



TDH Bi-Monthly Antibiotic Steward Call

August 13, 2024



Welcome



Announcements

Announcements

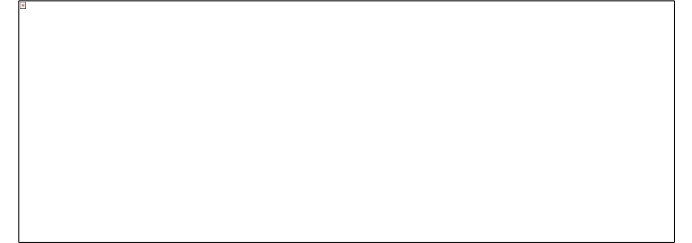
- **Deadline for Quarterly AU Quality and SAAR Reports for Q2 – August 15**
 - Please contact us with questions
- **Seeking Feedback on the SAAR Report**
 - Considering new SAARs to include
 - Please see Survey Link in the next SAAR Report email!

Updated CMS PI AUR Rule for 2025

- **As of August 1, 2024: CMS is finalizing the following measures in the Medicare Promoting Interoperability Program for eligible hospitals and CAHs:**
 - **Separation of the Antimicrobial Use and Resistance (AUR) Surveillance measure into two measures, Antimicrobial Use (AU) Surveillance and Antimicrobial Resistance (AR) Surveillance, beginning with the CY 2025 EHR reporting period**
 - **Addition of a new exclusion for eligible hospitals or CAHs that lack discrete electronic access to data elements that are required for AU or AR Surveillance reporting**
 - **Modification to the applicability of the existing exclusions to either the AU or AR Surveillance measures, respectively**
 - **Treatment of the AU and AR Surveillance measures as two new measures with respect to active engagement beginning with the CY 2025 EHR reporting period**

Tennessee ID Network

- **Volunteer network to optimize communication between the TDH CEDEP and ID specialists statewide**
- **Primary use to share:**
 - Urgent public health information (e.g., outbreak response recommendations)
 - Queries on emerging disease clusters trends in Tennessee
 - Engagement and partnership opportunities with TDH or local health departments
 - Educational (CME) opportunities from TDH, CDC and others
- **Email TNIDNetwork@tn.gov for more information**



TDH MDAG AS Subcommittee

- **Seeking one infectious diseases trained physician and one LTC representative to serve on the TDH MDAG Antimicrobial Stewardship Subcommittee**
- **From any TN region or facility type/practice site**
- **Commitments**
 - **2–3 meetings per year (2 hours each)**
 - **Provide feedback on current and proposed TDH stewardship projects**
 - **Next Meeting in October/November**



ARLN:
AFST and ExAST



AR Lab Network

Enhanced Threat Detection

Erin Hitchingham | ARLN Southeast Regional Epidemiologist

Outline

- ARLN Background
- Testing Capabilities
 - Expanded Antimicrobial Susceptibility Testing (ExAST) for Hard-to-Treat Infections
 - Antifungal Susceptibility Testing Updates for *Candida spp.*



What is ARLN?

2015

National Action Plan for Combating Antibiotic-Resistant Bacteria (CARB)

