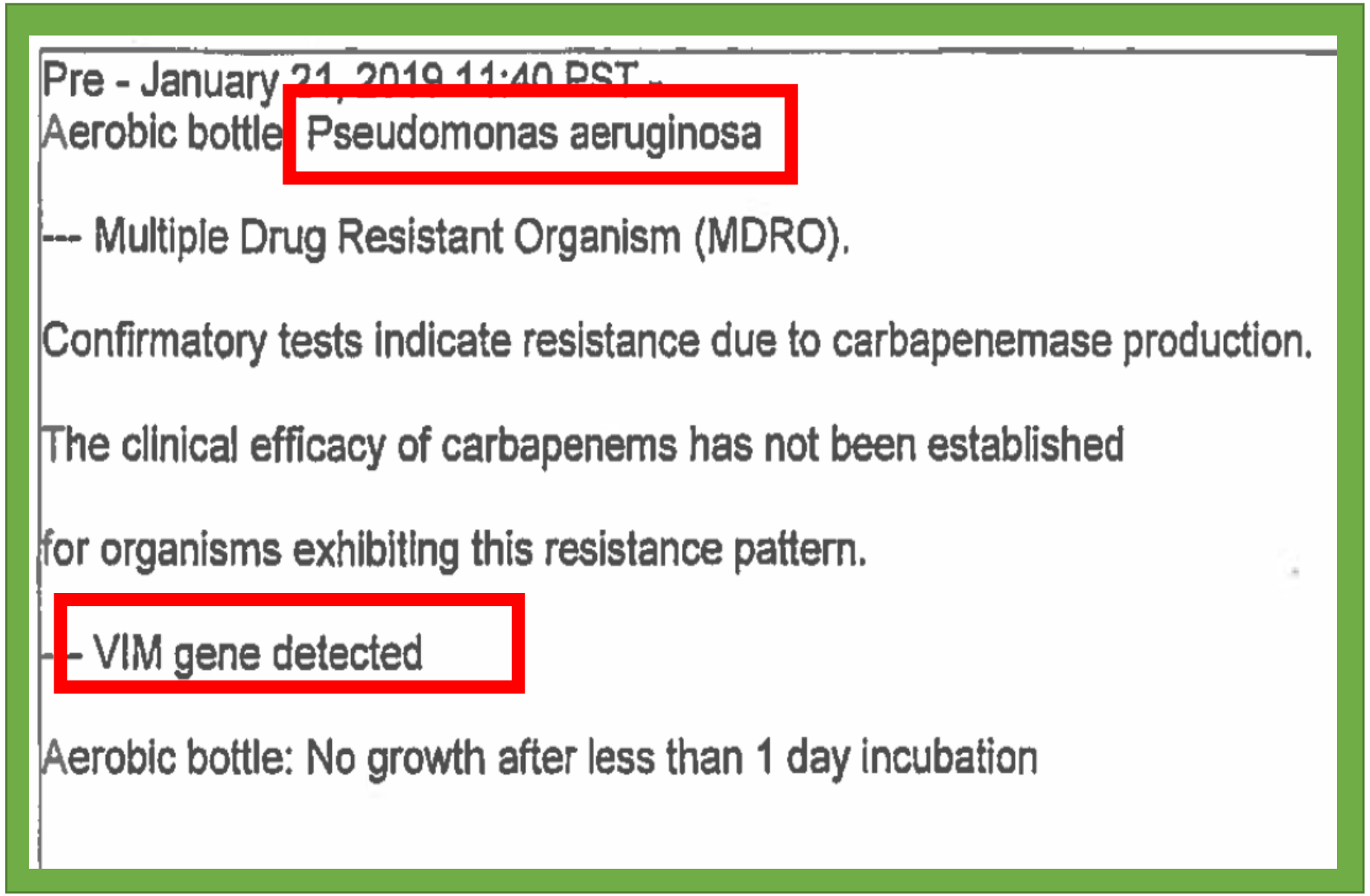
The clinical efficacy of carbapenems has not been established

for organisms exhibiting this resistance pattern.

--- VIM gene detected

Aerobic bottle: No growth after less than 1 day incubation

EX: Testing Result for CP-CRO



Pre - January 21, 2019 11:40 PST -

Aerobic bottle Pseudomonas aeruginosa

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The clinical efficacy of carbapenems has not been established

for organisms exhibiting this resistance pattern.

