NHSN Antimicrobial Resistance (AR) Option: Beginner Analysis

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NHSN Antimicrobial Use and Resistance Team

NHSN Annual Training

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Objectives

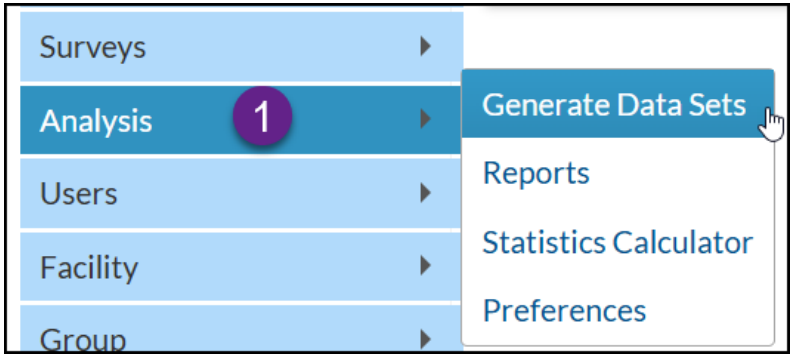
We will demonstrate how to run and interpret AR Option analysis reports. By the end of this session, you will be able to:

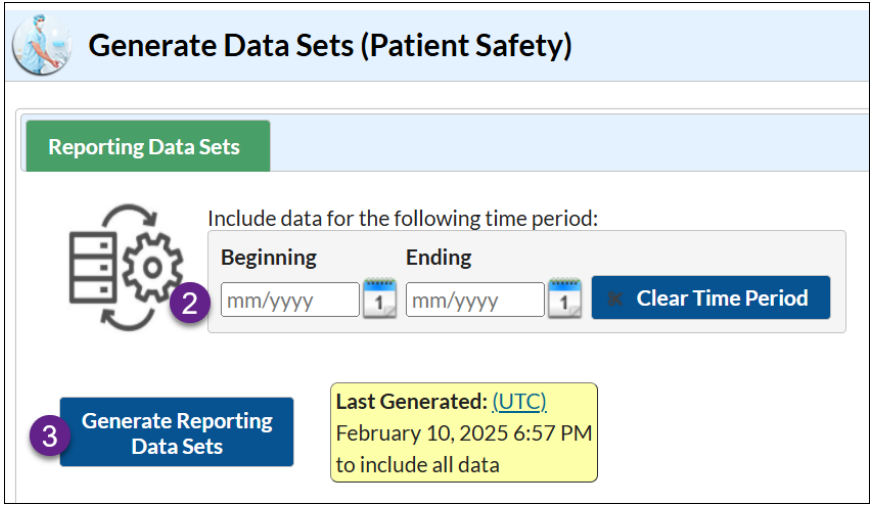
- Describe the analysis reports currently available within the NHSN AR Option
- Explain the utility of each analysis report
- Interpret the output produced in each report

Remember: Always Generate Data Sets!

When new data have been uploaded, generate new data sets within NHSN

1. Click Analysis then Generate Data Sets
2. Specify the beginning & ending dates or leave blank to include all data ever entered into NHSN
3. Click Generate Reporting Data Sets

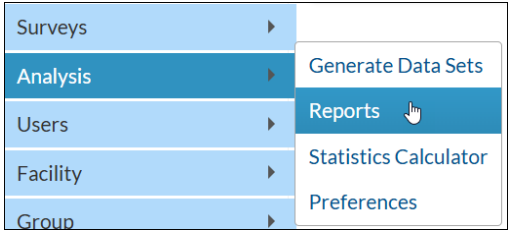




https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/generatedatasets-psc-508.pdf

Where to Find AR Option Reports

Once data sets are finished generating, click Analysis then Reports



Type of AR Option Reports

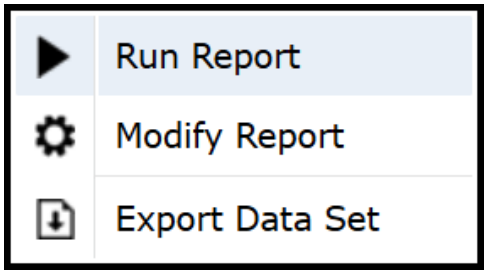
AR Option Data	Type of Reports
AR Event (aka Numerator)	Line list, bar chart, antibiogram & percent tested
AR Organism (AR Event assigned phenotype)	Line list, frequency table, rate table
AR Summary (aka Denominator)	Line list
Incidence and Prevalence (AR Event and AR Summary)	Rate tables
Risk-adjusted (AR Event and AR Summary): Standardized Resistant Infection Ratio (SRIR) and Pathogen-specific Resistant Infection Ratio (pSIR)	Ratios