CDC's Antibiotic Resistance (AR) Solutions Initiative

2016

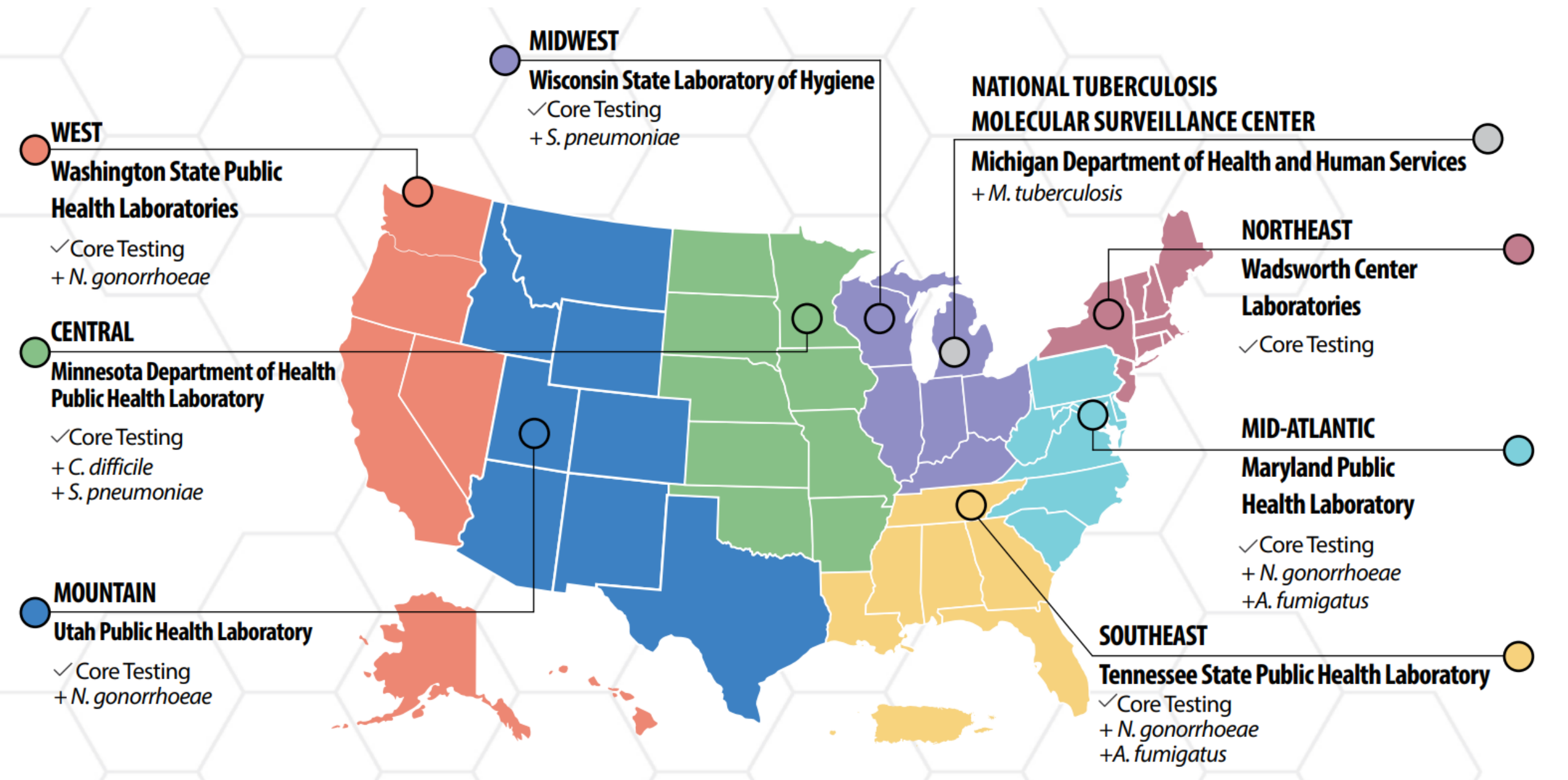
AR Lab Network

2021

Global Antimicrobial Resistance Laboratory and Response Network

The AR Lab Network

- Detect
 - Stronger detection of new resistance and better trend tracking
- Prevent
 - Better data for stronger infection control
- Innovate
 - Lab samples may be available through the AR Isolate Bank
- Respond
 - Collaboration to identify spread and support outbreak response



Southeast Region Testing Capabilities

TN

2017

Carbapenemase production (mCIM) & PCR gene detection for Enterobacterales, *Pseudomonas aeruginosa*, and *Acinetobacter baumannii*

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

Candida auris identification and colonization screening, culture-based

Fungal susceptibility of *Candida* species

Novel carbapenemase gene detection

Enhanced detection of *Neisseria gonorrhea* and whole genome sequencing (WGS)

*Validated early 2018

2021

+Expanded susceptibility testing for new drugs and drug combinations

+*C. auris* PCR for colonization screening

+OXA-23, OXA-24/40, OXA-58

Carbapenemase gene detection for *A. baumannii*

+Azole-resistant *Aspergillus fumigatus* surveillance

2024

+WGS for *C. auris*[†]

+AFST for *Aspergillus fumigatus* surveillance[†]

+OXA-235

Carbapenemase gene detection for *A. baumannii*

[†]Not yet validated

HAI/AR Program Focus Areas

- Carbapenemase-producing Enterobacterales (CP-CRE), *Pseudomonas aeruginosa* (CP-CRPA), and *Acinetobacter baumannii* (CP-CRAB)
- *Candida auris*
- Azole-resistant *Aspergillus fumigatus*



ExAST Testing

Expanded AST for Hard-to-Treat Infections

- Expanded susceptibility testing for Enterobacterales
 - Only ARLN testing that is not surveillance only testing
- Reports susceptibility for:
 - Ceftazidime-avibactam
 - Aztreonam
 - Aztreonam-avibactam

ExAST Continued

- 3-day turn-around-time
- TECAN D300e



THERMO SCIENTIFIC™ SENSITITRE™ GRAM NEGATIVE PLATE FORMAT

Plate Code:

GN7F

Plate Type:

MIC

	1	2	3	4	5	6	7	8	9	10	11	12
A	AMI 8	TGC 1	FEP 2	DOR 0.5	ETP 0.25	IMI 1	MERO 0.5	FAZ 1	TAZ 1	AZT 1	LEVO 0.5	AXO 0.5
B	AMI 16	TGC 2	FEP 4	DOR 1	ETP 0.5	IMI 2	MERO 1	FAZ 2	TAZ 2	AZT 2	LEVO 1	AXO 1
C	AMI 32	TGC 4	FEP 8	DOR 2	ETP 1	IMI 4	MERO 2	FAZ 4	TAZ 4	AZT 4	LEVO 2	AXO 2
D	P/T4 8/4	TGC 8	FEP 16	DOR 4	ETP 2	IMI 8	MERO 4	FAZ 8	TAZ 8	AZT 8	LEVO 4	AXO 4
E	P/T4 16/4	C/T 2/4	CIP 0.25	MIN 1	ETP 4	CZA 2/4	MERO 8	FAZ 16	TAZ 16	AZT 16	LEVO 8	AXO 8
F	P/T4 32/4	C/T 4/4	CIP 0.5	MIN 2	ETP 8	CZA 4/4	GEN 2	TOB 2	A/S2 4/2	AMP 8	TET 4	AXO 16
G	P/T4 64/4	C/T 8/4	CIP 1	MIN 4	NIT 32	CZA 8/4	GEN 4	TOB 4	A/S2 8/4	AMP 16	TET 8	AXO 32
H	SXT 2/38	C/T 16/4	CIP 2	MIN 8	NIT 64	CZA 16/4	GEN 8	TOB 8	A/S2 16/8	POS	POS	POS

ANTIMICROBICS

AMI	Amikacin
AMP	Ampicillin
A/S2	Ampicillin / sulbactam 2:1 ratio
AZT	Aztreonam
FAZ	Cefazolin
FEP	Cefepime
TAZ	Ceftazidime
CZA	Ceftazidime/avibactam
C/T	Ceftolozane/tazobactam 4
AXO	Ceftriaxone
CIP	Ciprofloxacin
DOR	Doripenem
ETP	Ertapenem
GEN	Gentamicin
IMI	Imipenem
LEVO	Levofloxacin
MERO	Meropenem
MIN	Minocycline
NIT	Nitrofurantoin
P/T4	Piperacillin / tazobactam constant 4
TET	Tetracycline
TGC	Tigecycline
TOB	Tobramycin
SXT	Trimethoprim / sulfamethoxazole
POS	Positive Control