-- VIM gene detected

Aerobic bottle: No growth after less than 1 day incubation

EX: Organism with CP Testing

TEST ORDERED: CPR genes Islt/Spm QI~Carbapenem resistant Klebsiella pneumoniae (organism)

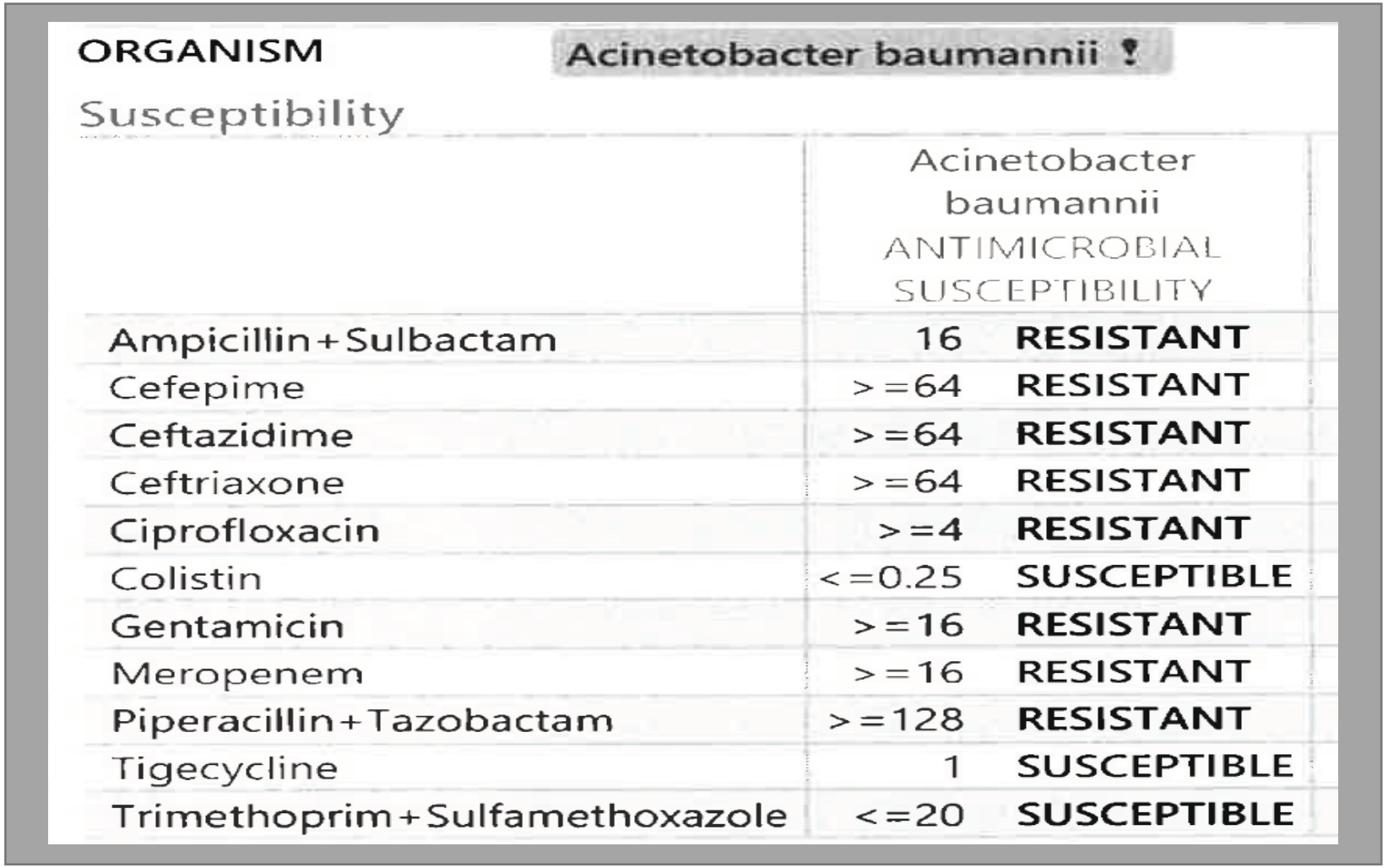
RESULT	VALUE	UNITS	REFERENCE RANGES	ABNORMAL	RESULT STATUS
blaIMP Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaVIM Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaNDM Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaKPC Islt/Spm QI	Detected (qualifier value)		Not Detected	Abnormal	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaOXA-48 Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final

