

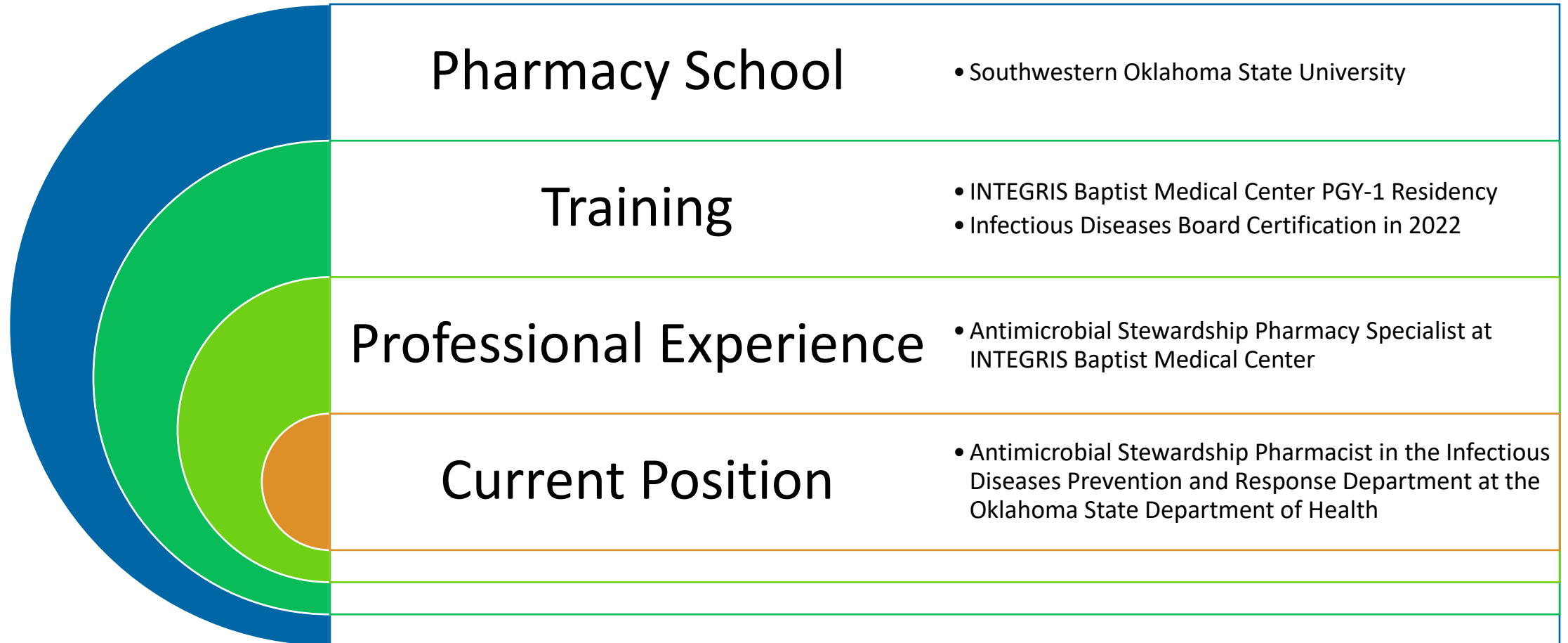
Antimicrobial Stewardship: History and Introduction to Core Elements

Madison Riojas, PharmD, BCIDP
Antimicrobial Stewardship Pharmacist



OKLAHOMA
State Department
of Health

Introduction and Bio



Objectives

Discuss the history of antimicrobial resistance.

Identify resources and tools available to augment antimicrobial stewardship efforts.

Review the CDC Core Elements for Antimicrobial Stewardship for Long Term Care.

Antimicrobial Resistance

OKLAHOMA STATE DEPARTMENT OF HEALTH

Antimicrobial Resistance

- Naturally occurring phenomenon consisting of genetic mutation and sharing of mutated genes for bacterial/fungal survival. Resistance mutations occur largely as a result of antimicrobial exposure.
- Due to the rapid spread and high mortality/morbidity associated with antimicrobial resistant infections, it is considered an urgent global public health threat.