Submission Criteria

- Test “not susceptible” to all beta lactams tested, including but not limited to ceftazidime-avibactam, meropenem-vaborbactam, or imipenem-relebactam

-OR-

- Test positive for NDM, VIM, or IMP CP-genes
- Submissions must be approved at ARLN.health@tn.gov





Candida Antifungal Susceptibility Testing

AFST Suppression

- As of 2024, all AFST values will be suppressed on lab reports for *Candida spp.* testing.
 - Due to limited published breakpoint interpretations
- We are working on a frontward facing dashboard with data summaries
- Here's a sneak peek of the data:

National Picture

- ~90% of isolates resistant to fluconazole
- ~30% of isolates resistant to amphotericin B
- ~<2% of isolates resistant to echinocandins

Candida auris Polyene Resistance SE Region

- Slide Removed

Candida auris Azole Resistance SE Region

- Slide Removed

Candida auris Echinocandin Resistance SE Region

- Slide Removed

Candida auris Echinocandin Resistance SE Region

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Candida auris Echinocandin Resistance SE Region

- Slide Removed

Contact Information

TN AR Lab Network Lab Manager:

Zach Perry

TN AR Lab Network Regional Epidemiologist:

Erin Hitchingham

General Inbox: ARLN.Health@tn.gov





Questions?

References

- Centers for Disease Control and Prevention. (2024). *About CDC's AR Lab Network*. <https://www.cdc.gov/antimicrobial-resistance-laboratory-networks/media/pdfs/About-Antimicrobial-Resistance-Lab-Network-Fact-Sheet.pdf>
- Centers for Disease Control and Prevention. (2024). *Antifungal Susceptibility Testing for C. auris*. <https://www.cdc.gov/candida-auris/hcp/laboratories/antifungal-susceptibility-testing.html>



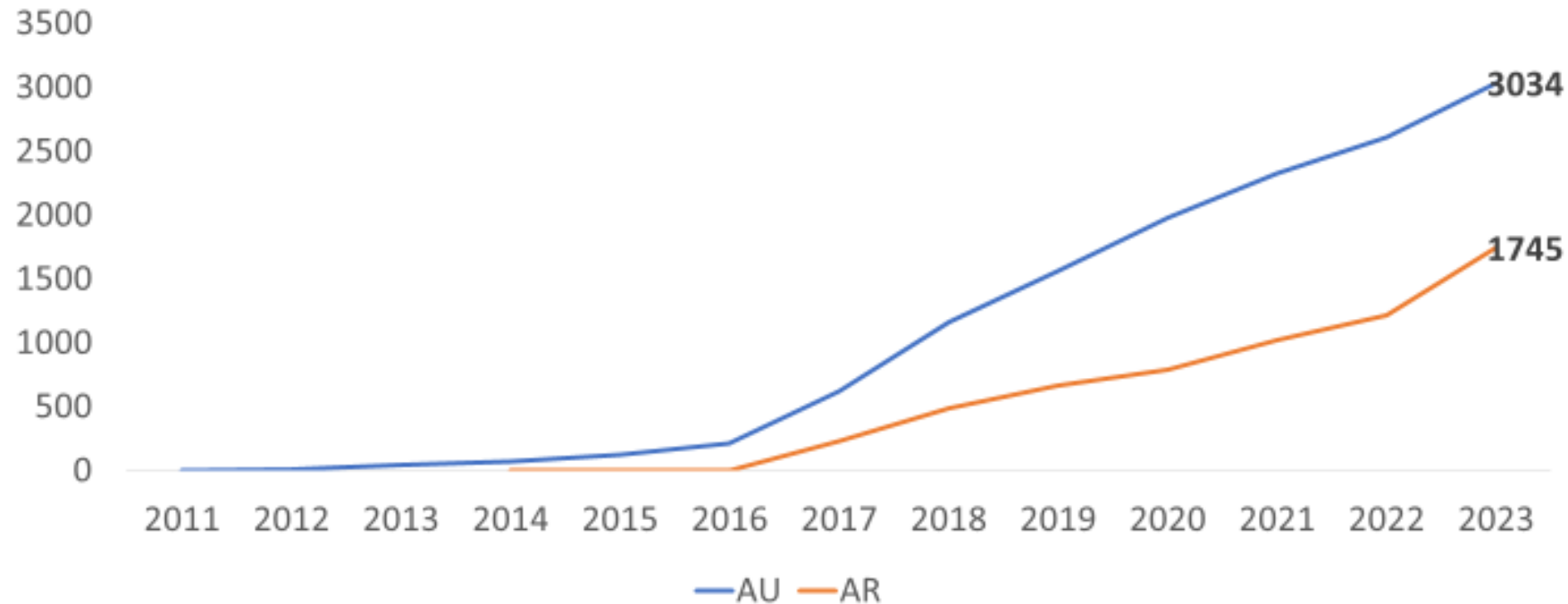
NHSN AR Option

Purpose of the NHSN AR Option

- **Standardized method to evaluate antimicrobial resistance data**
- **Improve awareness of local providers**
 - Aid in clinical decision making
 - Prioritize prevention of transmission efforts
- **Provide facility data in a regional and national perspective**
 - Antibigram Development
- **As of 2023, provide AR benchmarking metrics:**
 - SRIR: Standardized Resistant Infection Ratio
 - pSIR: Pathogen-specific Standardize Infection Ratio