EX: Organism with CP Testing

TEST ORDERED: CPR genes Islt/Spm Q - Carbapenem resistant Klebsiella pneumoniae (organism)

RESULT	VALUE	UNITS	REFERENCE RANGES	ABNORMAL	RESULT STATUS
blaIMP Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaVIM Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaNDM Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaKPC Islt/Spm QI	Detected (qualifier value)		Not Detected	Abnormal	Final
RESULT	**VALUE**	**UNITS**	**REFERENCE RANGES**	**ABNORMAL**	**RESULT STATUS**
blaOXA-48 Islt/Spm QI	Not detected (qualifier value)		Not Detected	N	Final

Ex: *Acinetobacter* AST

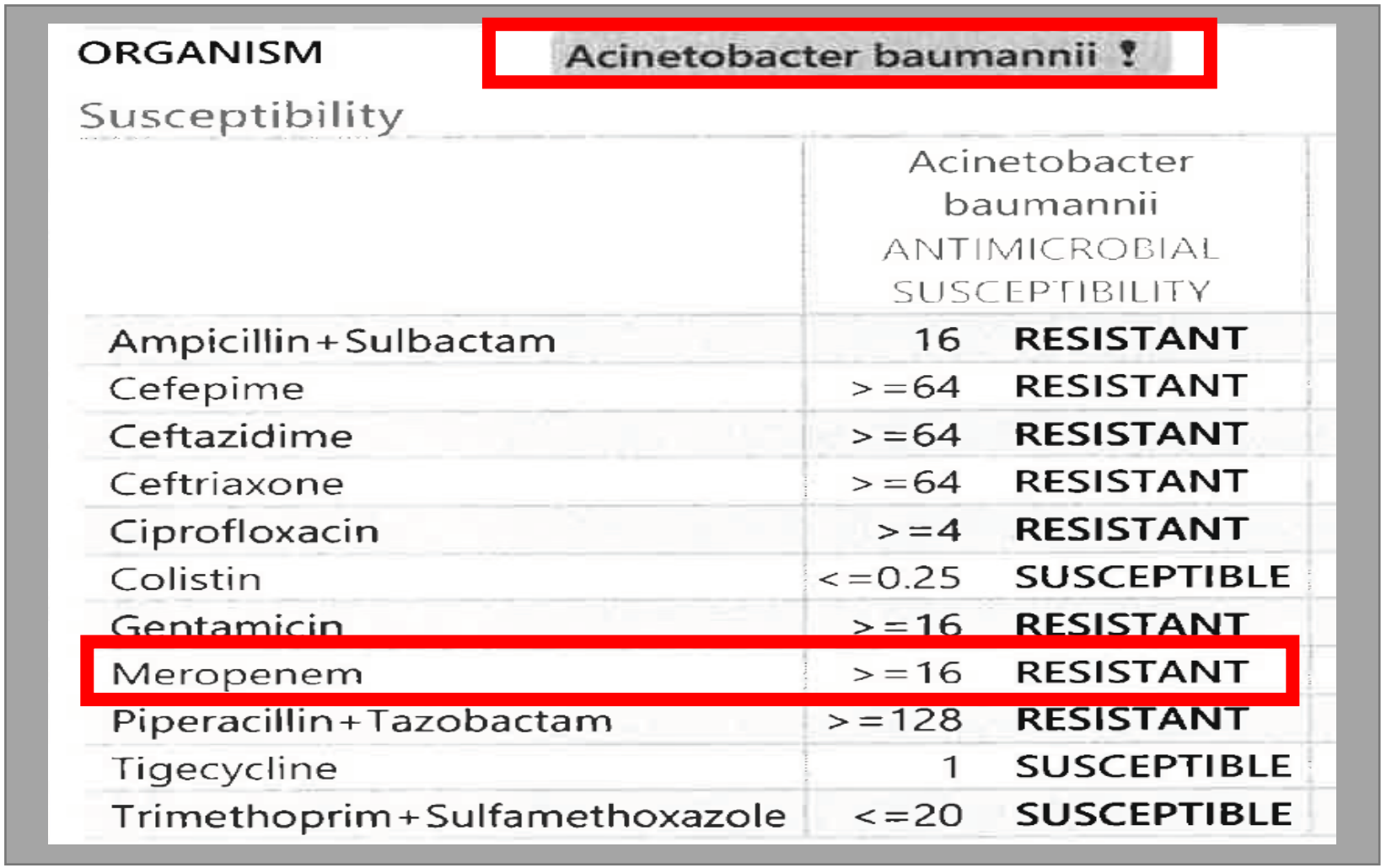


ORGANISM **Acinetobacter baumannii !**

Susceptibility

	Acinetobacter baumannii ANTIMICROBIAL SUSCEPTIBILITY	
Ampicillin+Sulbactam	16	**RESISTANT**
Cefepime	>=64	**RESISTANT**
Ceftazidime	>=64	**RESISTANT**
Ceftriaxone	>=64	**RESISTANT**
Ciprofloxacin	>=4	**RESISTANT**
Colistin	<=0.25	**SUSCEPTIBLE**
Gentamicin	>=16	**RESISTANT**
Meropenem	>=16	**RESISTANT**
Piperacillin+Tazobactam	>=128	**RESISTANT**
Tigecycline	1	**SUSCEPTIBLE**
Trimethoprim+Sulfamethoxazole	<=20	**SUSCEPTIBLE**

Ex: *Acinetobacter* AST



ORGANISM **Acinetobacter baumannii !**

Susceptibility

	Acinetobacter baumannii ANTIMICROBIAL SUSCEPTIBILITY	
Ampicillin+Sulbactam	16	**RESISTANT**
Cefepime	>=64	**RESISTANT**
Ceftazidime	>=64	**RESISTANT**
Ceftriaxone	>=64	**RESISTANT**
Ciprofloxacin	>=4	**RESISTANT**
Colistin	<=0.25	**SUSCEPTIBLE**
Gentamicin	>=16	**RESISTANT**
Meropenem	>=16	**RESISTANT**
Piperacillin+Tazobactam	>=128	**RESISTANT**
Tigecycline	1	**SUSCEPTIBLE**
Trimethoprim+Sulfamethoxazole	<=20	**SUSCEPTIBLE**

EX: Fungal result

