TN NHSN User Call

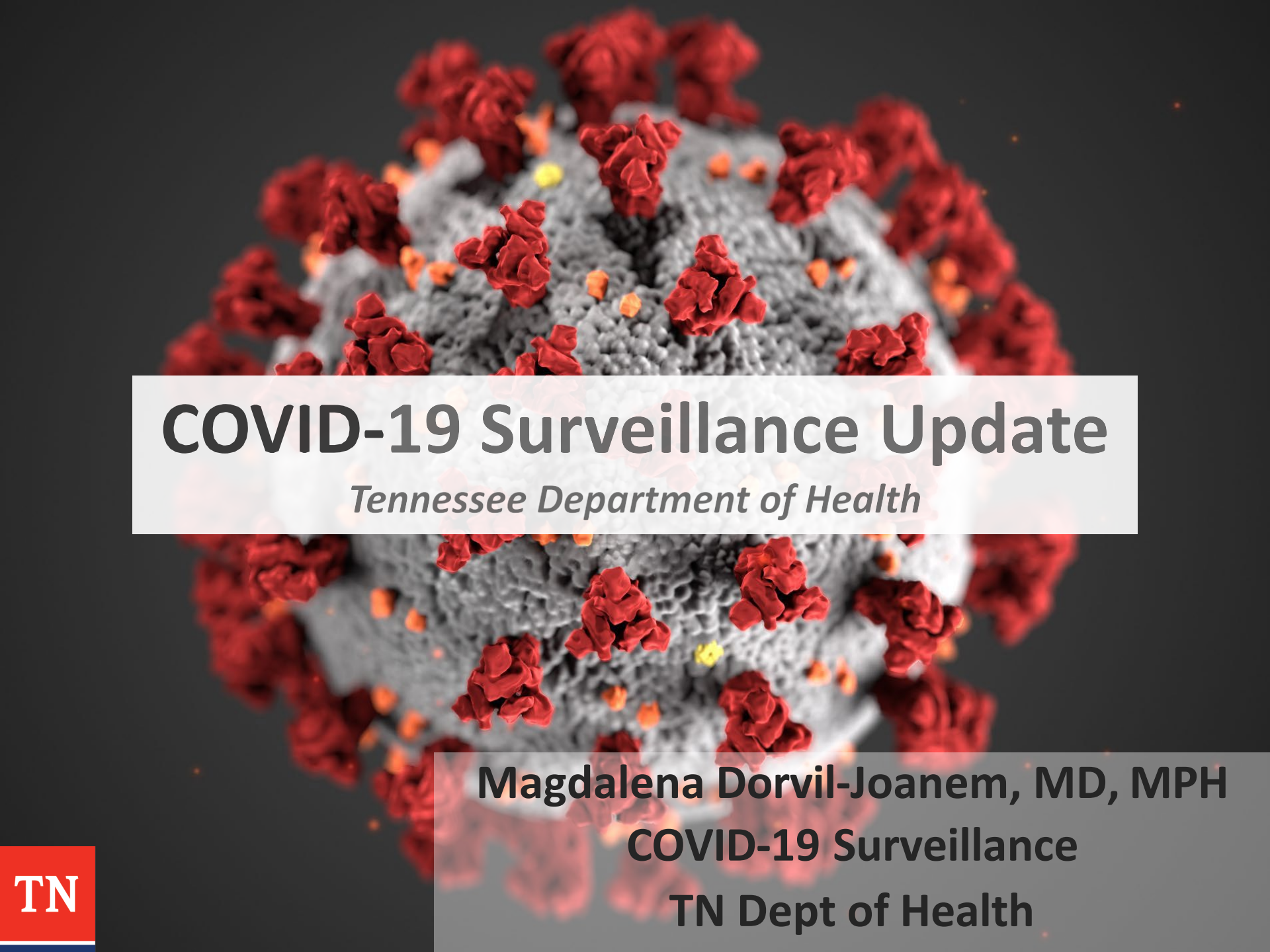
Monday, April 17, 10am CT

Agenda

- **COVID-19 Update**
  - **Magdalena Dorvil-Joanem, MD, MPH**
- **NHSN Update**
  - **Vicky Reed, AAS, RN, CIC**
- **Downstream *C. auris* Transfer Letter**
- **Resistance Mechanisms of MDROs**
  - **Simone Godwin, DVM, MPH, MS**
- **Multi-Drug Resistant Organism (MDRO) Surveillance Team Update**
  - **Marissa Turner, MPH**

TDH NHSN Team

- **Abigail Marrero, MPH - NEW!**
  - Senior NHSN Epidemiologist
- **Vicky Reed, AAS, RN, CIC**
  - Senior NHSN Public Health Nurse Consultant
    - Lead Technological Assistance
  - Infection Prevention and Control Specialist
- **Tara Suhs, MPH**
  - Assistant NHSN Epidemiologist
  - MRSA Initiative Lead
- **Ashley Gambrell, MPH**
  - Assistant NHSN Epidemiologist
- **Marissa Turner, MPH**
  - Assistant NHSN Epidemiologist
- **Alex Kurutz, MPH**
  - Dialysis Epidemiologist
- **Dr. Simone Godwin, DVM, MPH, MS**
  - Outbreak Lead



COVID-19 Surveillance Update

Tennessee Department of Health

Magdalena Dorvil-Joanem, MD, MPH
COVID-19 Surveillance
TN Dept of Health

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NHSN Updates

Information for PSC-Facility Users

- **NHSN implemented a temporary adjustment to the Patient Safety Component "Line Listing - Participation Alerts" and "Frequency Table - Participation Alerts" analysis reports, located in the Advanced folder of the NHSN analysis menu.**
  - **Starting with datasets generated on or after 6:00am ET on 04/06/2023, no data will be included in the dataset used to generate these two specific reports.**
  - **Note that this adjustment impacts the above-mentioned analysis reports only, and only for facility-level users.**
  - **This does not impact the functionality of the Alerts themselves and does not impact Group-level users.**

NHSN AU option Users Call

- **NHSN Antimicrobial Use (AU) Option Users Call:**
  - **Tuesday, April 18 from 3:00-4:00pm ET.**
  - **The call will feature an overview of using AU data at the NHSN Group level and two external speakers will share their use cases.**
  - **We'll also highlight updates for the Standardized Antimicrobial Administration Ratios (SAARs) including a sneak-peak at the AUR Team plans for the next SAAR re-baseline.**
  - **The Team will highlight some important announcements and also leave time for audience Q&A.**

https://cdc.zoomgov.com/webinar/register/WN_Ntmhq0o2RDqCRpEAA3_AGQ

Corrected Version of Data Tracking Worksheet

- **NHSN discovered and corrected two issues with the October 2022 - Excel Data Tracking Worksheet for facilities reporting COVID-19 vaccination data for healthcare personnel through the Healthcare Personnel Safety Component.**
  - **Please download the corrected version dated October 2022 to collect your facility's COVID-19 vaccination data.**
  - **Data from earlier versions of the worksheet may also be copied and pasted into the updated data tracking worksheet.**
  - **Please review the Excel Data Tracking Worksheet Reference Guide -February 2023 for instructions on how to copy and paste these data.**

Letter: Accepting Resident Transfers with Possible or Confirmed *C. auris*

TN Department of Health

April 6, 2023

Re: Nursing Home Acceptance of *Candida auris (C. auris)* Colonized Residents

Dear Nursing Home Staff,

Thank you for your interest and concerns regarding *Candida auris (C. auris)* which is an emerging fungus first detected in Tennessee in 2022. Though *C. auris* is a serious threat, nursing home residents can be safely admitted and cared for in nursing homes regardless of their colonization status or pending test results. A positive colonization screen, or an unknown *C. auris* status, is not justification for denial of admission.

Tenn. Comp. R. & Regs 0720-18-.03 details infection control conditions required for nursing homes including the prevention of communicable diseases. Denial of admission on the grounds of communicable disease status may be grounds for complaint due to discrimination or inappropriate infection control procedures (see R. & Regs 0720-18-.03). Tennessee's Healthcare-Associated Infections and Antimicrobial Resistance Program (HAI/AR) is able to provide free on-site infection prevention consults to assist your nursing home in ensuring effective infection control practices are in place at your facility.

C. auris colonized residents, or those awaiting screening results, can be safely managed utilizing contact precautions or enhanced barrier precautions as detailed in CDCs Strategies for Prevention and Response to Novel and Targeted Multi-Drug Resistant Organisms (MDROs), which can be found here. Disinfectant products from the EPAs List P or EPA List K are effective for daily and terminal cleaning and disinfection procedures.

If a nursing home is considering requiring a *C. auris* colonization screen on admission, HAI/AR can provide that nursing home with *C. auris* testing supplies free of charge, including specimen transportation. Testing at the state public health lab can be completed within 48 hours of receiving samples. Whilst a nursing home is awaiting results, a resident can be safely cared for at the nursing home. A hospital stay should not be extended for a resident due to pending *C. auris* status or for positive *C. auris* colonization.

The HAI/AR program will be proactive in engaging with all facility types, including nursing homes, to discuss safe ways to care for residents colonized with *C. auris* or those being transferred without a known *C. auris* status. To arrange an infection prevention consult or a *C. auris* admission testing strategy at your nursing home, please contact HAI.Health@tn.gov or call (615) 741- 7247 and request HAI.

We thank you again for all you do to safeguard resident wellbeing. If you have any questions or concerns, please reach out to one of HAI/AR's Infection Preventionists or any HAI/AR team member.

Sincerely,

Christopher Wilson, MD, MPH
Medical Director
Healthcare-Associated Infections and Antimicrobial Resistance Program

Communicable and Environmental Diseases and Emergency Preparedness Division
710 James Robertson Parkway • Andrew Johnson Tower • Nashville, TN 37243
Tel: 615-741-7247 • Fax: 615-741-3857 • tn.gov/health

Background of Select Multidrug-resistant Organisms (MDROs) and Resistance Mechanisms

Simone Godwin, DVM, MS, MPH| Epidemiologist | HAI/AR Program

Organisms of Interest

- **Gram-negative bacteria**

- **Carbapenem-resistant *Acinetobacter baumanii* (CRAB)**
- **Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA)**
  - **CRAB and CRPA only include those two species**

- **Carbapenem-resistant Enterobacterales**
  - **Enterobacterales is an order of gram-negative bacteria**

CRE

- **“The Big Three”**
  - ***Escherichia***
    - ***E. coli***
  - ***Klebsiella***
    - ***Klebsiella pneumoniae* (the KP part of KPC)**
  - ***Enterobacter***
    - ***Enterobacter cloacae***

CRE

- **Other common genera:**
  - ***Citrobacter***
  - ***Serratia***
  - ***Proteus***
  - ***Providencia***
  - ***Morganella***
  - ***Salmonella***

Why do we care?