Current Participation

Cumulative Numbers of Facilities Submitting Data to AU and AR Options

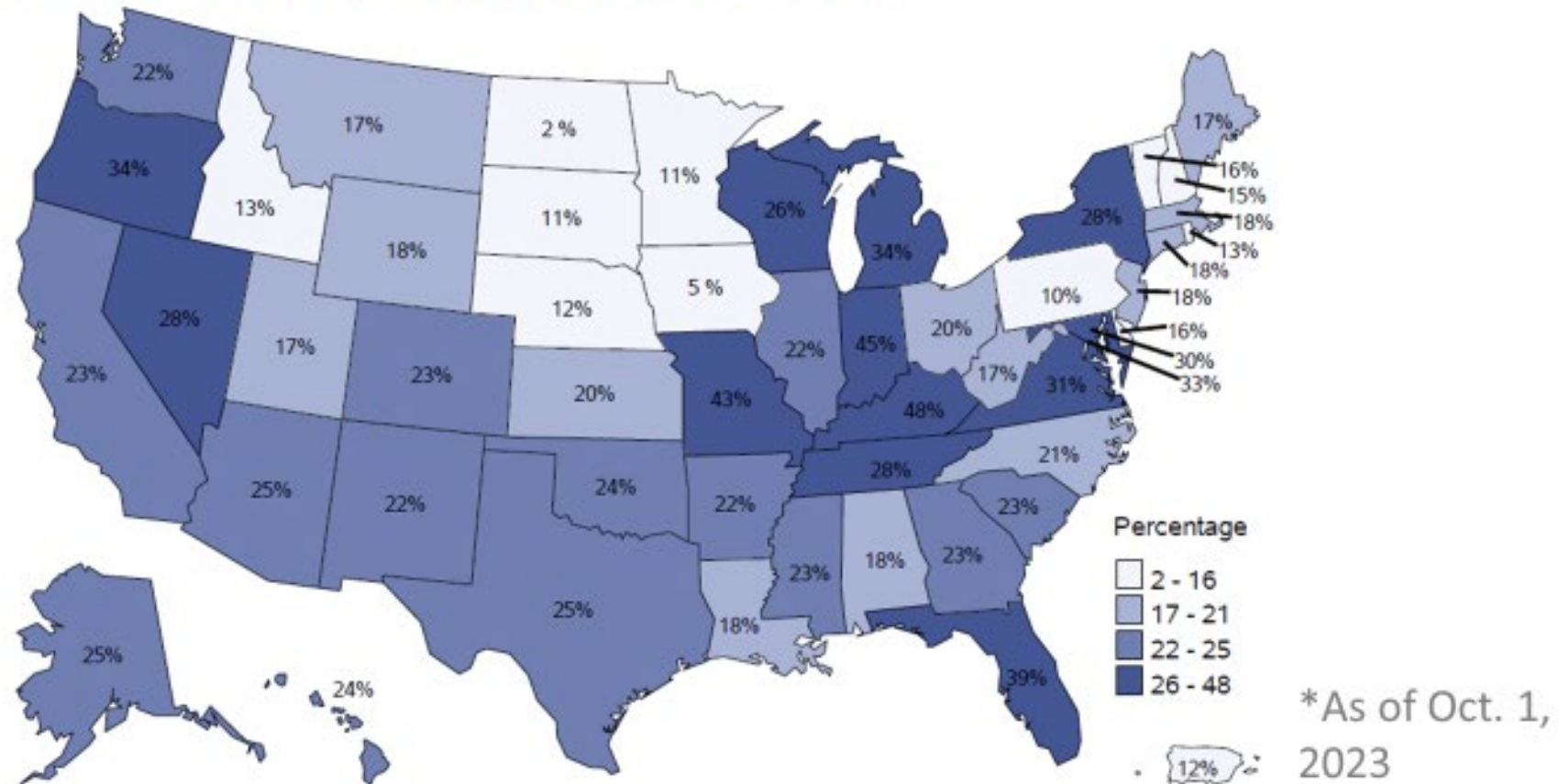


*As of Oct. 1, 2023



Current Participation

Cumulative percentage of facilities reporting at least one month of data to the AR Option*



AUR Module data are required in CY 2024

- Beginning in **CY 2024**, AUR Module data are required under the Public Health and Clinical Data Exchange Objective of the CMS PI Program
- Applies to eligible hospitals and critical access hospitals that participate in the CMS PI Program
- **Measure includes submission of both AU and AR Option data**
- For CY 2024 facilities attest to either:
 - Being in active engagement with NHSN to submit AUR data or,
 - Claim an applicable exclusion



List of Organisms and Sites

- **Select organisms and drugs**

Appendix F. List of Eligible Organisms for the NHSN AR Option

Please note that standardized terminology (SNOMED) mappings are provided in the [Antimicrobial Resistance Toolkit](#). Facilities and vendors should refer to the AR Option Pathogen Roll-up Workbook found in the [Antimicrobial Resistance Toolkit](#) for the eligible organisms for AR Option reporting and the complete list of their associated SNOMED codes. Testing methods should follow most recent CLSI guidance as appropriate.