Question 1

Which resistant organism has nationally seen declining incidence rates since the COVID-19 pandemic?

a) *Candida auris*

b) Carbapenem Resistant
Acinetobacter baumannii
(CRAB)

c) Methicillin Resistant
Staphylococcus aureus
(MRSA)

d) Multidrug-resistant
Pseudomonas aeruginosa

Question 1

Which resistant organism has nationally seen declining incidence rates since the COVID-19 pandemic?

a) *Candida auris*

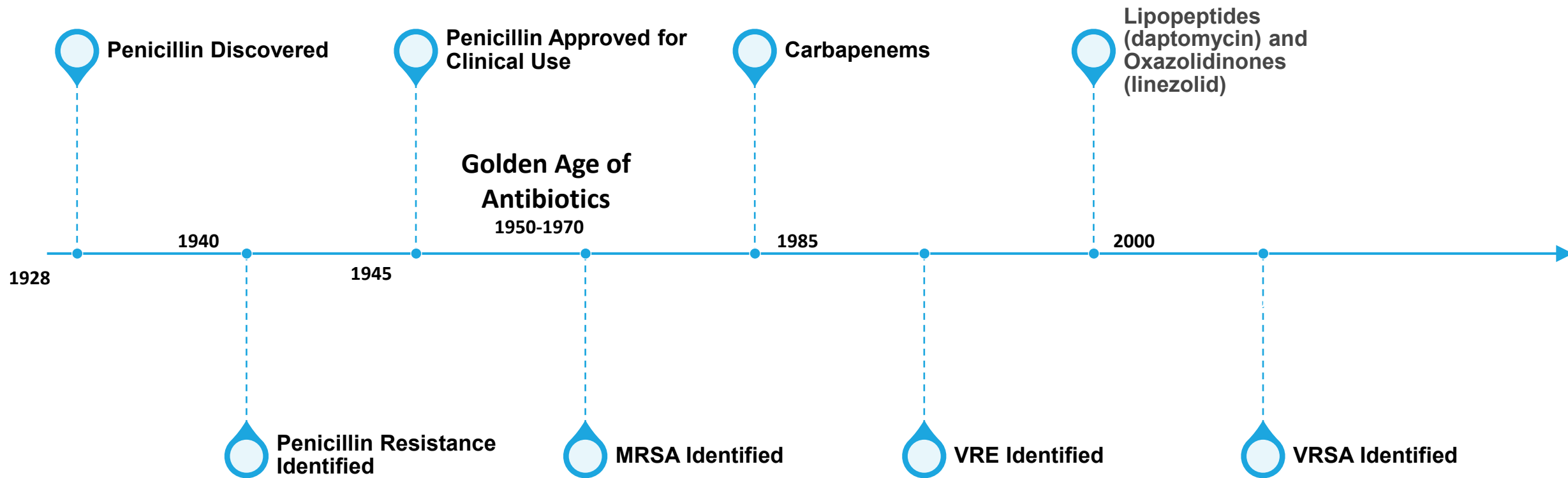
b) Carbapenem Resistant *Acinetobacter baumannii* (CRAB)

c) Methicillin Resistant *Staphylococcus aureus* (MRSA)