2019 AR Threats Report

CDC's *Antibiotic Resistance Threats in the United States, 2019* [PDF – 150 pages] (2019 AR Threats Report) includes the latest national death and infection estimates for 18 antimicrobial-resistant bacteria and fungi. This report underscores the continued threat of antimicrobial resistance in the U.S., the actions taken to combat this threat, and gaps slowing progress.

The germs are listed in three categories—urgent, serious, and concerning—based on level of concern to human health. The report also includes a Watch List with three threats that have not spread widely in the U.S. but could become common without continued aggressive action.

https://www.cdc.gov/drugresistance/biggest-threats.html

Why do we care?

Urgent Threats

These germs are public health threats that require urgent and aggressive action:

CARBAPENEM-RESISTANT
ACINETOBACTER

CARBAPENEM-RESISTANT
ENTEROBACTERIACEAE

Resistant Pathogen	2017 Threat Estimate	2018 Threat Estimate	2019 Threat Estimate	2017-2019 Change	2020 Threat Estimate and 2019-2020 Change
Carbapenem-resistant *Acinetobacter*	8,500 cases 700 deaths	6,300 cases 500 deaths	6,000 cases 500 deaths	Stable*	7,500 cases 700 deaths **Overall: 35% increase*** **Hospital-onset: 78% increase***
Carbapenem-resistant Enterobacterales	13,100 cases 1,100 deaths	10,300 cases 900 deaths	11,900 cases 1,000 deaths	▼ Decrease*	12,700 cases 1,100 deaths Overall: Stable* **Hospital-onset: 35% increase***

Why do we care?

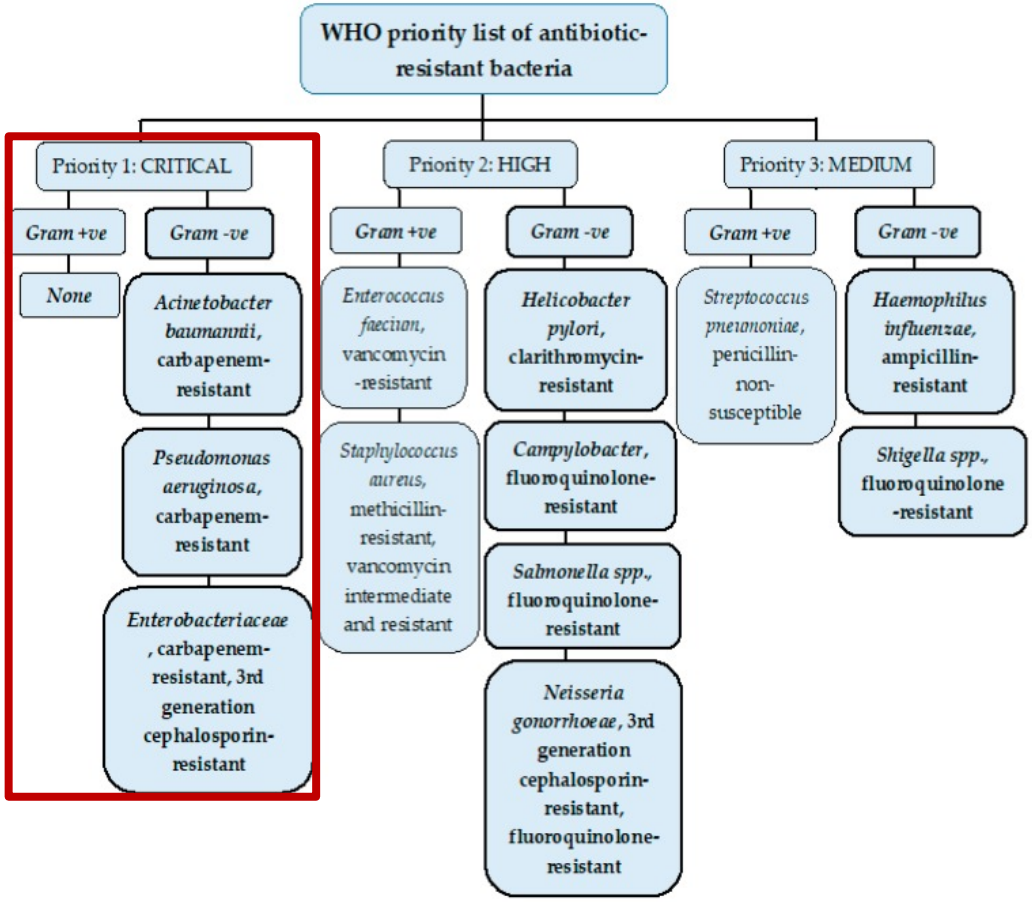
Serious Threats

These germs are public health threats that require prompt and sustained action:

MULTIDRUG-RESISTANT
PSEUDOMONAS AERUGINOSA

Resistant Pathogen	2017 Threat Estimate	2018 Threat Estimate	2019 Threat Estimate	2017-2019 Change	2020 Threat Estimate and 2019-2020 Change
Multidrug-resistant *Pseudomonas aeruginosa*	32,600 cases 2,700 deaths	29,500 cases 2,500 deaths	28,200 cases 2,400 deaths	Decrease*	28,800 cases 2,500 deaths Overall: Stable* **Hospital-onset: 32% increase***

Why do we care?



Why do we care?

Date Reported: 8/20/2021

PRELIMINARY REPORT

Page 1 of 3

Accession #: **N21E195096-01**

Patient Name: [redacted]

Date of Birth: [redacted] Sex: [redacted]

Patient ID:

Medical Record No.:

Specimen Type: **Bacterial isolate specimen**

Specimen Source: **Sputum**

Date Collected: **08/09/2021**

Date Received: **08/17/2021**

Date of Onset:

Race:

Ethnicity:

Facility: [redacted]

Nashville, TN 37202

Ordering Provider:

County: **Davidson**

Region: **Nashville/ Davidson County**

Patient Address:

, TN

Event ID:

Carbapenem Resistant Organism Culture

Key:
S=Susceptible
I=Intermediate
R=Resistant

RESULT:Carbapenem Resistant Organism Culture *Acinetobacter baumannii*

Provider Reported Organism Acinetobacter baumannii NASHVILLE

Why do we care?

BMD

Acinetobacter baumannii

Drug	Interpretation	Results	Units	Reference Range S	Reference Range I	Reference Range R	Location
Amikacin	Resistant	> 32	ug/mL	<= 16	32	> 32	NASHVILLE
Cefepime	Resistant	> 16	ug/mL	<= 8	16	> 16	NASHVILLE
Cefotaxime	Resistant	> 32	ug/mL	<= 8	16 - 32	> 32	NASHVILLE
Ceftazidime	Resistant	> 16	ug/mL	<= 8	16	> 16	NASHVILLE
Ciprofloxacin	Resistant	> 2	ug/mL	<= 1	2	> 2	NASHVILLE
Doripenem	Non-susceptible	> 2	ug/mL	<= 2		> 2	NASHVILLE
Doxycycline	Resistant	> 16	ug/mL	<= 4	8	>= 16	NASHVILLE
Gentamicin	Resistant	> 8	ug/mL	<= 4	8	> 8	NASHVILLE
Imipenem	Resistant	> 8	ug/mL	<= 2	4	>= 8	NASHVILLE

Why do we care?

Date Reported: 8/20/2021

PRELIMINARY REPORT

Accession #: **N21E195096-01**

Acinetobacter baumannii	Levofloxacin	Resistant	> 8	ug/mL	<= 2	4	>= 8	NASHVILLE
	Meropenem	Resistant	> 8	ug/mL	<= 2	4	>= 8	NASHVILLE
	Minocylcine	Resistant	16	ug/mL	<= 4	8	>= 16	NASHVILLE
	Piperacillin+Tazobactam	Resistant	> 64/4	ug/mL	<= 16/4	32/4 - 64/4	> 64/4	NASHVILLE
	Ticarcillin+Clavulanate	Resistant	> 128/2	ug/mL	<= 16/2	32/2 - 64/2	>= 128/2	NASHVILLE
	Tobramycin	Resistant	> 8	ug/mL	<= 4	8	> 8	NASHVILLE
	Trimethoprim+Sulfamethoxazole	Resistant	> 4/76	ug/mL	<= 2/38		>= 4/76	NASHVILLE

A Note on Gram-positives

- **There are concerning antibiotic-resistant gram-positive bacteria**
  - **E.g. methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococci* (VRE), etc.**

And it's not that we don't care:

- **Gram-negative bacteria are more intrinsically resistant to antibiotics than gram-positive bacteria**
  - **Have not posed as much of a concern**

- **The ARLN Southeast Regional Lab in Tennessee is not currently validated to perform additional testing (full AST panel, PCR for resistance genes) on gram-positives**

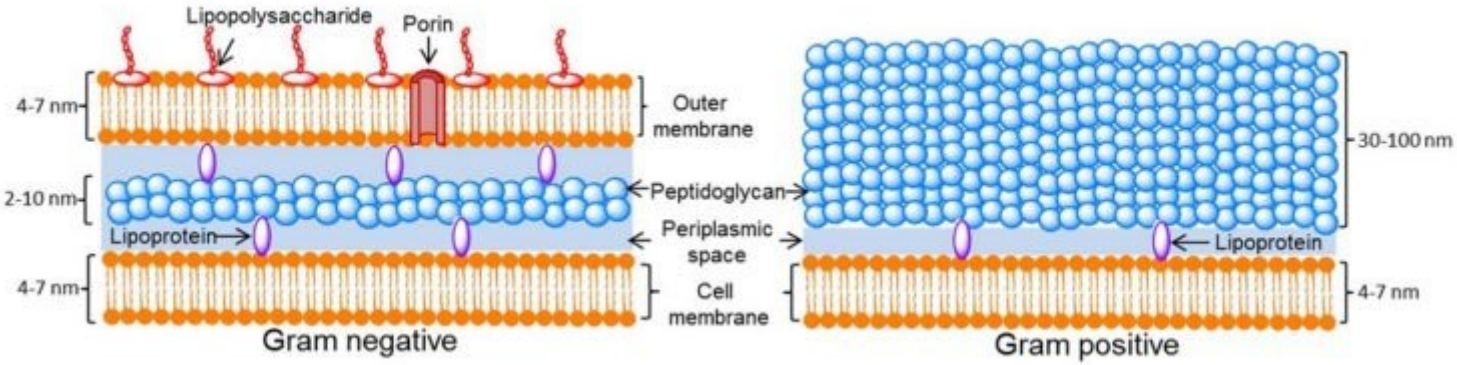
TN

Gram-negative vs. gram-positive

Gram-positive | Ex. *Streptococcus*
Thick peptidoglycan layer absorbs surrouding materials, even toxins. Easier to kill, develops resistance slower.