Organism	Specimen Type	Antimicrobial Agents
<i>Acinetobacter</i> (All <i>Acinetobacter</i> species noted in the AR Option Pathogen Roll-up Workbook)	Blood, Urine, Lower Respiratory, CSF	Amikacin Ampicillin-sulbactam Cefepime Cefiderocol Cefotaxime Ceftazidime Ceftriaxone Ciprofloxacin Colistin Doripenem Doxycycline Gentamicin Imipenem Levofloxacin Meropenem Minocycline Piperacillin-tazobactam Polymyxin B Tobramycin Trimethoprim-sulfamethoxazole
	Additional Agents for Urine	Tetracycline
<i>Candida albicans</i> <i>Candida auris</i> <i>Candida glabrata</i> <i>Candida parapsilosis</i> <i>Candida tropicalis</i>	Blood, Urine, CSF Note: Lower respiratory will not be collected for <i>Candida</i> spp.	Anidulafungin Caspofungin Fluconazole Micafungin Posaconazole Voriconazole
	Additional Agents for Urine	None

Continued on the next page

- **Select Sites**

- Blood
- Urine
- Respiratory (multiple)
- CSF

Raw Data

Single Isolate

Single Isolate

ACBA	31113256	12/22/16	CC	IN:ACUTE:CC:MS	01/01/17	SULFAET
ACBA	31113256	12/22/16	CC	IN:ACUTE:CC:MS	01/01/17	TETRA
ACBA	31113256	12/22/16	CC	IN:ACUTE:CC:MS	01/01/17	TICARWC
ACBA	31113256	12/22/16	CC	IN:ACUTE:CC:MS	01/01/17	TOBRA
ACBA	30197451	01/02/17	WARD	IN:ACUTE:WARD:S	01/07/17	AMK
ACBA	30197451	01/02/17	WARD	IN:ACUTE:WARD:S	01/07/17	AMPIWS
ACBA	30197451	01/02/17	WARD	IN:ACUTE:WARD:S	01/07/17	CEFEP
ACBA	30197451	01/02/17	WARD	IN:ACUTE:WARD:S	01/07/17	CEFOT



pathogenDesc	orgID	eventID	admitDate	locationType	AMK_FinalInterp	AMPIWS_FinalInterp	CEFEP_FinalInterp
ACBA	11717	31113256	12/22/2016	CC	R	R	R
ACBA	11567	30197451	1/2/2017	WARD	R	I	R

TN Antibigram Development

- **Slide Removed**

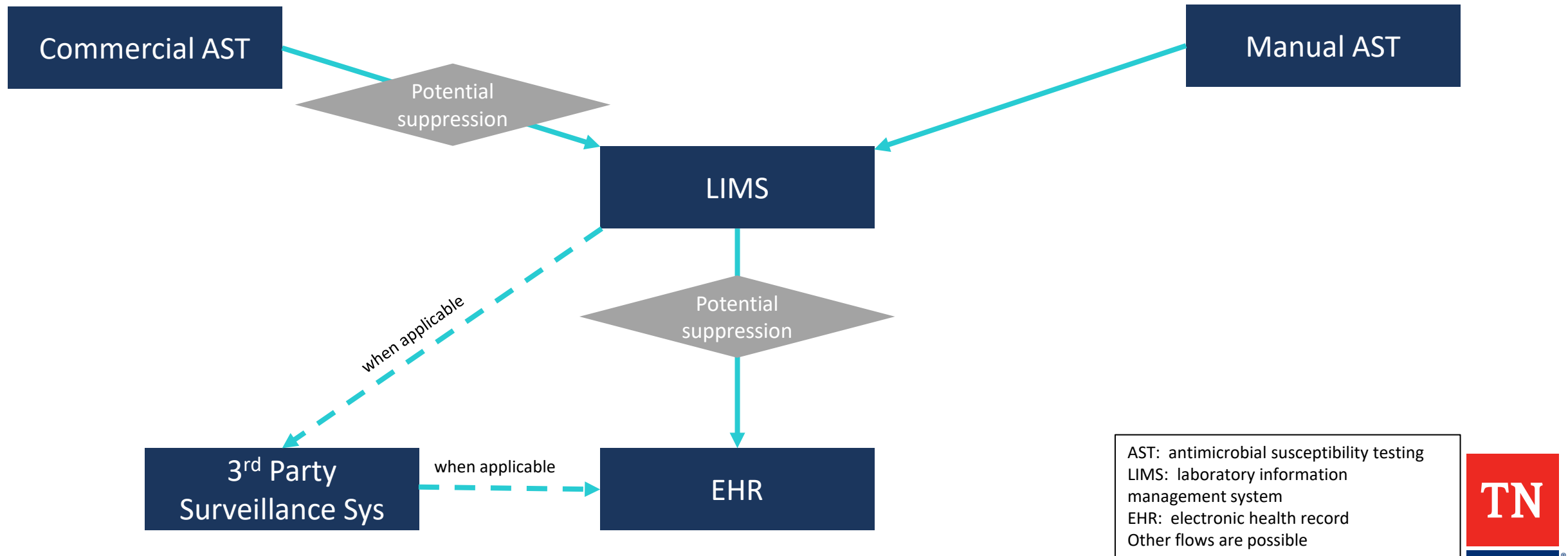
TN Antibigram Development

Limitation: AR Data Suppression

- **Suppression prevents complete susceptibility data from being reported to AR Option**
- **AR data may be suppressed for multiple reasons**
 - **Testing instrument suppression for organism-drug combinations that are not supposed to be reported for microbiology purposes**
 - **Example: Suppressing ampicillin susceptibility for *Pseudomonas aeruginosa* because it is known to be ampicillin resistant**
 - **Antimicrobial stewardship**
 - **Example: Suppressing carbapenem susceptibility for *E. coli* susceptible to first, second, or third generation cephalosporins to reduce the use of carbapenems**