d) Multidrug-resistant *Pseudomonas aeruginosa*

Timeline of Antimicrobial Resistance

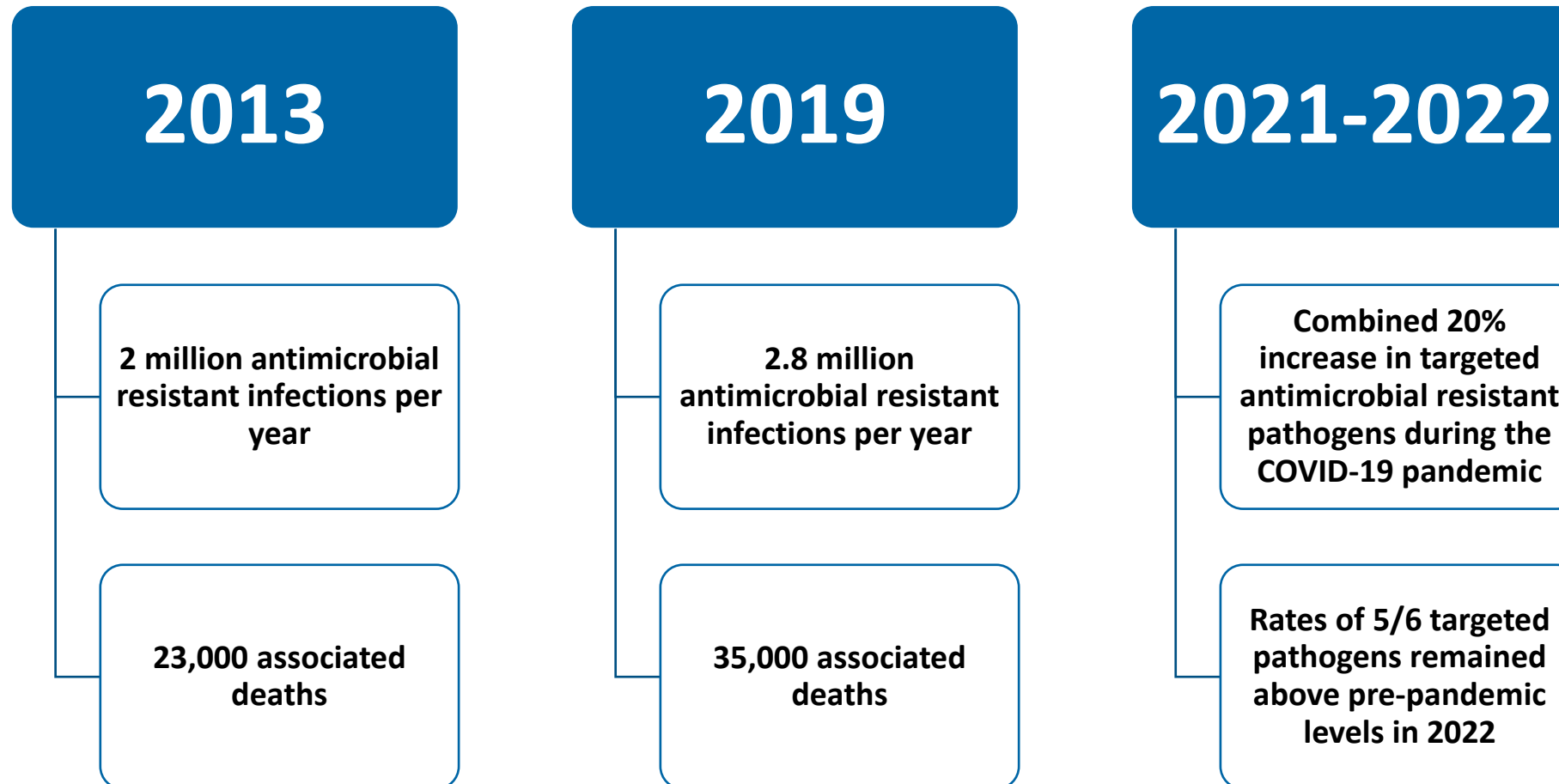
VRE was identified roughly 15 years before any antibiotics with activity entered the market



MRSA: methicillin resistant *Staphylococcus aureus*, VRE: vancomycin resistant *Enterococcus*, VRSA: vancomycin resistant *Staphylococcus aureus*

Impact of Resistance in the US

ANTIMICROBIAL RESISTANCE



CDC Threat Report 2024 Update

CDC Threat Report Update released in 2024 to demonstrate the impact of the COVID-19 pandemic on antimicrobial resistance throughout the country.

AR Threats

	Threat	Change in Rates or Number of Infections***			
		2020 vs. 2019	2021 vs. 2020	2022 vs. 2021	2022 vs. 2019
URGENT*	Hospital-onset CRE	▲ Increase	▲ Increase	▬ Stable	▲ Increase
	Hospital-onset Carbapenem-resistant <i>Acinetobacter</i>	▬ Stable	▬ Stable	▬ Stable	▲ Increase**
	Clinical Cases of <i>C. auris</i>	▲ Increase	▲ Increase	▲ Increase	▲ Increase
SERIOUS*	Hospital-onset MRSA	▲ Increase	▬ Stable	▼ Decrease	▬ Stable
	Hospital-onset VRE	▲ Increase	▲ Increase	▬ Stable	▲ Increase
	Hospital-onset ESBL-producing Enterobacterales	▲ Increase	▬ Stable	▬ Stable	▲ Increase
	Hospital-onset MDR <i>Pseudomonas aeruginosa</i>	▲ Increase	▲ Increase	▬ Stable	▲ Increase

Question 2

What contributed to the significant increase in resistance during the COVID-19 pandemic?