Gram-negative | Ex. *E. coli*
Thin peptidoglycan layer covered by multiple thin layers of membrane which eject toxins. Harder to kill, quick to develop resistance.

https://blog.eoscu.com/blog/gram-positive-vs-gram-positive

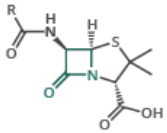


European Pharmaceutical Review, 2019

Key: COMMONLY ACT AS BACTERIOSTATIC AGENTS, RESTRICTING GROWTH & REPRODUCTION — COMMONLY ACT AS BACTERICIDAL AGENTS, CAUSING BACTERIAL CELL DEATH

ß-LACTAMS

MOST WIDELY USED ANTIBIOTICS IN THE NHS



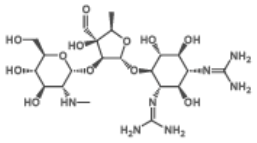
All contain a beta-lactam ring

EXAMPLES
Penicillins (shown) such as amoxicillin and flucloxacillin; *Cephalosporins* such as cefalexin.

MODE OF ACTION
Inhibit bacteria cell wall biosynthesis.

AMINOGLYCOSIDES

FAMILY OF OVER 20 ANTIBIOTICS



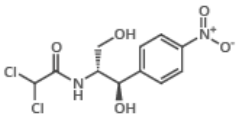
All contain aminosugar substructures

EXAMPLES
Streptomycin (shown), neomycin, kanamycin, paromomycin.

MODE OF ACTION
Inhibit the synthesis of proteins by bacteria, leading to cell death.

CHLORAMPHENICOL

COMMONLY USED IN LOW INCOME COUNTRIES



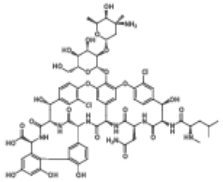
Distinct individual compound

MODE OF ACTION
Inhibits synthesis of proteins, preventing growth.

No longer a first line drug in any developed nation (except for conjunctivitis) due to increased resistance and worries about safety.

GLYCOPEPTIDES

COMMON 'DRUGS OF LAST RESORT'



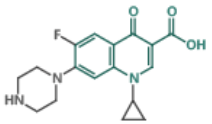
Consist of carbohydrate linked to a peptide formed of amino acids

EXAMPLES
Vancomycin (shown), teicoplanin.

MODE OF ACTION
Inhibit bacteria cell wall biosynthesis.

QUINOLONES

RESISTANCE EVOLVES RAPIDLY



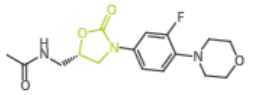
All contain fused aromatic rings with a carboxylic acid group attached

EXAMPLES
Ciprofloxacin (shown), levofloxacin, trovafloxacin.

MODE OF ACTION
Interfere with bacteria DNA replication and transcription.

OXAZOLIDINONES

POTENT ANTIBIOTICS COMMONLY USED AS 'DRUGS OF LAST RESORT'



All contain 2-oxazolidone somewhere in their structure

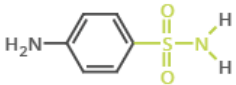
EXAMPLES
Linezolid (shown), posizolid, tedizolid, cycloserine.

MODE OF ACTION
Inhibit synthesis of proteins by bacteria, preventing growth.

DISCOVERY 1930 1940 1950 1960 1970 1980

SULFONAMIDES

FIRST COMMERCIAL ANTIBIOTICS WERE SULFONAMIDES



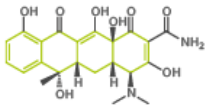
All contain the sulfonamide group

EXAMPLES
Prontosil, sulfanilamide (shown), sulfadiazine, sulfisoxazole.

MODE OF ACTION
Do not kill bacteria but prevent their growth and multiplication. Cause allergic reactions in some patients.

TETRACYCLINES

BECOMING LESS POPULAR DUE TO DEVELOPMENT OF RESISTANCE



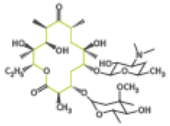
All contain 4 adjacent cyclic hydrocarbon rings

EXAMPLES
Tetracycline (shown), doxycycline, limecycline, oxytetracycline.

MODE OF ACTION
Inhibit synthesis of proteins by bacteria, preventing growth.

MACROLIDES

SECOND MOST PRESCRIBED ANTIBIOTICS IN THE NHS



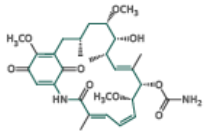
All contain a 14-, 15-, or 16-membered macrolide ring

EXAMPLES
Erythromycin (shown), clarithromycin, azithromycin.

MODE OF ACTION
Inhibit protein synthesis by bacteria, occasionally leading to cell death.

ANSAMYCINS

CAN ALSO DEMONSTRATE ANTIVIRAL ACTIVITY



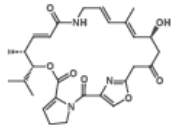
All contain an aromatic ring bridged by an aliphatic chain.

EXAMPLES
Geldanamycin (shown), rifamycin, naphthomycin.

MODE OF ACTION
Inhibit the synthesis of RNA by bacteria, leading to cell death.

STREPTOGRAMINS

TWO GROUPS OF ANTIBIOTICS THAT ACT SYNERGISTICALLY



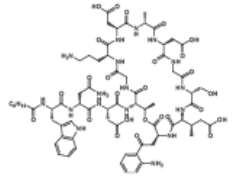
Combination of two structurally differing compounds, from groups denoted A & B

EXAMPLES
Pristinamycin IIA (shown), Pristinamycin IA.

MODE OF ACTION
Inhibit the synthesis of proteins by bacteria, leading to cell death.

LIPOPEPTIDES

INSTANCES OF RESISTANCE RARE



All contain a lipid bonded to a peptide

EXAMPLES
Daptomycin (shown), surfactin.

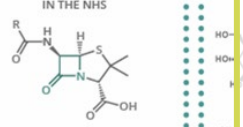
MODE OF ACTION
Disrupt multiple cell membrane functions, leading to cell death.

DIFFERENT CLA… … OVERVIEW

New: COMMONLY ACT AS BACTERIOSTATIC AG… …NTS, CAUSING BACTERIAL CELL DEATH

ß-LACTAMS

MOST WIDELY USED ANTIBIOTICS IN THE NHS



All contain a beta-lactam ring

EXAMPLES

Penicillins (shown) such as amoxicillin and flucloxacillin; *Cephalosporins* such as cefalexin.

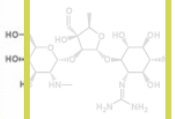
MODE OF ACTION

Inhibit bacteria cell wall biosynthesis.

DISCOVERY 1930

AMINOGLYCOSIDES

FA…MILY OF OVER 20 ANTIBI…



All …contain aminosugar substru…

EXAMPLES

St…ptomycin (shown), neom… kanamycin, paromomyci…

MODE OF ACTION

Inh…bit the synthesis of prote… bacteria, leading to cell dea…

19…

SULFONAMIDES

FIRST C…MMERCIAL ANTIBIOTICS WE… SULFONAMIDES

All contain the sulfonamide g…up

EXAMPLES

Prontosil, sulfanilamide (shown), sulfadiazine, sulfisoxazole.

MODE OF ACTION

Do not kill bacteria but prevent their growth and multiplication. Cause allergic reactions in some patients.

TETRACYCLINES

BECOMING LESS POPULAR D… DEVELOPMENT OF RESISTA…

All contain 4 adjacent cycl… hydrocarbon rings

EXAMPLES

Tetracycline (shown), doxycy… limecycline, oxytetracycli…

MODE OF ACTION

In…t synthesis of protein… ba…ia, preventing grow…

OXAZOLIDINONES

POTENT ANTIBIOTICS COMMONLY USED AS 'DRUGS OF LAST RESORT'

All contain 2-oxazolidone somewhere in their structure

EXAMPLES

Linezolid (shown), posizolid, tedizolid, cycloserine.

MODE OF ACTION

Inhibit synthesis of proteins by bacteria, preventing growth.

1980

LIPOPEPTIDES

INSTANCES OF RESISTANCE RARE

All contain a lipid bonded to a peptide

EXAMPLES

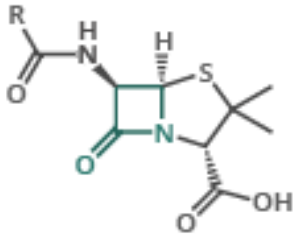
Daptomycin (shown), surfactin.

MODE OF ACTION

Disrupt multiple cell membrane functions, leading to cell death.

ß-LACTAMS

MOST WIDELY USED ANTIBIOTICS IN THE NHS



All contain a beta-lactam ring

EXAMPLES

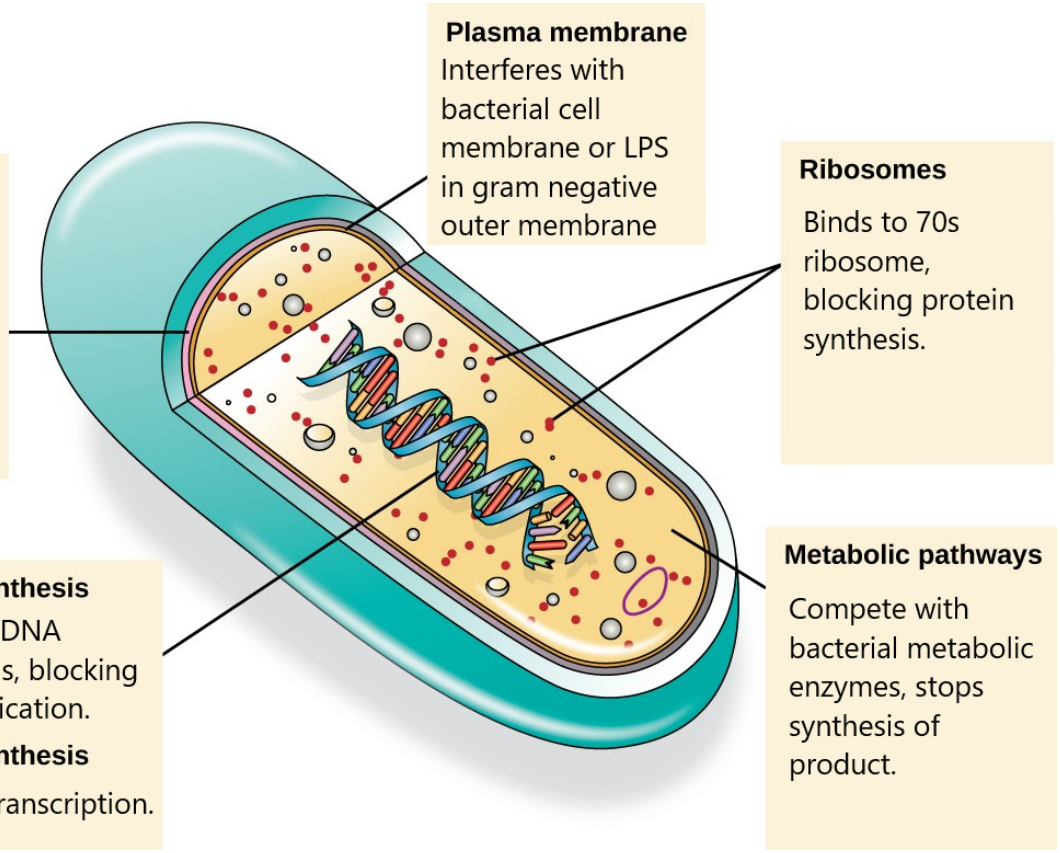
Penicillins (shown) such as amoxicillin and flucloxacillin; *Cephalosporins* such as cefalexin.