AR Option Reports Not Covered in this Presentation

- This presentation will not cover the SRIR, pSIR, or the incidence and prevalence reports as those reports have their own training presentations.
  - SRIR and pSIR (2024 NHSN Annual Training)
    - YouTube Link [https://www.youtube.com/watch?v=wat71p9bZZ0]
    - Slideset [https://www.cdc.gov/nhsn/pdfs/training/D2_AR-Option-SRIR-and-pSIR_2024_508c.pdf]
  - Incidence and Prevalence (2023 NHSN Annual Training)
    - YouTube Link [https://www.youtube.com/watch?v=1seKabgmCIA]
    - Slideset [https://www.cdc.gov/nhsn/pdfs/training/2023/AR-Option-Incidence-Prevalence.pdf]
  - Antibiogram and Percent Tested (briefly reviewed in this presentation)
    - New pre-recorded session available this year

Data Option View

- Three options exist for viewing data that have been uploaded to NHSN:
  - Run Report
    - Generates the report using default settings
  - Modify Report
    - Allows user to make changes to the default settings
  - Export Data Set
    - Allows user to take AR data out of NHSN and analyze in a different software (*e.g.*, Excel, SAS)



Data Option View cont.

- This presentation covers mostly default output.
- Modifying reports:
  - How to Modify a Report: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/howtomodifyreport.pdf
  - Analysis Quick Reference Guides: https://www.cdc.gov/nhsn/ps-analysis-resources/reference-guides.html#accordion-1-collapse-5
  - How to Export data from NHSN: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/Exporting-Modified-Analysis-Data-Sets.pdf

Knowledge Check 1

Q. What analysis reports are available for the AR Option? Select all that apply.

A. Line listing – All Antimicrobial Resistance Events
B. Rate Table – Antimicrobial Resistant Percentages
C. Frequency Table – Antimicrobial Resistant Organisms
D. Bar Chart – All Antimicrobial Resistance Events
E. Facility-wide Antibiogram and Percent Tested
F. SRIR Report
G. All of the above

Knowledge Check 1 – Answer

Q. What analysis reports are available for the AR Option? Select all that apply.

A. Line listing – All Antimicrobial Resistance Events
B. Rate Table – Antimicrobial Resistant Percentages
C. Frequency Table – Antimicrobial Resistant Organisms
D. Bar Chart – All Antimicrobial Resistance Events
E. Facility-wide Antibiogram and Percent Tested
F. SRIR Report
G. All of the above

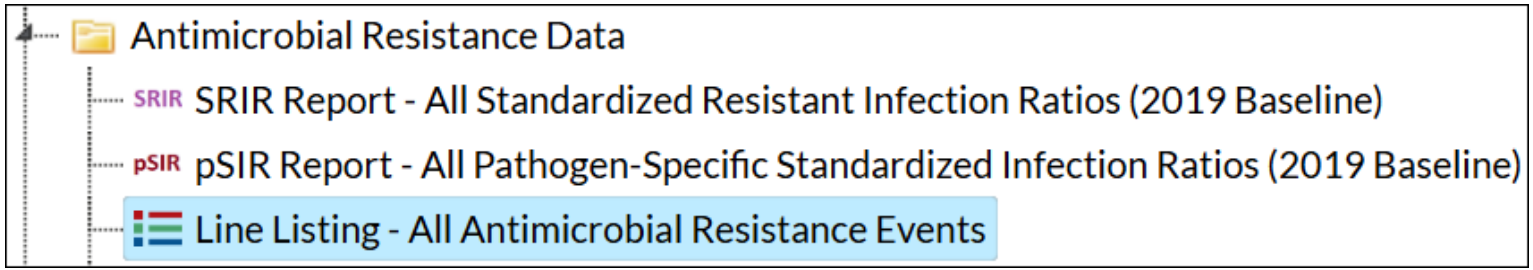
Explanation: All these analysis reports (and more) are available for the AR Option.