COVID-19 Pandemic Impact



Personal
protective
equipment
(PPE) shortage



Hospital
staffing
shortages



Longer
hospital
admissions



Increases in
overall
antibiotic use



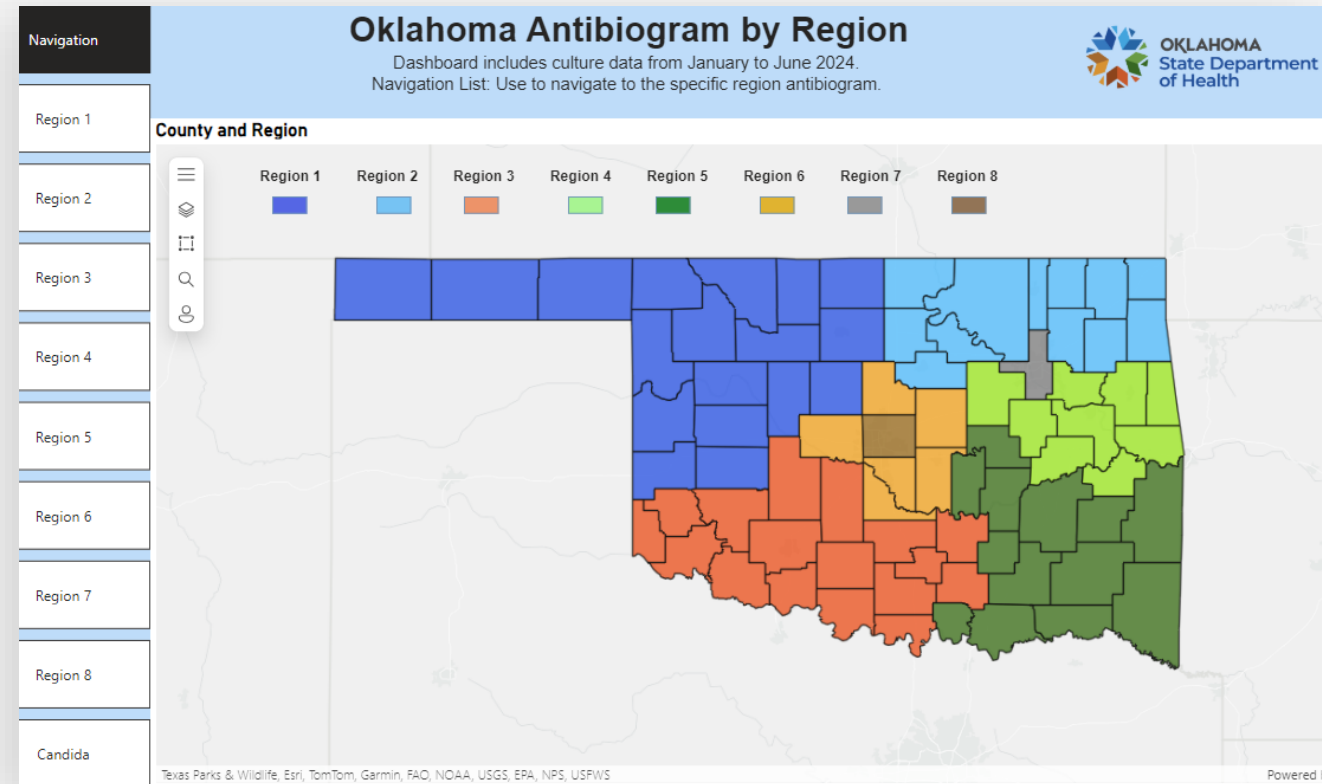
Increases in
unnecessary
antibiotic use



ANTIMICROBIAL RESISTANCE

Regional Antibigram

- Resource developed to aide empiric therapy in instances where statistically significant antibiograms are limited or unavailable
- Dashboard available through the OSDH HAI website on the Antimicrobial Stewardship page [Antimicrobial Stewardship Resources for Clinicians](#)



E. Coli (non-ESBL)

Regional Susceptibility by Region for Urine Source *E. coli* (Non-ESBL)