Data Flow into NHSN

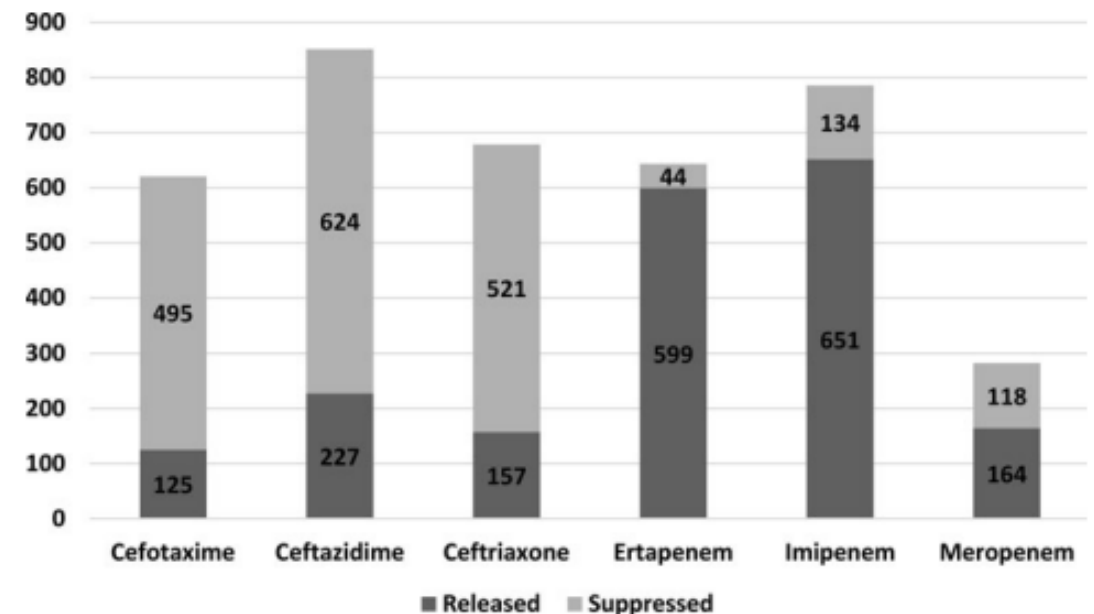
- Important to know how your data get into NHSN and whether they are affected by data suppression rules



Data Suppression can be very impactful:

- **Selective or Cascading Data Suppression**
 - May inhibit capture and input of suppressed antibiotics into NHSN
 - 852 isolates from 14 hospitals in 2017–2018
 - 85.2% of isolates had at least one suppressed antibiotic
 - 50.2% of susceptibility results for carbapenems and 3rd-gen cephalosporins were not reported into NHSN

Suppressed and Released Results by Antibiotic



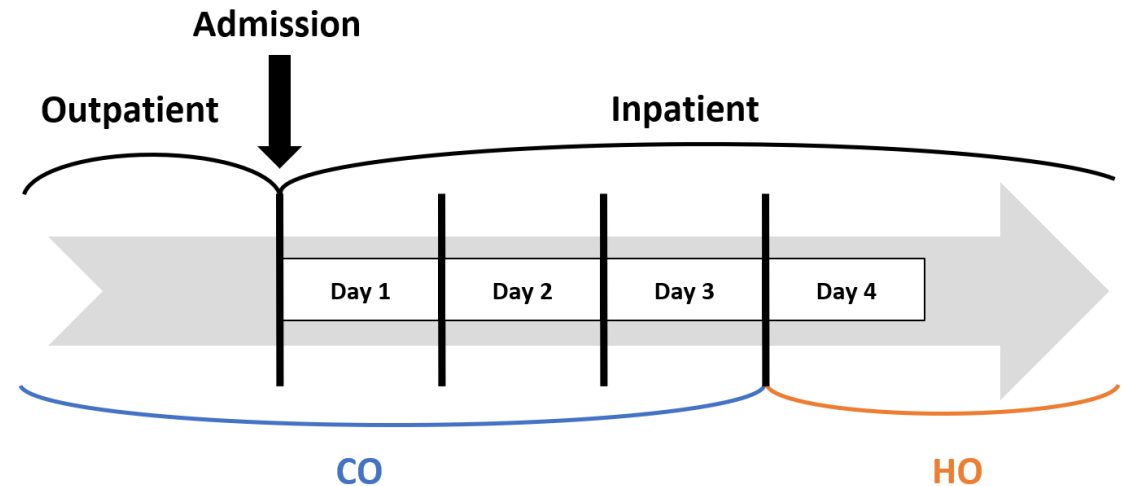
Two New Benchmarking Metrics

- **Standardized Resistant Infection Ratio (SRIR)**
- **Pathogen-Specific Standardized Infection Ratio (pSIR)**

SRIR and pSIR Application

- Hospitals can compare their rates of **hospital-onset** infections of specific AR phenotypes or pathogens to a national benchmark
 - SRIR for infections of specific AR phenotypes (e.g., MRSA)
 - pSIR for infections of specific pathogens (e.g., *S. aureus*)
- Health departments/systems can use the SRIR and pSIR to better understand these issues across and between facilities in their jurisdiction/system

- NHSN classifies AR events as hospital-onset (HO) or community-onset (CO) based on the specimen collection data and date of admission



Risk Adjustment

- **For predicting resistant infections and pathogen-specific infections, the following facility-level factors were assessed:**
 - **Facility type**
 - **Number of beds**
 - **Number of ICU beds**
 - **Percentage of ICU beds**
 - **Medical school affiliation**
 - **Medical school affiliation type (i.e., undergrad, grad, major teaching)**
 - **Hospital length of stay (annual # patient days / annual # admissions)**
 - **Community-onset (CO) prevalence (# resistant CO isolates / 10,000 admissions) – Only in SRIR model**