TEST ORDERED: Candida auris DNA [Presence] in Specimen by NAA with non-probe detection

RESULT	VALUE	UNITS	REFERENCE RANGES	ABNORMAL	RESULT STATUS
Candida auris DNA [Presence] in Specimen by NAA with non-probe detection	Positive			Abnormal	Final

This test is not Food and Drug Administration (FDA) approved and has been validated in-house for reporting under CLIA as a laboratory developed test. It is intended for infection control purposes.

This test cannot differentiate between non viable or viable Candida auris cells present in the samples.

Detection of Candida auris DNA by PCR is classified as a confirmed colonization/screening case. A negative culture does not rule out the presence of Candida auris DNA.

Candida auris culture testing to follow.

Performing Organization: San Diego County PHL
Performing Organization Address: 5570 Overland Ave, Ste 103, San Diego, CA, 92123

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	Pseudomonas aeruginosa		*Serratia marcescens*		*Klebsiella pneumoniae*	
DRUG/CP	MINT	IINTERP	MINT	INTERP	MINT	INTERP
CEFAZOLIN	S		R			
CEFEPIME	S		R			
CEFOXTIME	I		R			
CEFTAZIDIME	S		R			
CIPROFLOXACIN	S		R		R	
ERTAPENEM	I		S		R	
IMIPENEM	I		S		S	
MEROPENEM	R		S		I	
IMP		NOT DET				NOT DET
KPC		NOT DET				DET
VIM		NOT DET				NOT DET
NDM		NOT DET				NOT DET
OXA-48		NOT DET				NOT DET

	Pseudomonas aeruginosa		*Serratia marcescens*		*Klebsiella pneumoniae*	
DRUG/CP	MINT	INTERP	MINT	INTERP	MINT	INTERP
CEFAZOLIN	S		R			
CEFEPIME	S		R			
CEFOXTIME	I		R			
CEFTAZIDIME	S		R			
CIPROFLOXACIN	S		R		R	
ERTAPENEM	I		S		R	
IMIPENEM	I		S		S	
MEROPENEM	R		S		I	
IMP		NOT DET				NOT DET
KPC		NOT DET				DET
VIM		NOT DET				NOT DET
NDM		NOT DET				NOT DET
OXA-48		NOT DET				NOT DET