Region	Ceftriaxone	Cefepime	Ciprofloxacin	Meropenem	Piperacillin/tazobactam	SMX/TMP
1	99	100	83	100	97	75
2	99	100	84	100	97	78
3	100	100	81	100	97	78
4	99	100	82	100	96	77
5	99	100	82	100	97	74
6	99	100	82	100	97	77
7	99	100	86	100	97	77
8	98	100	80	100	97	76

Regional Susceptibility by Region for Non-Urine Source *E. coli* (Non-ESBL)

Region	Ceftriaxone	Cefepime	Ciprofloxacin	Meropenem	Piperacillin/tazobactam	SMX/TMP
1	100	100	83.3	100	93	76
2	99	100	83	100	40	84
3	97	97	70	100	87	65
4	96	100	76	100	93	68
5	94	94	94	100	94	88
6	100	100	71	100	93	93
7	100	100	100	100	100	57
8	99	99	82	100	90	72

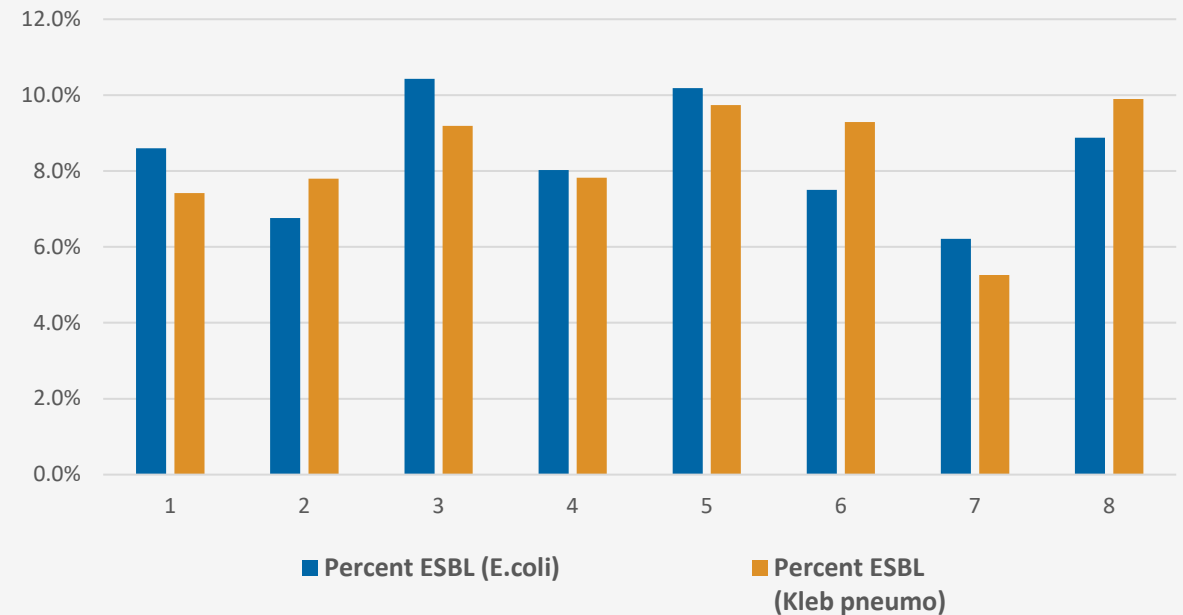
ESBL Trends: Urine Source

ANTIMICROBIAL RESISTANCE

ESBL = extended spectrum beta lactamase

Consider empiric antimicrobial selections and the impact that ESBL presumption has on selection.

ESBL Trends per Region (Urine Source)