MODE OF ACTION

Inhibit bacteria cell wall biosynthesis.

DISCOVERY 1930

Antimicrobial Mechanisms of Activity



Allied Health Microbiology, 2012

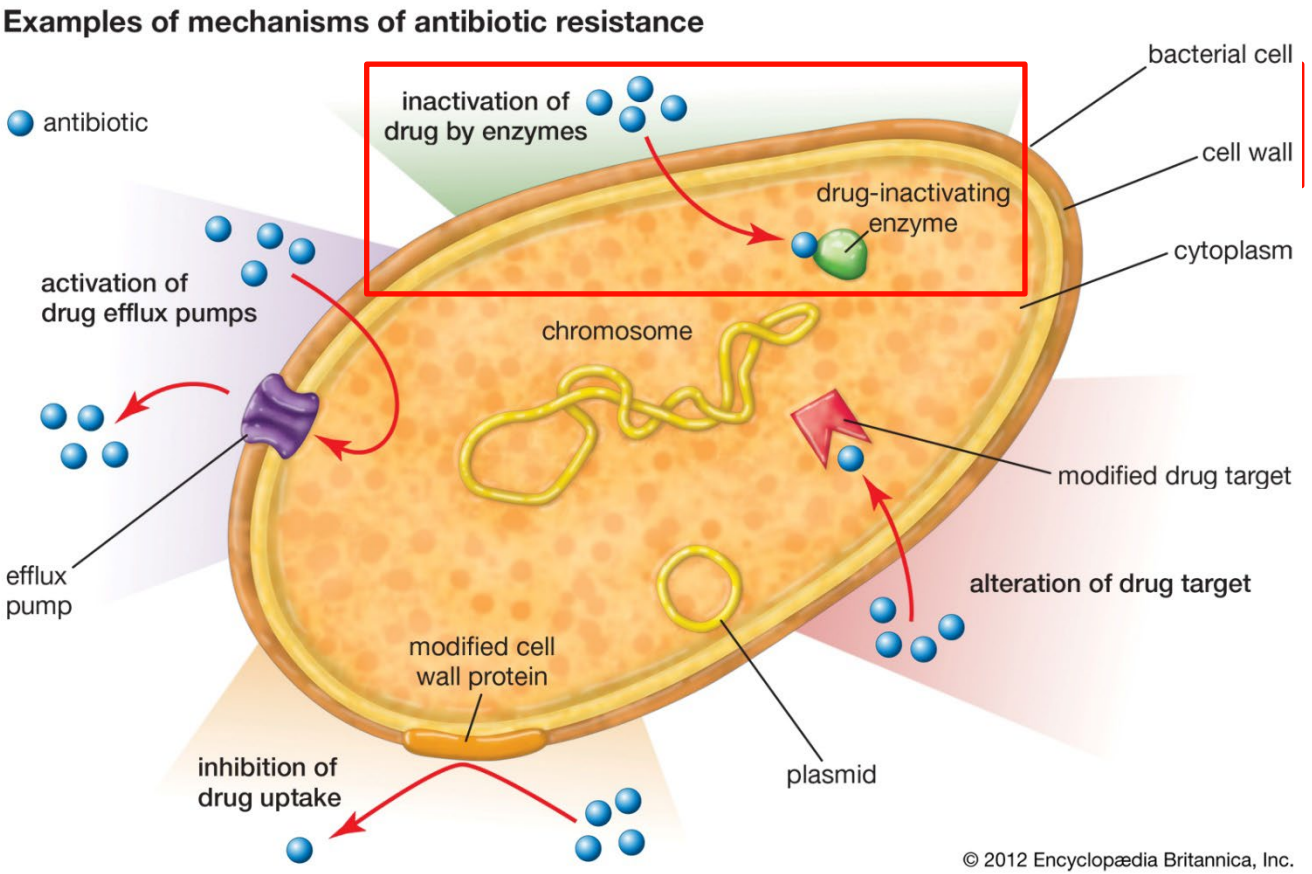
Antimicrobial Mechanisms of Activity

Mode of Action	Target	Drug Class
Inhibit cell wall biosynthesis	Penicillin-binding proteins	β-lactams: penicillins, cephalosporins, monobactams, carbapenems
	Peptidoglycan subunits	Glycopeptides
	Peptidoglycan subunit transport	Bacitracin
Inhibit biosynthesis of proteins	30S ribosomal subunit	Aminoglycosides, tetracyclines
	50S ribosomal subunit	Macrolides, lincosamides, chloramphenicol, oxazolidinones
Disrupt membranes	Lipopolysaccharide, inner and outer membranes	Polymyxin B, colistin, daptomycin
Inhibit nucleic acid synthesis	RNA	Rifamycin
	DNA	Fluoroquinolones
Antimetabolites	Folic acid synthesis enzyme	Sulfonamides, trimethoprim
	Mycolic acid synthesis enzyme	Isonicotinic acid hydrazide
Mycobacterial adenosine triphosphate (ATP) synthase inhibitor	Mycobacterial ATP synthase	Diarylquinoline

Allied Health Microbiology, 2012

TN

Antimicrobial Resistance Mechanisms

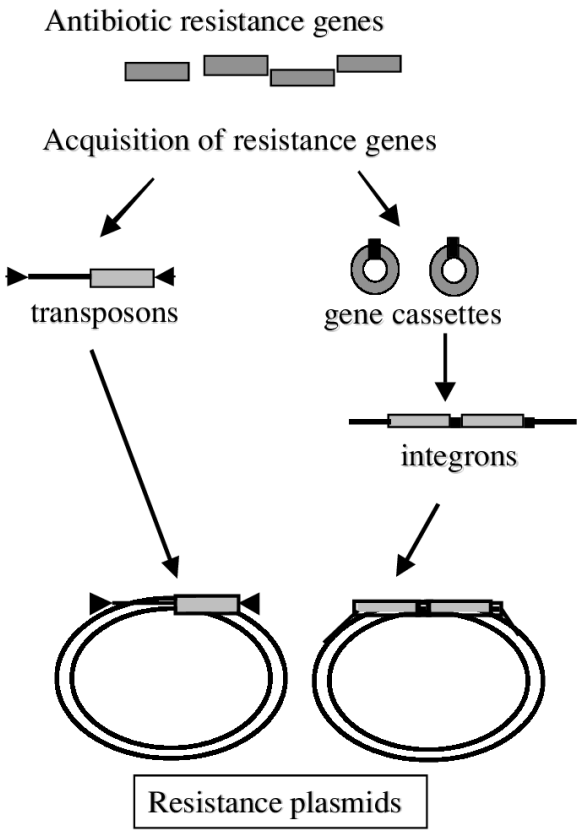


Allied Health Microbiology, 2012

Carbapenemase Production

- **Carbapenemase-producing organisms (CPOs) are able to produce an enzyme which inactivates carbapenem antibiotics**
- **CRE, CRPA, and CRAB are capable of acquiring resistance genes that allow them to produce carbapenemase**
- **These genes can be transferred between bacteria of the same and different species via mobile genetic elements**
  - **This process is called horizontal gene transfer**

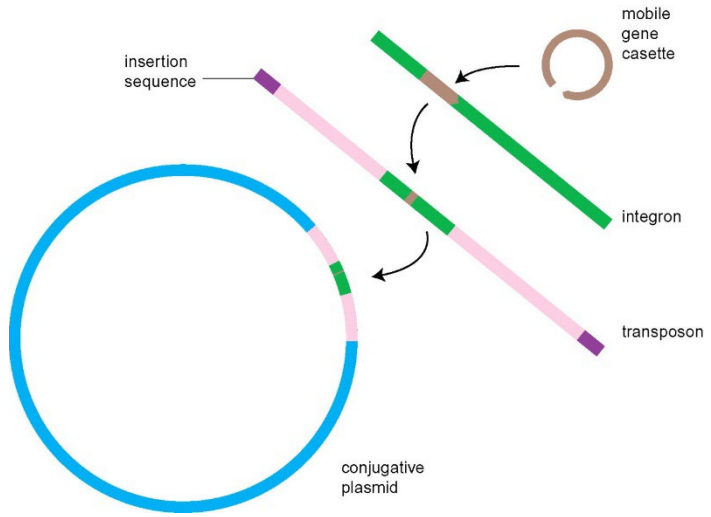
Mobile Genetic Elements



- **Gene cassettes: Contains a gene and a recombination site (allows insertion elsewhere)**
- **Integrons: Capture one ore more cassettes to be transferred together**
- **Transposons: Move genetic material by “cut and paste” mechanism**
- **Plasmids: Circular DNA molecules that replicate independently of the chromosome**
  - **Don’t carry core genes for growth and multiplication**
  - **Do carry genes that allow the cell to exploit certain environmental situations**

Mobile Genetic Elements

- **Elements that can move from**
  - **Cell to cell by replication**
    - **Plasmids**
    - **Transposons**
  - **One location to another within a cell by recombination and/or replication**
    - **Transposons**
    - **Gene Cassettes**