Not Carbapenem Resistant

Carbapenem Resistant

Carbapenem Resistant

COUNTY OF SAN DIEGO HEALTH AND HUMAN SERVICES AGENCY

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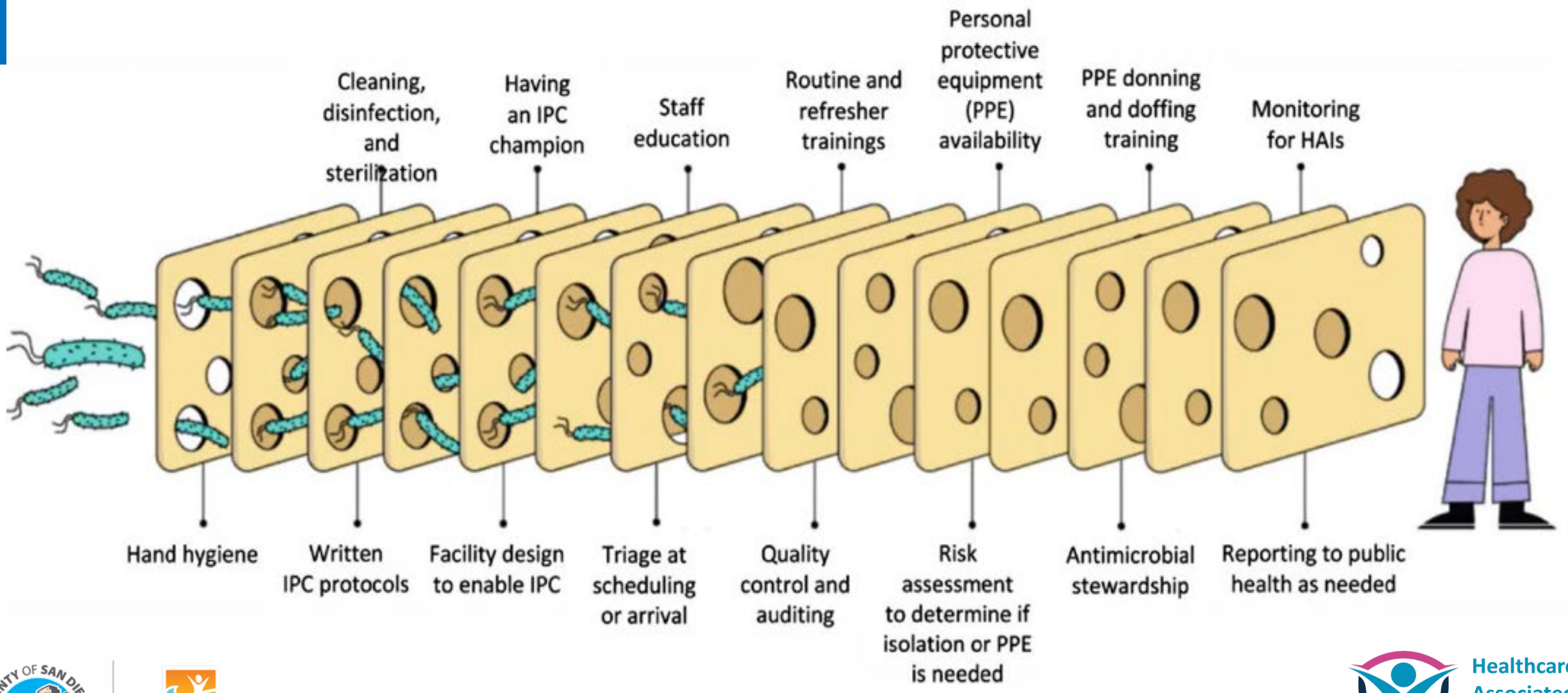
Healthcare Associated Infections Program

How does Antimicrobial Resistant: Impact the IP and SNF?

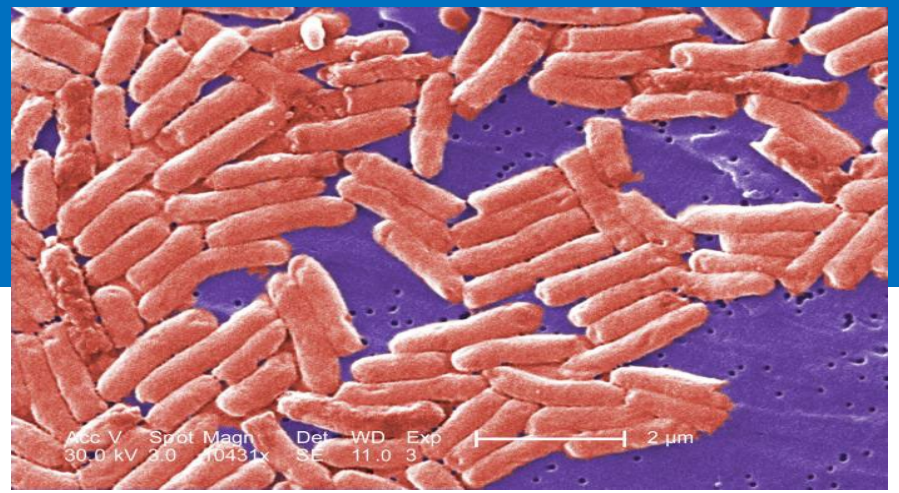
Swiss Cheese Model for Infection Control