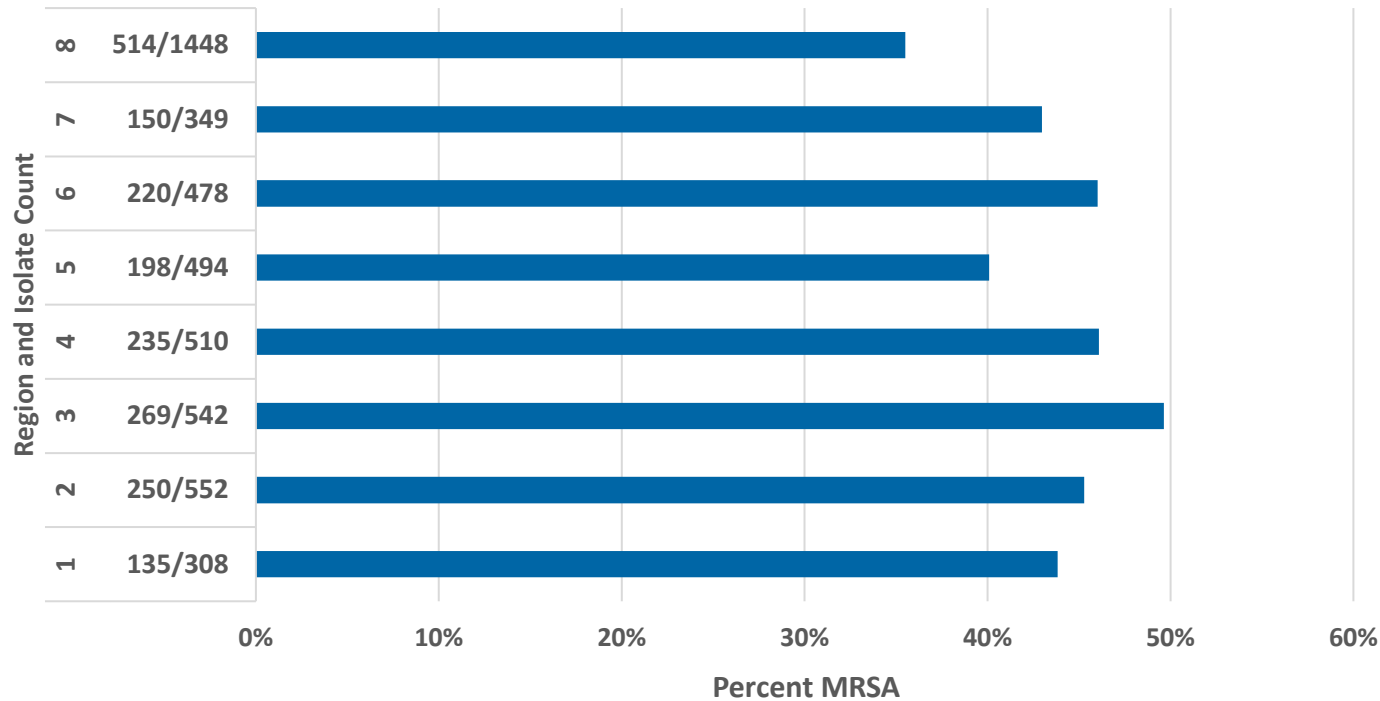


ESBL *E. coli* Prevalence (8.4%)
2,528/30,119 *E. coli* isolates

ESBL *Klebs pneumoniae* Prevalence (8%)
455/5,663 *Klebs pneumoniae* isolates

Staphylococcus aureus

MRSA Prevalence by Region Percent MRSA (Non-Urine Source)



Across the state, the prevalence of MRSA is less than 50%.

Consider the impact that this finding could or should have on empiric prescribing habits and/or protocols.

Antimicrobial Stewardship

CDC's Core Elements of Stewardship

O K L A H O M A S T A T E D E P A R T M E N T O F H E A L T H

Core Elements



**Leadership
Commitment**



Accountability



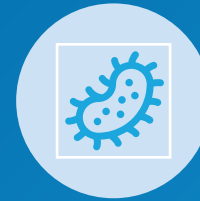
**Stewardship/
Pharmacy Expertise**



Action



Tracking



Reporting



Education

Seven Core Elements of Antimicrobial Stewardship

Core Elements and even further with Priorities of Core Elements are an expectation of regulatory bodies.

The utilization and barriers to implementation of the Core Elements vary across the variety of patient care facilities, but regardless of setting or facility size they are a useful road map to pave the way toward the goal of stewarding the antibiotics we have.

OSDH Resources for Antimicrobial Stewardship

OKLAHOMA STATE DEPARTMENT OF HEALTH

Webpage Resources

OSDH RESOURCES

Antibiotic Resistance: 5 Things To Know

Antibiotic resistance (AR) is one of the most urgent threats to public health. AR is a "one health" problem and connects to the health of people, animals, and the environment.

Each year in the United States, at least 2.8 million people are infected with antibiotic-resistant germs—at least 35,000 die.