SRIR

The standardized resistant infection ratio (SRIR) allow facilities to compare their number of observed resistant infections from a specific source for eligible phenotypes to the number predicted, based on 2019 baseline risk-adjusted AR models:

$$SRIR = \frac{\text{Observed Resistant Infections}}{\text{Predicted Resistant Infections}}$$

- **Available phenotypes on next slide**
- **Available for the following specimens:**
 - **Blood**
 - **Urine**
 - **Lower respiratory tract**

Phenotype Definitions

Phenotype Name	Phenotype Definition
Carbapenem-resistant Enterobacterales	Any <i>Escherichia coli</i> , <i>Klebsiella aerogenes</i> , <i>Klebsiella oxytoca</i> , <i>Klebsiella pneumoniae</i> , or <i>Enterobacter</i> spp. that has tested resistant (R) to at least one of the following: imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam
Extended-spectrum cephalosporin-resistant Enterobacterales	Any <i>Escherichia coli</i> , <i>Klebsiella aerogenes</i> , <i>Klebsiella oxytoca</i> , <i>Klebsiella pneumoniae</i> , or <i>Enterobacter</i> spp. that has tested resistant (R) to at least one of the following: cefepime, ceftriaxone, cefotaxime, ceftazidime, ceftazidime-avibactam, or ceftolozane-tazobactam
Fluoroquinolone-resistant Enterobacterales	Any <i>Escherichia coli</i> , <i>Klebsiella aerogenes</i> , <i>Klebsiella oxytoca</i> , <i>Klebsiella pneumoniae</i> , or <i>Enterobacter</i> spp. that has tested resistant (R) to at least one of the following: ciprofloxacin, levofloxacin, or moxifloxacin
Vancomycin-resistant <i>Enterococcus</i>	Any <i>Enterococcus</i> spp. that has tested resistant (R) to vancomycin
Fluoroquinolone-resistant <i>Pseudomonas aeruginosa</i>	<i>Pseudomonas aeruginosa</i> that has tested resistant (R) to at least one of the following: ciprofloxacin or levofloxacin
Multidrug-resistant <i>Pseudomonas aeruginosa</i>	<i>Pseudomonas aeruginosa</i> that has tested either intermediate (I) or resistant (R) to at least one drug in at least three of the following six categories: 1. Extended-spectrum cephalosporin (cefepime, ceftazidime, ceftazidime-avibactam, ceftolozane-tazobactam) 2. Fluoroquinolones (ciprofloxacin, levofloxacin) 3. Aminoglycosides (amikacin, gentamicin, tobramycin) 4. Carbapenems (imipenem, meropenem, doripenem, imipenem/relebactam) 5. Piperacillin/tazobactam 6. Cefiderocol
Methicillin-resistant <i>Staphylococcus aureus</i>	<i>Staphylococcus aureus</i> that has tested resistant (R) to at least one of the following: oxacillin or cefoxitin

National Healthcare Safety Network
SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)

As of: February 25, 2024 at 2:26 PM
Date Range: AR_ALL_SRIR_2019 summaryYr 2021 to 2023

Hospital-onset (HO) Multi-drug-resistant Pseudomonas aeruginosa in lower respiratory tract specimens

Facility Org ID	Summary Yr	SRIR Type	Resistant Hospital- Onset Isolates	Predicted Resistant Hospital-Onset Isolates	Patient days from AR Summary	SRIR	SRIR p- value	95% Confidence Interval
33617	2021	HO_MDR_PA_LRT	0	1.081	25759	0.000	0.339	., 2.771
33617	2022	HO_MDR_PA_LRT	7	2.713	22336	2.580	0.028	1.128, 5.104
33617	2023	HO_MDR_PA_LRT	0	0.296	7050	.	.	

Interpreting SRIR values

- **As a ratio, SRIR values are always ≥ 0**
- **Similar to SIRs, lower values are considered better**
- **SRIR Interpretations:**
 - **A value of <1 indicates fewer resistant HO infections were observed than predicted**
 - **A value equal to 1 indicates the number of observed resistant HO infections were equivalent to the number predicted**
 - **A value of >1 indicates a greater number of resistant HO infections were observed than predicted**

One Important Note

- **SRIRs will NOT generate for two phenotypes if outdated breakpoints were in use (based on responses from that year's NHSN Annual Facility Survey):**

Has the laboratory implemented revised breakpoints recommended by CLSI for the following:

- a. Third Generation Cephalosporin and monobactam (i.e. aztreonam) breakpoints for *Enterobacterales* in 2010 ☐ Yes ☐ No
- b. Carbapenem breakpoints for *Enterobacterales* in 2010 ☐ Yes ☐ No

pSIR

The pathogen-Specific Infection Ratio (pSIR) allows facilities to compare their number of observed infections for eligible pathogens from a specific source to the number predicted, based on 2019 baseline risk-adjusted AR models:

$$pSIR = \frac{\text{Observed Infections}}{\text{Predicted Infections}}$$

- **Available for the following phenotypes*:**
 - *Enterobacterales*
 - ***Enterococcus***
 - ***Pseudomonas aeruginosa***
 - *Staphylococcus aureus*
- Available for the following specimens:
 - Blood
 - Urine
 - Lower respiratory tract

*Criteria for generating pSIRs can be found in the AUR Module Protocol:
<https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf>

National Healthcare Safety Network

pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)