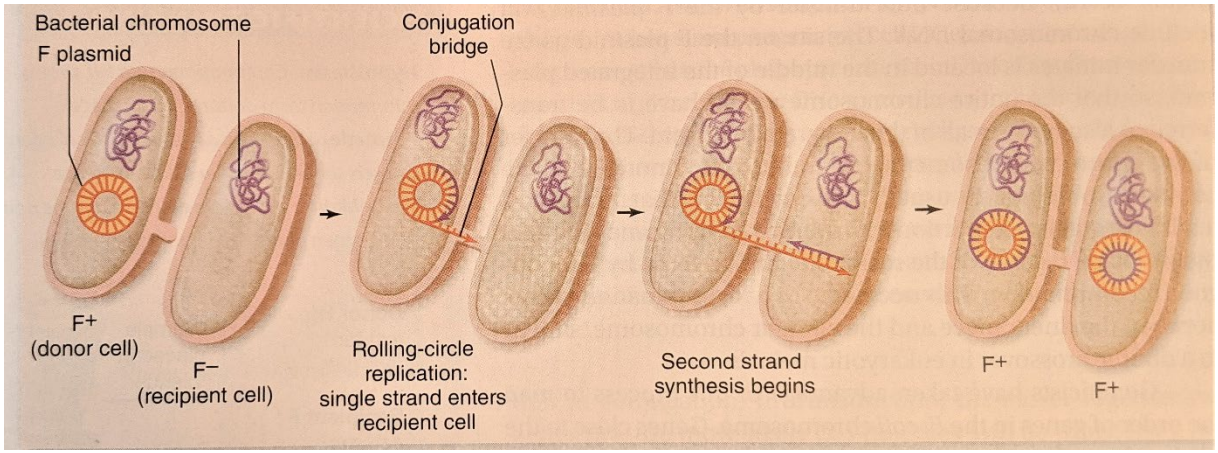


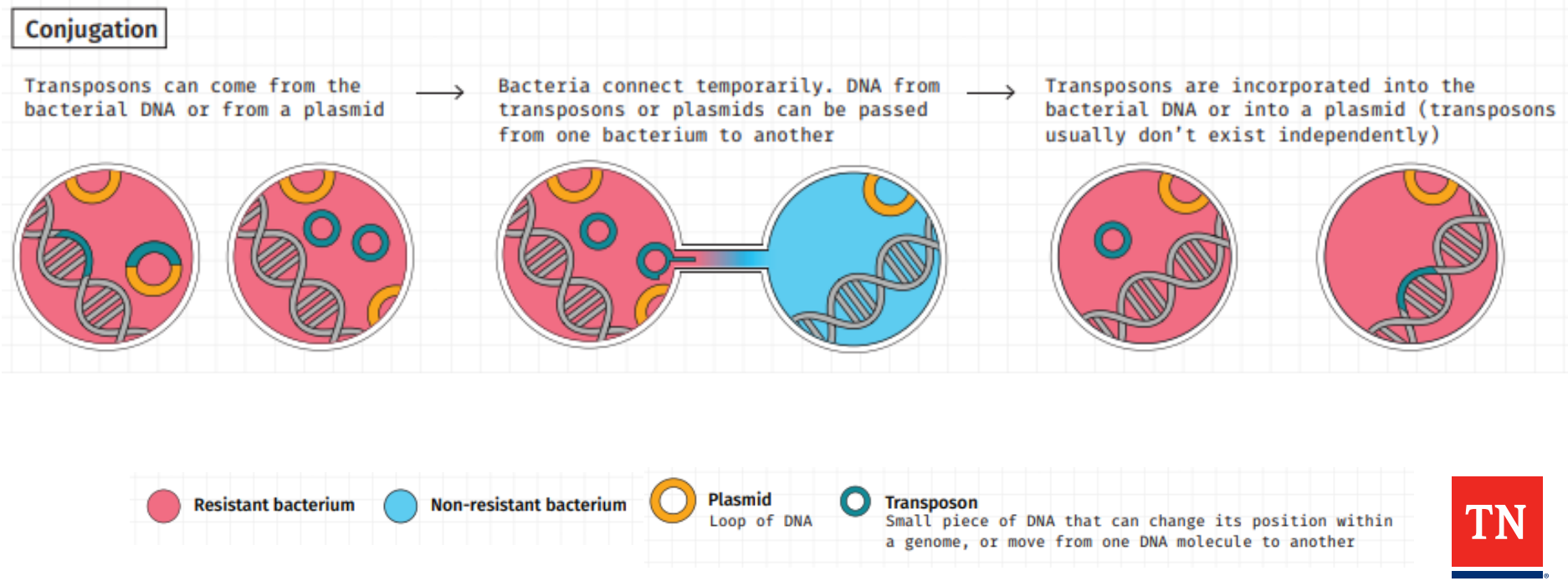
Horizontal Gene Transfer

- **The movement of genetic information between organisms**

- **Types of transfer**
  - **Transformation**
    - **Bacteria take up DNA from their environment**
  - **Conjugation**
    - **Bacteria directly transfer genes to another cell**
  - **Transduction**
    - **Bacteriophages move genes from one cell to another (i.e., a virus that infects bacteria)**

Conjugation





Carbapenemase Genes

The "Big-5"

- **Klebsiella pneumoniae carbapenemase (KPC)***
- **Imipenemase Metallo-β-lactamase (IMP)**
- **New Delhi Metallo-β-lactamase (NDM)**
- **Oxacillinase-48-type carbapenemase (OXA-48)**
- **Verona integron-encoded Metallo-β-lactamase (VIM)**

CRAB-Only OXA Genes

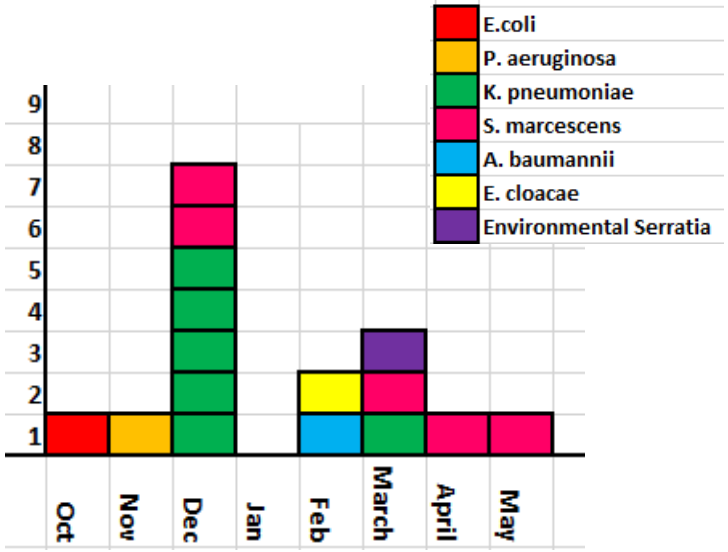
- **Oxacillinase-23-type carbapenemase (OXA-23)**
- **Oxacillinase-24/40-type carbapenemase (OXA-24/40)**
- **Oxacillinase-58-type carbapenemase (OXA-58)**

Carbapenemase Genes

- **Most of these genes share traits**
  - **Ability to hydrolyze all β-lactams other than monobactam**
  - **Often not responsive to β-lactamase inhibitors (e.g., clavulanic acid)**
  - **Have high rate of transfer amongst unrelated bacterial species**
    - **Except OXA-23, 24/40, and 58 genes, which are specific to CRAB**

Data from 2021-2022 Tennessee VIM Outbreak

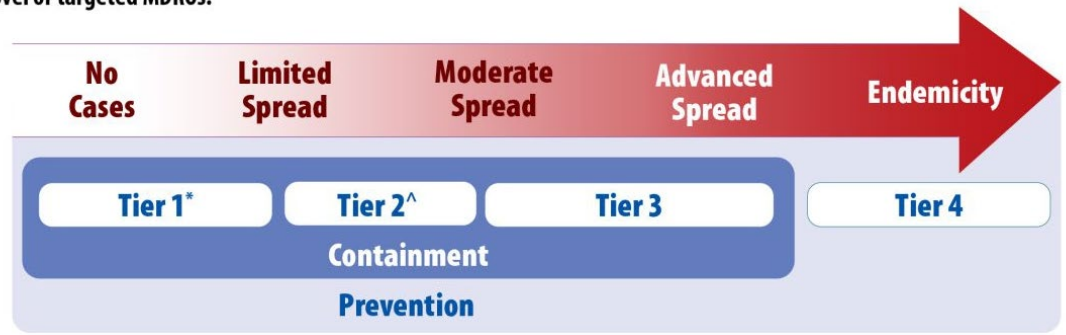
- **15 VIM+ specimens have been identified from 11 patients with specimen collection dates from October 2021 to May 2022**
- **The 15 VIM+ specimens represented 6 different pathogens:**
  - **1 *E.coli* specimen**
  - **1 *P. aeruginosa* specimen**
  - **1 *A. baumannii* specimen**
  - **6 *K. pneumoniae* specimens**
  - **5 *S. marcescens* specimens**
  - **1 *E. cloacae* specimen**