- 1 Antibiotic resistance occurs when germs defeat the drugs designed to kill them.**
It does **NOT** mean the body is resistant to antibiotics.
- 2 Antibiotic resistance can affect people at any stage of life.**
Infections caused by resistant germs are difficult—sometimes impossible—to treat. In many cases, these infections require extended hospital stays, additional follow-up doctor visits, and the use of treatments that may be costly and potentially toxic to the patient.
- 3 Healthy habits can protect you from infections and help stop germs from spreading.**
Get recommended vaccines, keep hands and wounds clean, and take good care of chronic conditions, like diabetes.
- 4 Antibiotics save human and animal lives. Any time antibiotics are used, they can lead to side effects and resistance.**
Antibiotics do not work on viruses, such as colds and the flu. Talk to your healthcare provider or veterinarian about whether antibiotics are needed.
- 5 Antibiotic resistance has been found in all regions of the world.**
Modern trade and travel mean AR can move easily across borders. It can spread in places like hospitals, farms, the community, and the environment. Tell your healthcare provider if you recently traveled to or received care in another country.

Your actions can help combat antibiotic resistance.

Learn more at www.cdc.gov/DrugResistance

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COMMIT TO ACTION
DELIVER RESULTS

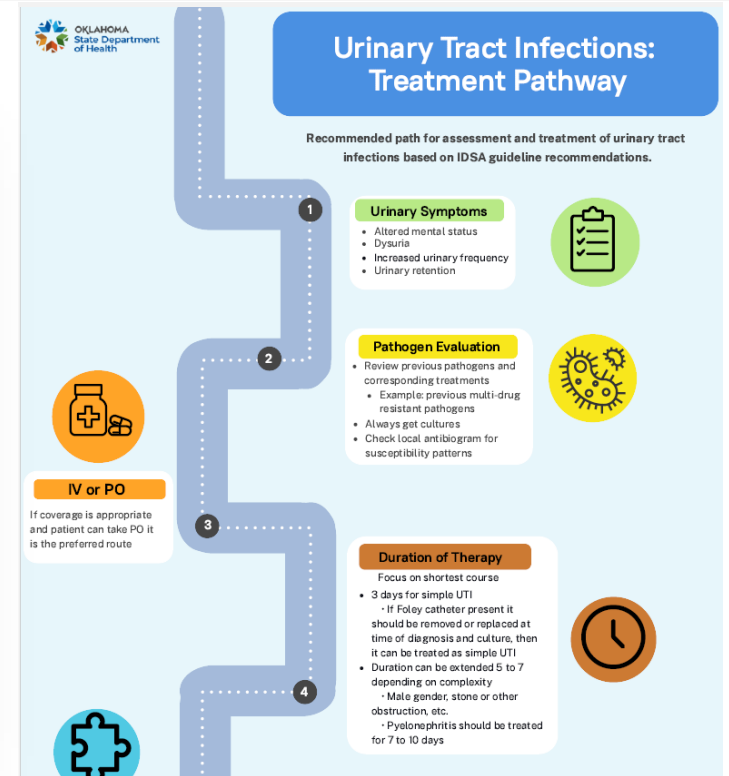
Patient Handouts and
Flyers

IDSA Antimicrobial Resistance Guidelines