As of: February 25, 2024 at 2:30 PM

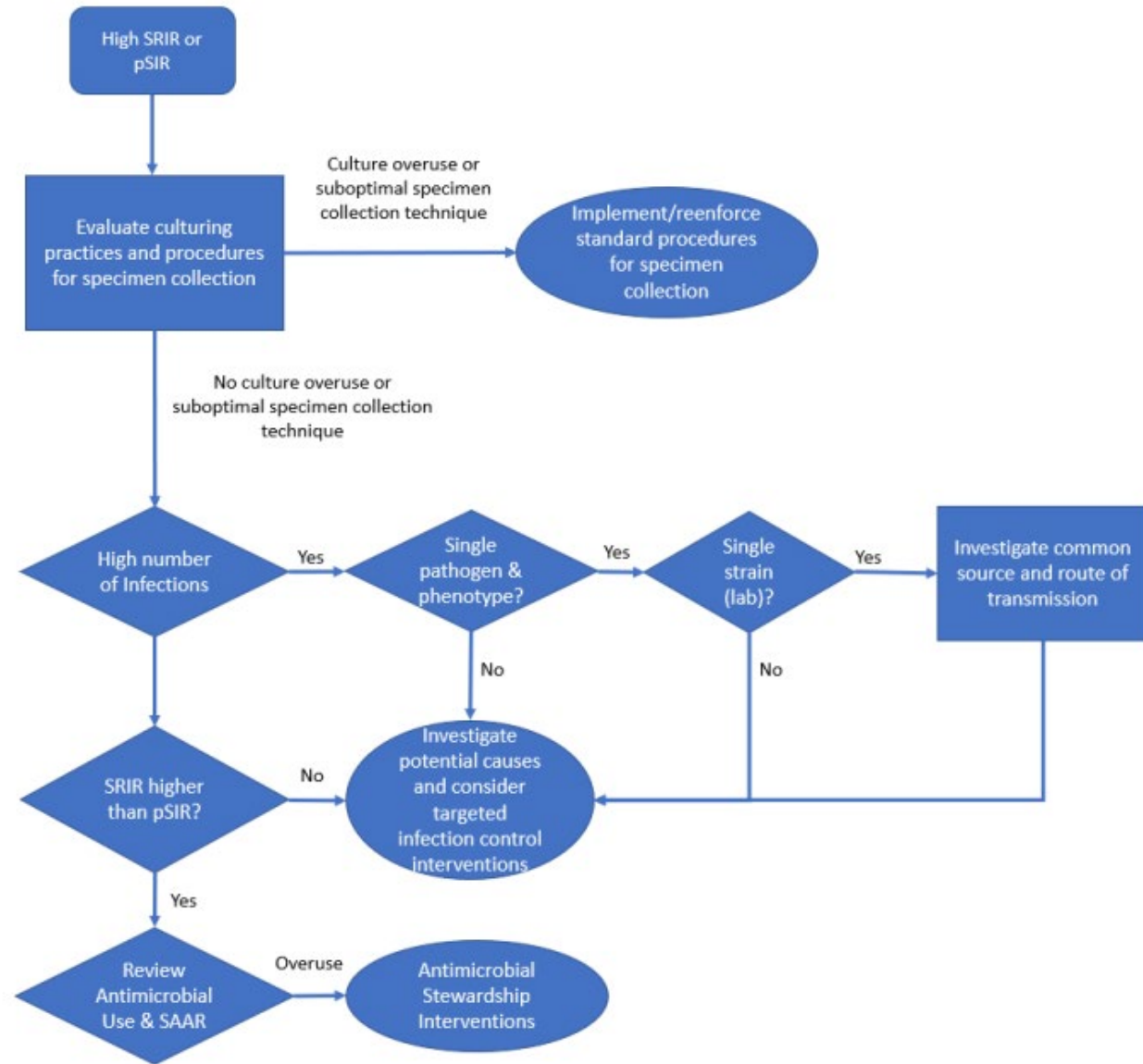
Date Range: AR_ALL_pSIR_2019 summaryYQ 2021Q3 to 2023Q2

Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens

Facility Org ID	Summary Yr/Qtr	pSIR Type	Hospital-Onset Isolates	Predicted Hospital-Onset Isolates	Patient days from AR Summary	pSIR	pSIR p-value	95% Confidence Interval
33617	2021Q3	HO_PA_LRT	0	3.567	10750	.	.	
33617	2021Q4	HO_PA_LRT	0	1.460	4400	.	.	
33617	2022Q1	HO_PA_LRT	0	1.808	5450	.	.	
33617	2022Q2	HO_PA_LRT	0	.	.	.	.	
33617	2022Q3	HO_PA_LRT	4	1.447	4361	2.764	0.0754	0.878, 6.668
33617	2022Q4	HO_PA_LRT	3	4.156	12525	0.722	0.6197	0.184, 1.965
33617	2023Q1	HO_PA_LRT	0	1.560	4700	0.000	0.2101	., 1.920

Possible Explanations for High or Low SRIR or pSIR

- **Data Quality (Informatics)**
- **Specimen Collection Practices**
- **Shifts in Laboratory Processes**
- **Infection Control**
- **Antimicrobial Stewardship**



Where to find more information:

- **NHSN AUR Homepage**
 - <https://www.cdc.gov/nhsn/acute-care-hospital/aur/>
- **NHSN AUR Training Videos**
 - <https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html>
- **NHSN AUR Protocol**
 - <https://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf>
- **NHSN Validation Guidance**
 - <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/AU-Option-Implementation-Data-Validation-P.pdf>
- **NHSN SRIR & pSIR Guide**
 - <https://www.cdc.gov/nhsn/pdfs/SRIR-and-pSIR-guide-2024-508.pdf>

Next Steps

- **Next Call**
 - **October 15 at 2pm Eastern/1pm Central Time**
 - **THIRD Thursday (instead of second)**
 - **Topic: IDWeek in Review with Callyn Wren and Cullen Adre**
 - **Topic: Targeted Assessment for Antimicrobial Stewardship with CDC Speakers (DECEMBER)**
- **Feedback always appreciated**
 - **Christopher.evans@tn.gov**