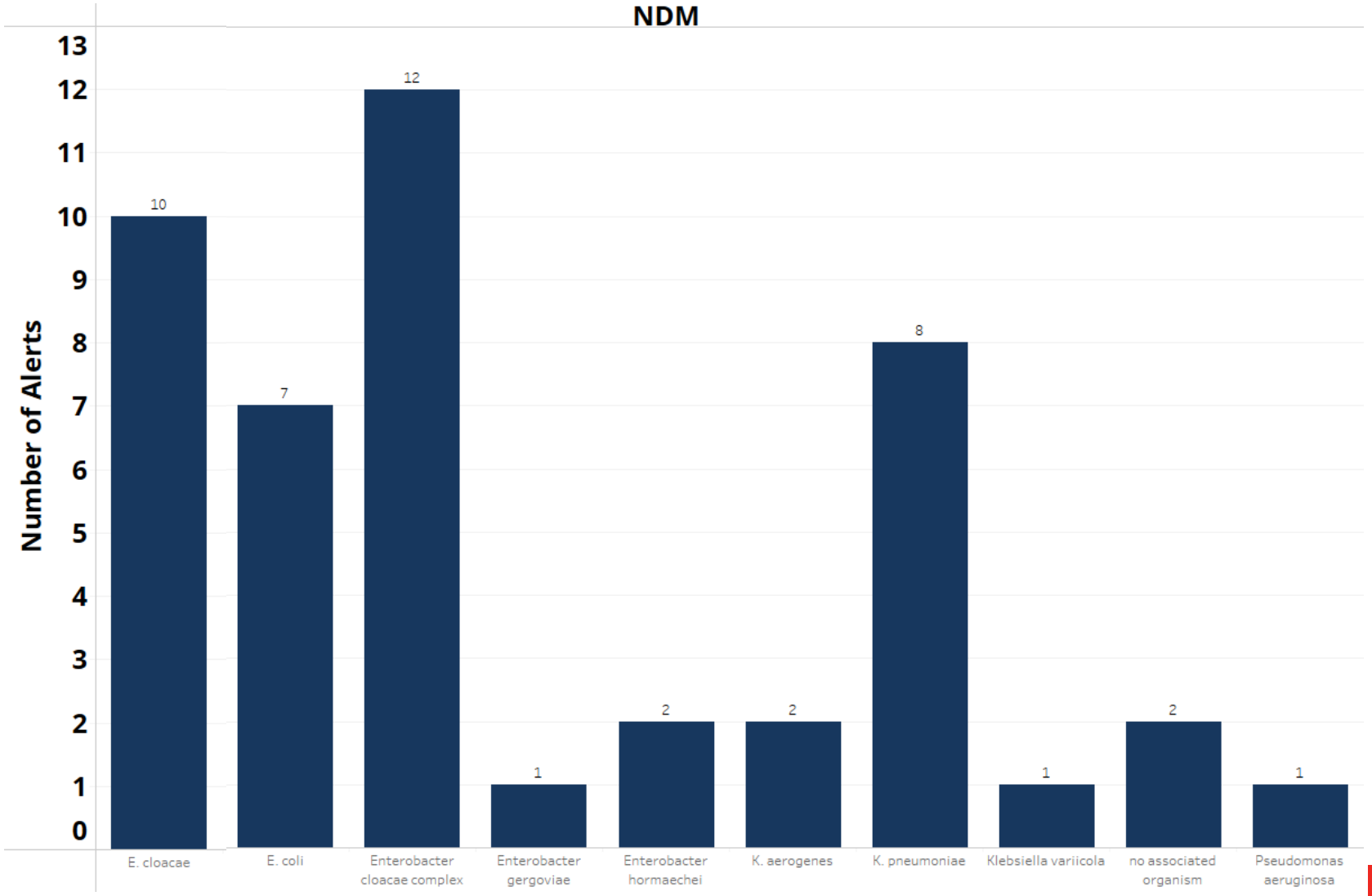
Carbapenemase Genes

- **Some gene-organism combinations are more common than others**
  - **Epidemiology differs by region**
  - **TDH Responses are tiered according to regional epidemiology**
  - **Novel or rare gene-organism combinations may trigger more intensive containment efforts**

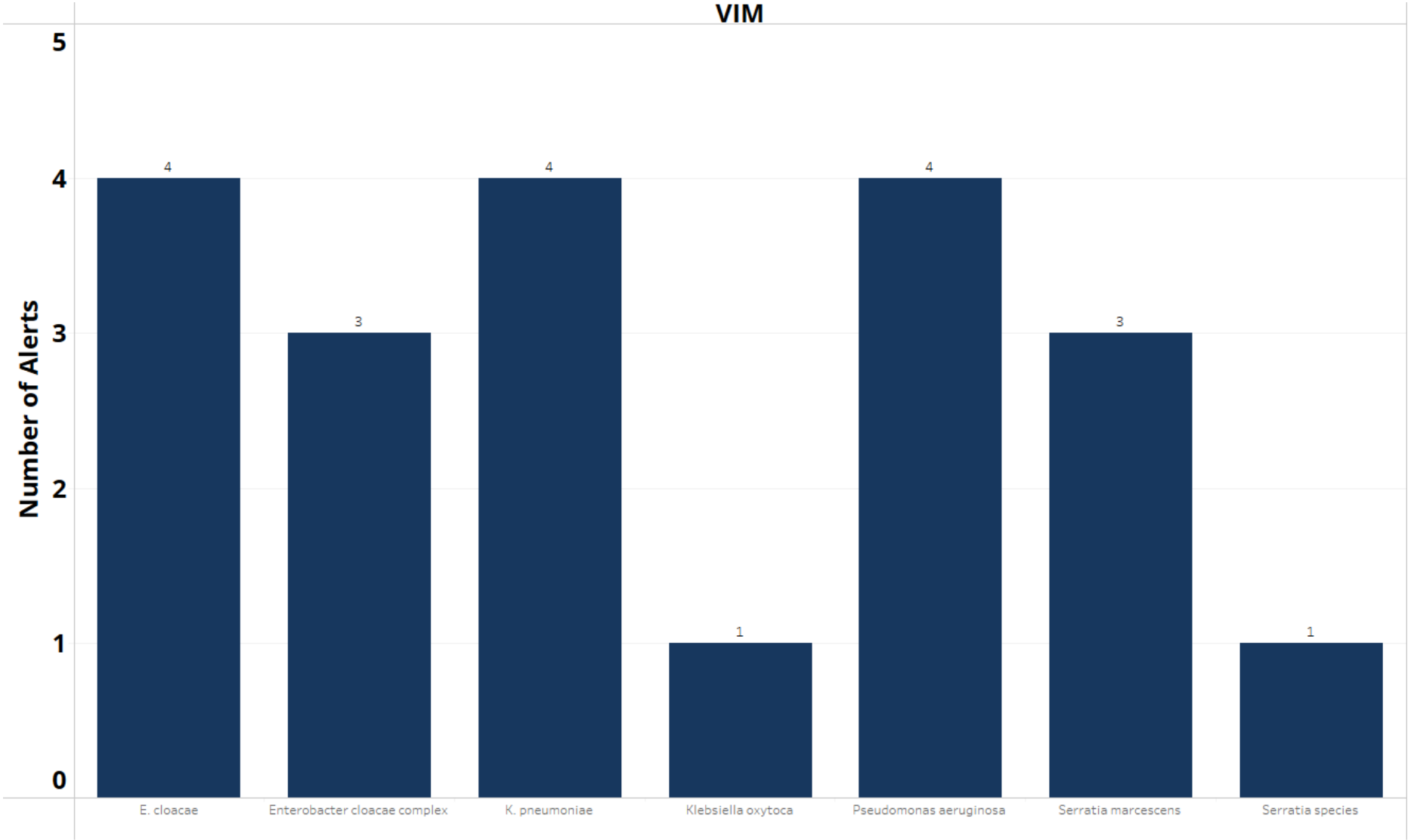
Figure 1. Relationship between epidemic stages, response tiers, containment response, and prevention activities for novel or targeted MDROs.