Madison Riojas, PharmD, BCIDP
Robbie Savely, PharmD, BCPS, BCIDP

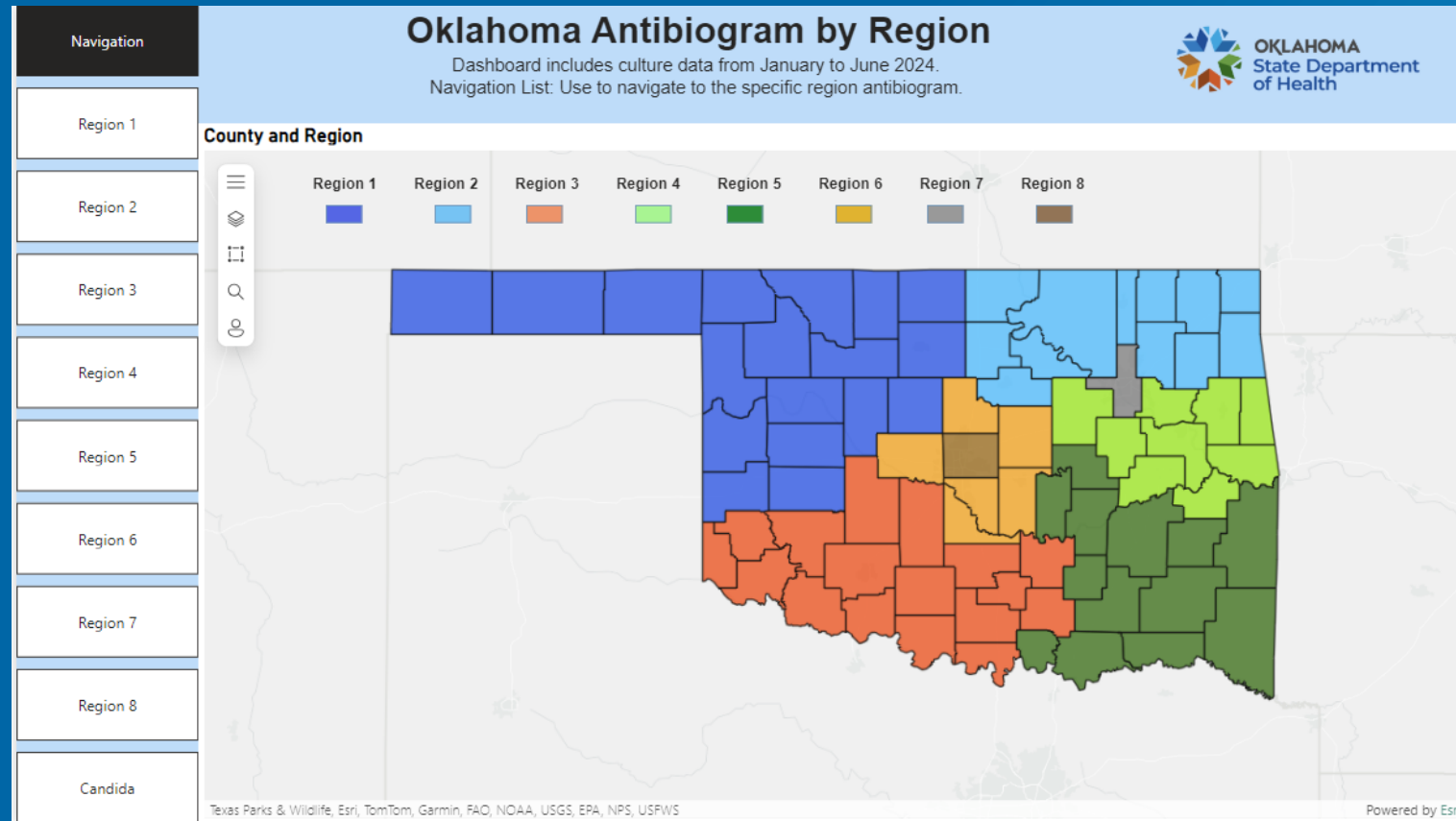
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Educational Slide Sets



Infographics

Interactive Regional Antibioqram



[Regional Antibioqram Access Request](#)



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Healthcare Associated Infections and Antimicrobial Resistance (HAI/AR) Prevention Program

HAI@health.ok.gov
405-426-8710



Coordinate State HAI/AR activities directly with CDC and collaborate with internal and external stakeholders.



Education

Internal and External
Partners
Training (hands on and
virtual)



Prevention,
Containment, and
Response

Rapid detection and
preventing transmission of
novel/targeted Multidrug-
Resistant Organisms



Antimicrobial
Stewardship

Optimizing Antimicrobial
Prescribing and Use
Practices for improved
outcomes



Technical Support

NHSN Data for Action (HAI
Event reporting and AUR
Module)

Additional Resources

[OSDH Antimicrobial Stewardship Resources for Clinicians](#)

[Regional Antibigram Access Request](#)

[Core Elements of Antibiotic Stewardship | Antibiotic Prescribing and Use | CDC](#)

References

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Hutchings, Matthew I., Andrew W. Truman, and Barrie Wilkinson. "Antibiotics: Past, Present and Future." *Current Opinion in Microbiology*, vol. 51, 2019, pp. 72-80. <https://doi.org/10.1016/j.mib.2019.10.008>.

Questions?

Madison Riojas, PharmD, BCIDP
Madison.riojas@health.ok.gov



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