https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(25)00143-0/fulltext

Healthcare Associated Infections Program

Colonization vs. infection



Colonization:

- When a resident is carrying a pathogen but is not showing signs and symptoms of infection
- Can still spread the pathogen to others
- Colonized patients can go on to develop clinical infections
- **Colonized treatment is not (generally) recommended**

Infection:

- Pathogen present on or in the body causing symptoms of infection
- Can be a source of transmission
- Requires treatment.

https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/IntroToPriorityMDROs_022025.pdf

Cohorting

Knowing what organisms and the Type of CP you have in house will allow you cohort appropriately

- Cohorting will help lower risk for spread to other residents
- Cohorting also helps with monitoring outbreaks when you know where organisms are in your facility.

https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/MDROCohorting.pdf

EVS impact

Knowing the organisms you have in your building helps with:

- Making sure the disinfectant being used in your facility is effective against those organisms.
- Making sure the contact times being used is appropriate for the organisms you are trying to kill.
- Making sure the processes being used by EVS and floors staff for cleaning and disinfections is effective at disinfecting the environment and shared equipment.

https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/PFL_EVSmodule2_UnderstandingDisinfectants.pdf

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Education & Training That IP Would Do

Understanding what organisms are in your facility are able to:

- Provide staff and patient education that is targeted towards those specific organisms.
- Provide training on how to mitigate spread and why Infection Controls are important and should be followed.

Precautions: Which Ones?

Knowing what organisms are in your building will ensure that the appropriate precautions are ordered and posted for that resident.

There will be more discussion on precautions in a Mara's presentation.

https://www.sandiegocounty.gov/content/sdc/hhsa/programs/phs/hai-program/transmission-precautions.html

Healthcare Associated Infections Program

Questions?

For more information, contact the HAI Program at

phs.hai.hhsa@sdcounty.ca.gov

Thank you!

www.sdhai.org

phs.hai.hhsa@sdcounty.ca.gov

COUNTY OF SAN DIEGO
HEALTH AND HUMAN SERVICES AGENCY

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Healthcare Associated Infections Program

References

- https://www.cdc.gov/project-firstline/about/index.html
- https://www.cdc.gov/infection-control/hcp/mdro-management/background.html
- https://www.cdc.gov/antimicrobial-resistance/media/pdfs/covid19-impact-report-508.pdf
- https://www.cdc.gov/antimicrobial-resistance/media/pdfs/antimicrobial-resistance-threats-update-2022-508.pdf
- https://www.cdc.gov/antimicrobial-resistance/media/pdfs/How-Germs-Fight-Back-Against-Antibiotics-508.pdf
- https://www.cdc.gov/antimicrobial-resistance/media/pdfs/How-AR-Moves-508.pdf
- https://www.cdc.gov/antimicrobial-resistance/media/pdfs/AR-Germs-Develop-Resistance-Over-Time-508.pdf
- https://www.cdc.gov/cre/about/index.html
- https://www.cdc.gov/pseudomonas-aeruginosa/about/index.html
- https://communities.springernature.com/posts/giving-acinetobacter-baumannii-a-choice-death-by-phage-or-death-by-antibiotic
- https://www.cdc.gov/candida-auris/about/index.html
- https://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ARDataReporting.aspx
- https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPOQuicksheet_Only.pdf
- https://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ARDataReporting.aspx
- Antimicrobial Susceptibility Testing - StatPearls - NCBI Bookshelf
- https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/IntroToPriorityMDROs_022025.pdf
- https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/MDROCohorting.pdf
- https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/PFL_EVSmodule2_UnderstandingDisinfectants.pdf
- https://www.sandiegocounty.gov/content/sdc/hhsa/programs/phs/hai-program/transmission-precautions.html
- https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(25)00143-0/fulltext