NDM Organisms, 2022-present

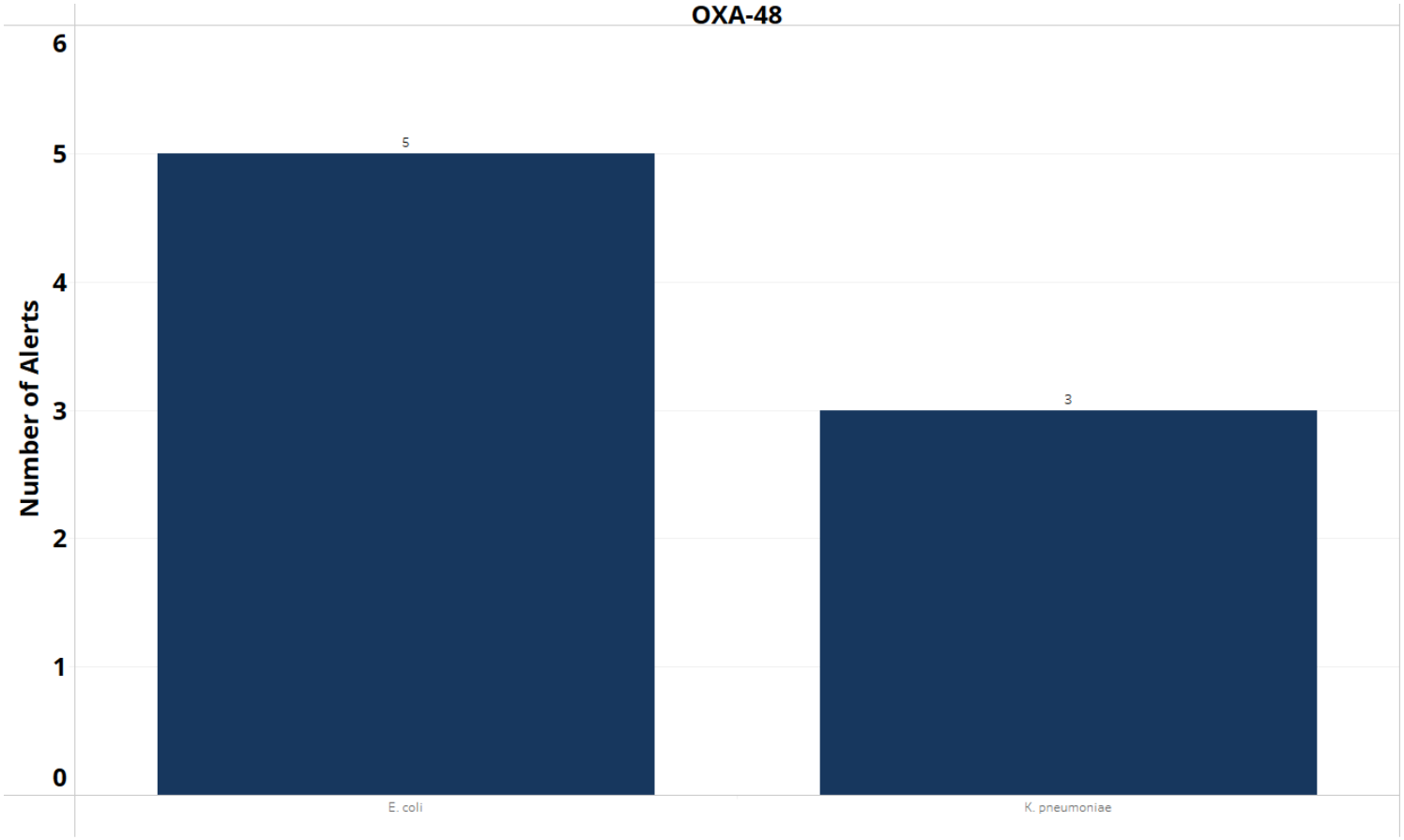


VIM Organisms, 2022-present



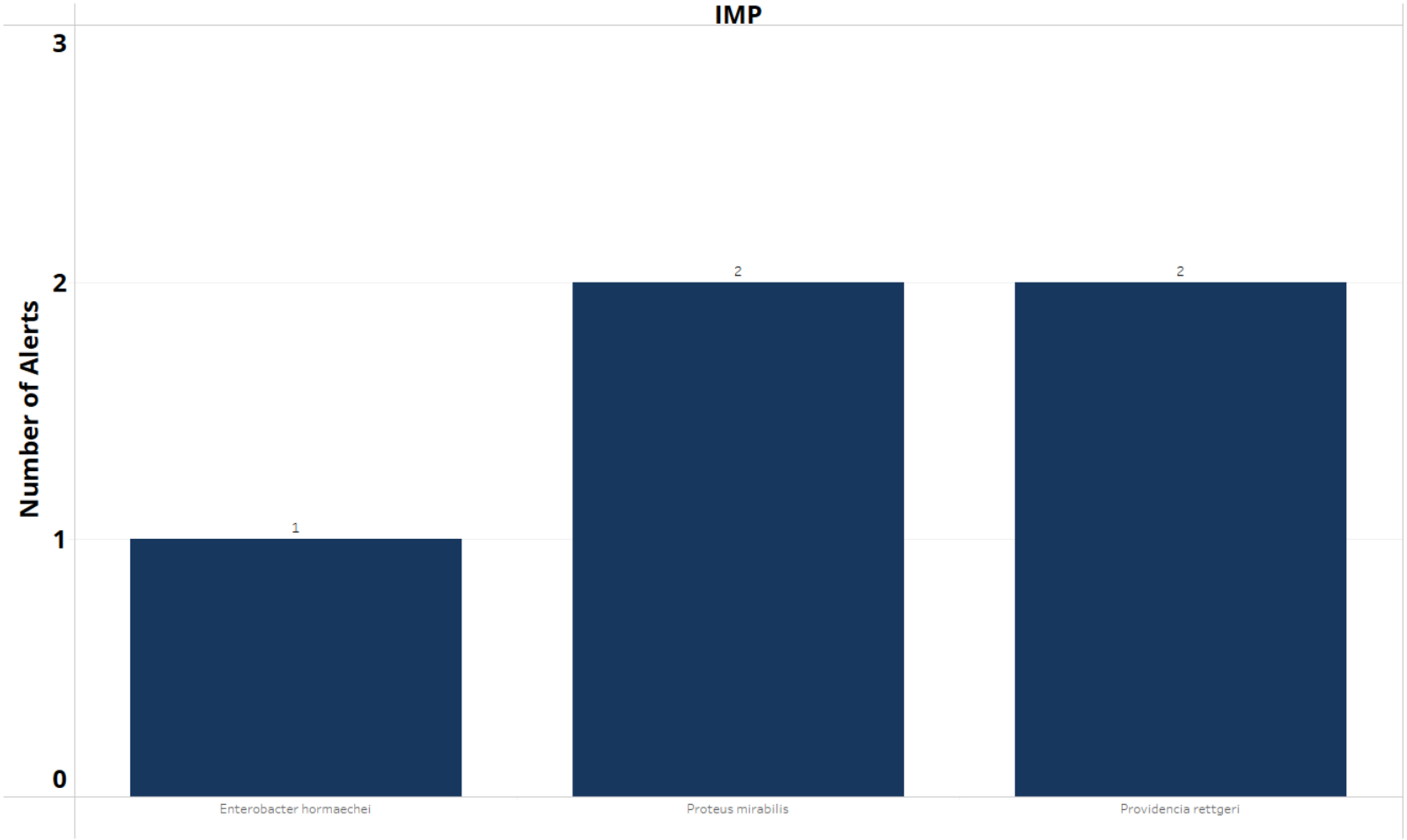
Count of Alerts for each Organism broken down by Resistance Gene. The marks are labeled by count of Alerts. The data is filtered on Date of Notification (MDY), which keeps 123 of 149 members. The view is filtered on Resistance Gene, which keeps VIM.

OXA-48 Organisms, 2022-present



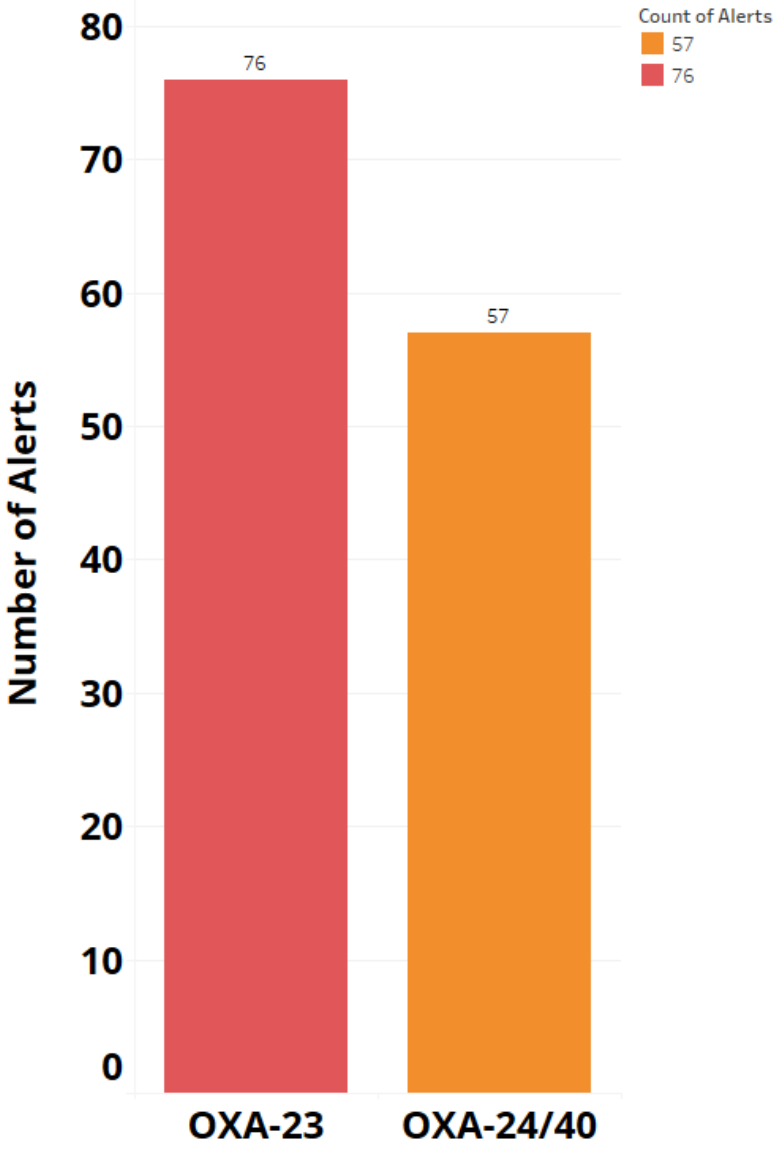
Count of Alerts for each Organism broken down by Resistance Gene. The marks are labeled by count of Alerts. The data is filtered on Date of Notification (MDY), which keeps 123 of 149 members. The view is filtered on Resistance Gene, which keeps OXA-48.

IMP Organisms, 2022-present



Count of Alerts for each Organism broken down by Resistance Gene. The marks are labeled by count of Alerts. The data is filtered on Date of Notification (MDY), which keeps 123 of 149 members. The view is filtered on Resistance Gene, which keeps IMP.

CRAB Genes, 2022-present



Conclusions

- **Carbapenemase-producing organisms represent an urgent public health threat**
- **Horizontal transfer via mobile genetic elements allow unrelated organisms to develop carbapenemase production**
- **Gene-organism combinations are regionally specific and responses are tailored based on regional epidemiology**
- **More to come on reviewing CDC's new MDRO Containment Guidance and its application in Tennessee**

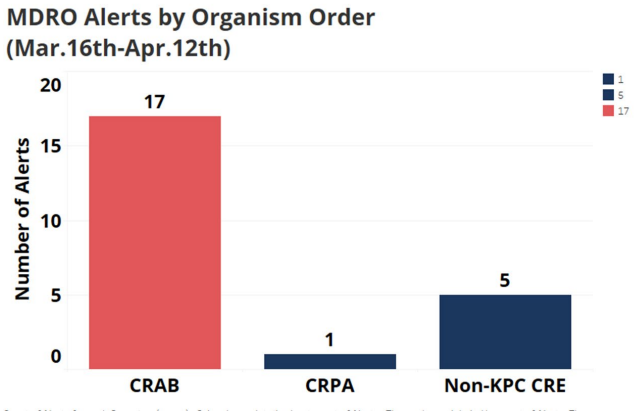
Multi-Drug Resistant Organism (MDRO) Outbreak Team Update

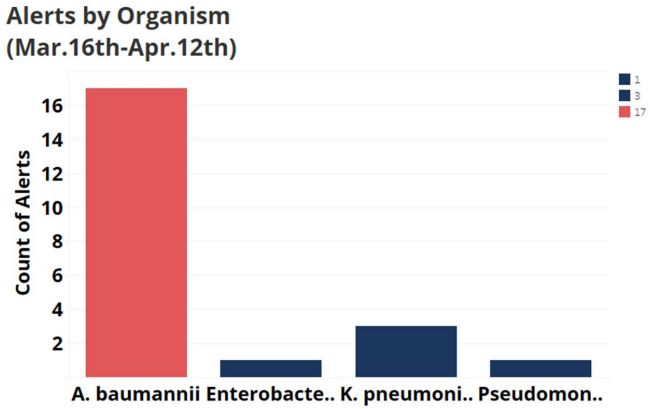
March 16th – April 12th, 2023

Marissa Turner, MPH | April 2023

MDRO Alerts

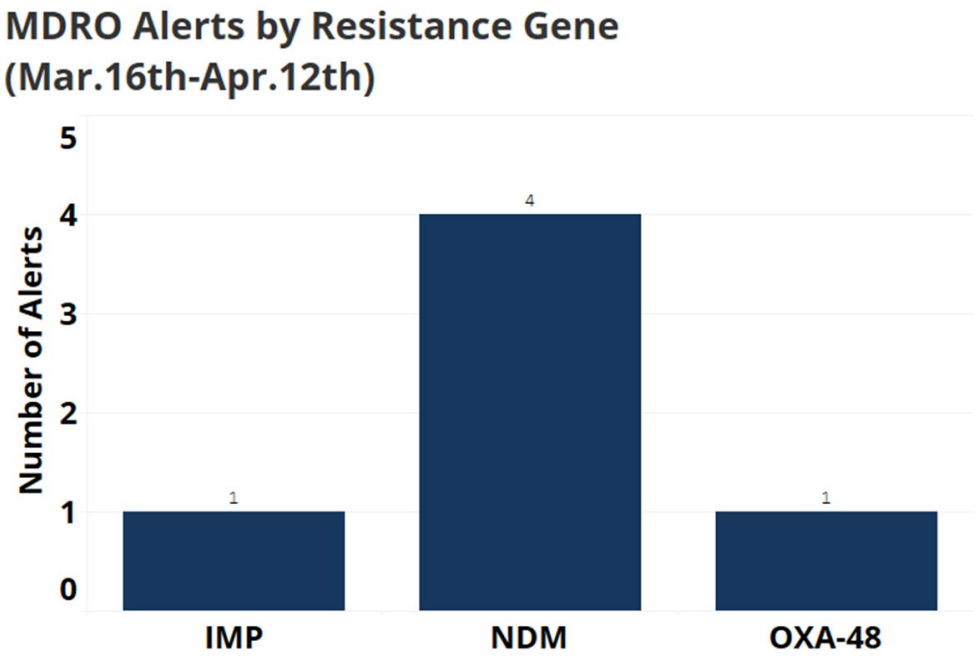
- **CRPA – Carbapenem-resistant *Pseudomonas aeruginosa***
- **CRAB – Carbapenem-resistant *Acinetobacter baumannii***
- **CRE - Carbapenem-resistant *Enterobacterales***
- **KPC – *Klebsiella pneumoniae* Carbapenemase-producing**





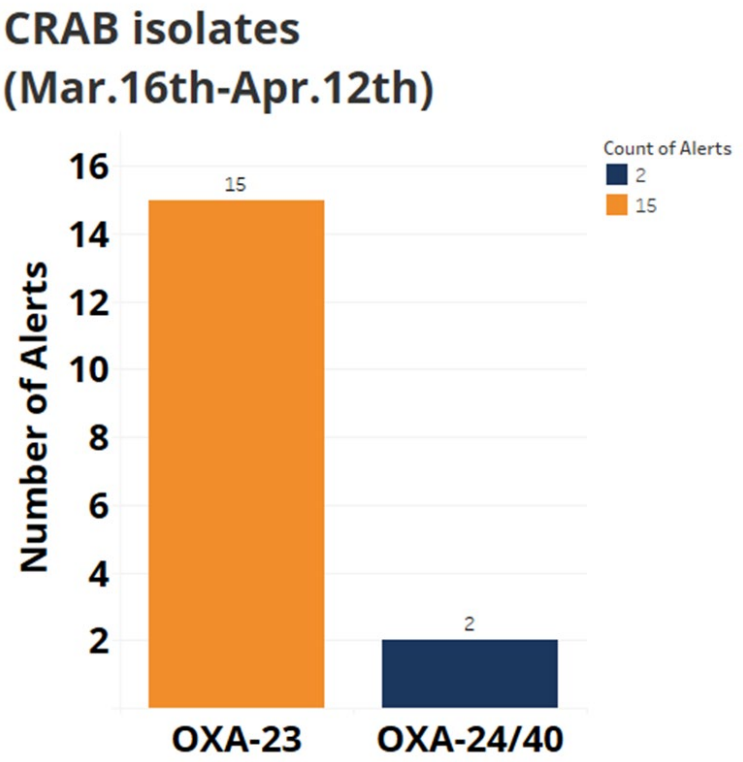
Non-KPC CRE Genes

- **Carbapenemase-producing genes:**
  - **“Big Five”**
    - **KPC**
    - **IMP**
    - **NDM**
    - **OXA-48**
    - **VIM**

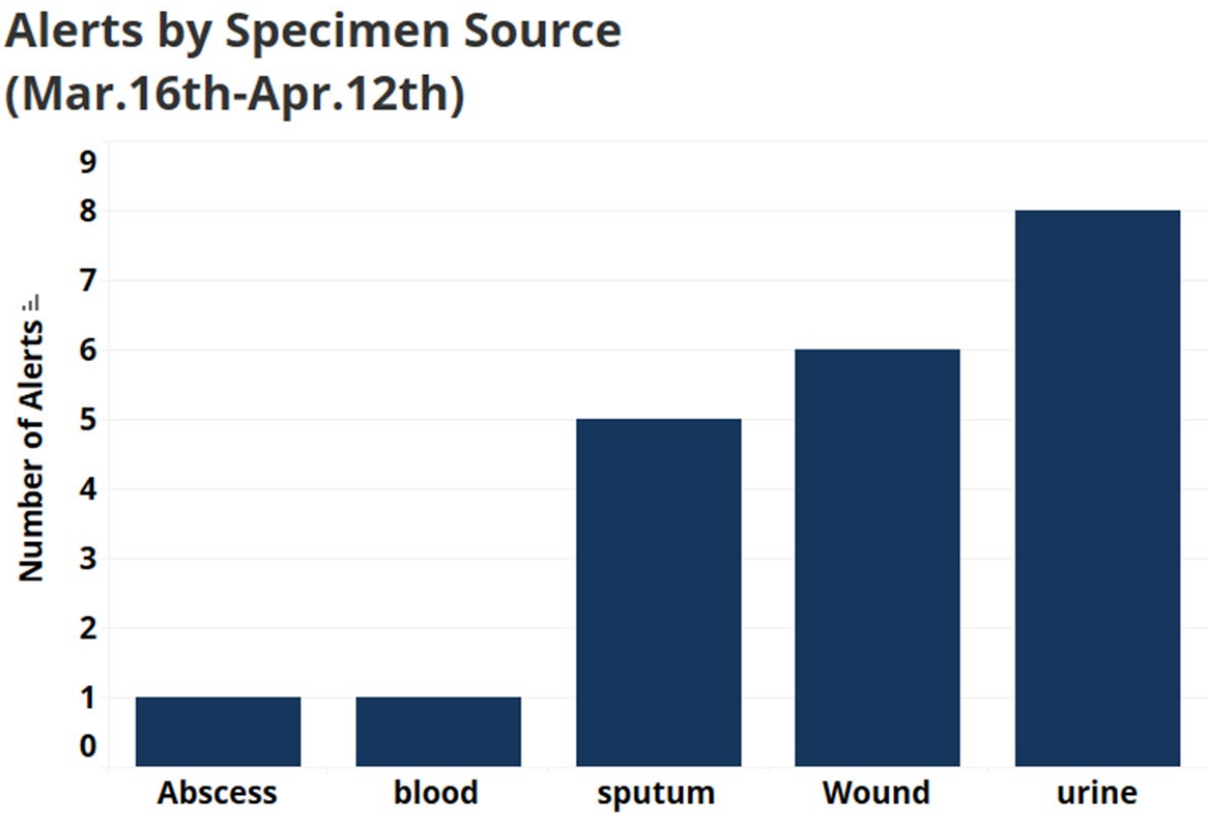


CRAB Alerts

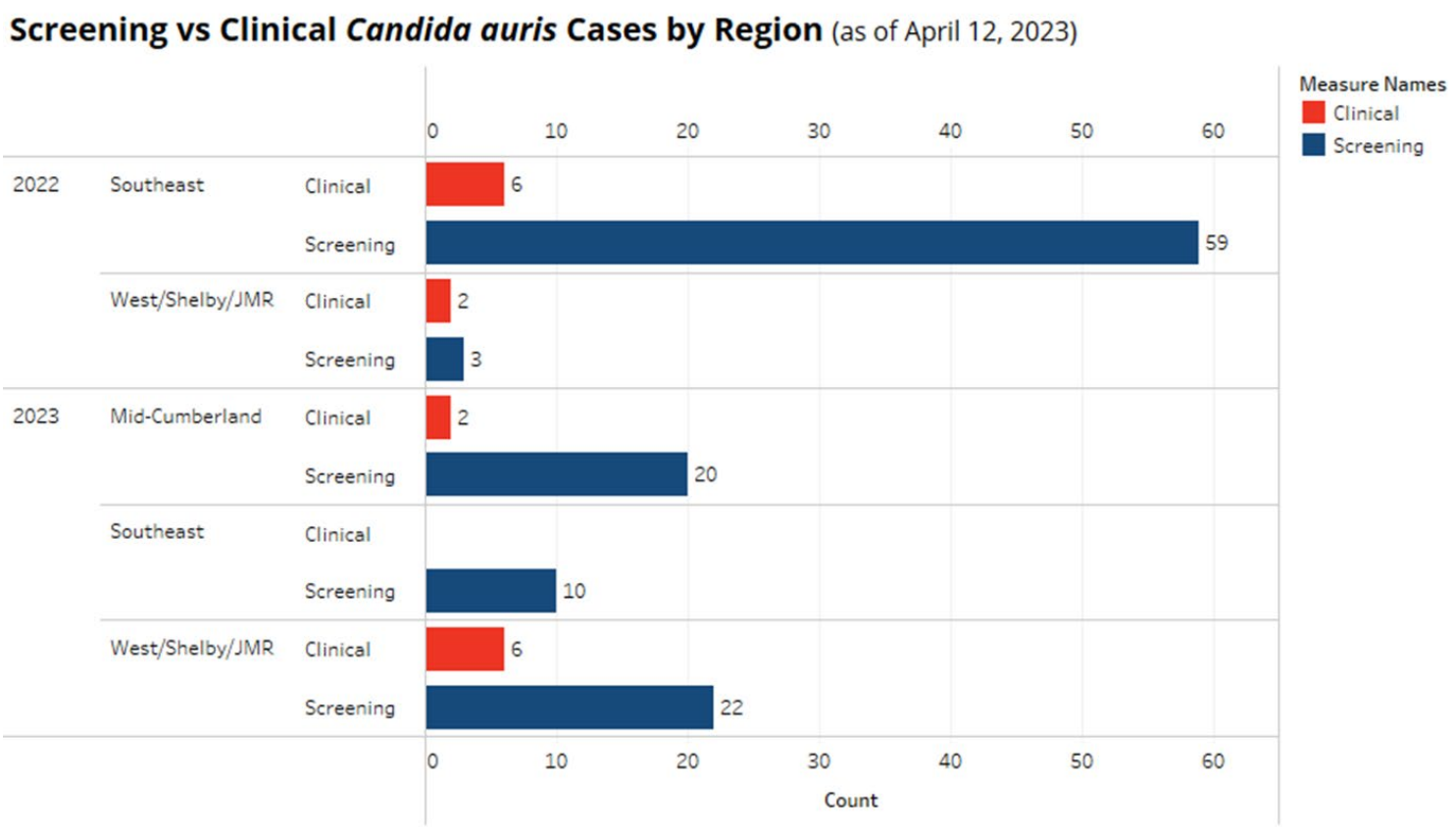
- **Carbapenemase-producing genes:**
  - **Other Oxacillinases**
    - **OXA-24/40**
    - **OXA-23**



Specimen Sources



C. auris Cases



TN MDRO Alerts for 2023

- **For 2023**
  - **46 CRAB specimens**
    - **34 OXA-23**
    - **12 OXA-24/40**
  - **19 non–KPC CRE**
    - **10 NDM**
    - **2 IMP**
    - **1 KPC, NDM**
    - **2 KPC, VIM**
    - **1 mCIM**
    - **2 OXA-48**
    - **1 VIM**
  - ***C. auris***
    - **8 Clinical cases**
    - **52 Screening cases**

Next NHSN User Call

- **Monday, May 15, 2023**
  - **10am CT / 11am ET**

- **NHSN Related**
  - **Vicky.Reed@tn.gov**
  - **Simone.Godwin@tn.gov**

- **AU/AR Module**
  - **Christopher.Evans@tn.gov**

- **Infection Prevention**
  - **HAI.Health@tn.gov**