AR Event Reports

Line List, Bar Chart, and Antibiogram & Percent Tested

AR Event Line List

- A detailed list of all AR Events uploaded into your NHSN facility
  - Includes patient, specimen, organism, & drug susceptibility testing variables
  - One row per drug susceptibility test for each event
- Due to the number of AR Events, you'll likely reach the maximum number of rows for a line list within a few months of reporting. Workarounds include:
  - Make modifications to narrow selections
  - Export data



AR Event Line List – Example of Default Report

- 1 AR Event with 7 drug susceptibility test results

National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen
As of: February 7, 2025 at 11:32 PM UTC
Date Range: AUR_DETAIL SpecimenDateYr After and Including 2025
if (((PathogenDesc = "CA") AND (SpecimenGroup = "Blood")))

Pathogen Description=CA

Facility Org ID	Event ID	Patient ID	Fac Admission Date	Date Specimen Collected	Location	Isolate ID	Specimen Group	Pathogen Description	Drug Description	Final interpretation Description
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	AMPH - Amphotericin B	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	ANID - Anidulafungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	CASPO - Caspofungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	FLUCO - Fluconazole	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	MICA - Micafungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	POSAC - Posaconazole	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	VORI - Voriconazole	N - Not Tested

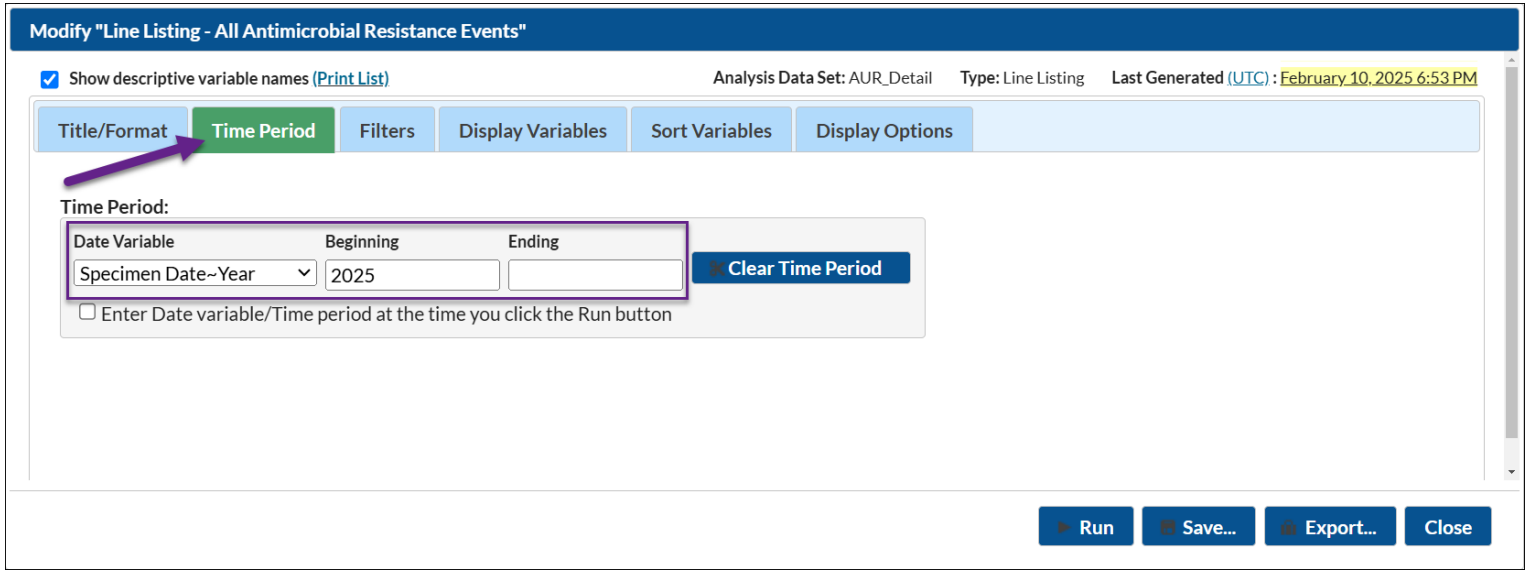
1. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Gentamicin high potency and Gentamicin are combined and displayed as Gentamicin high potency.
2. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Streptomycin high potency and Streptomycin are combined and displayed as Streptomycin high potency.
3. This line list shows a limited number of variables by default. To expand the number of variables shown, export the data out of NHSN or use the "modify" option to edit the line list.

Sorted by PathogenDesc specimenDate
Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

*All data presented are fictitious and used for illustrative purposes only

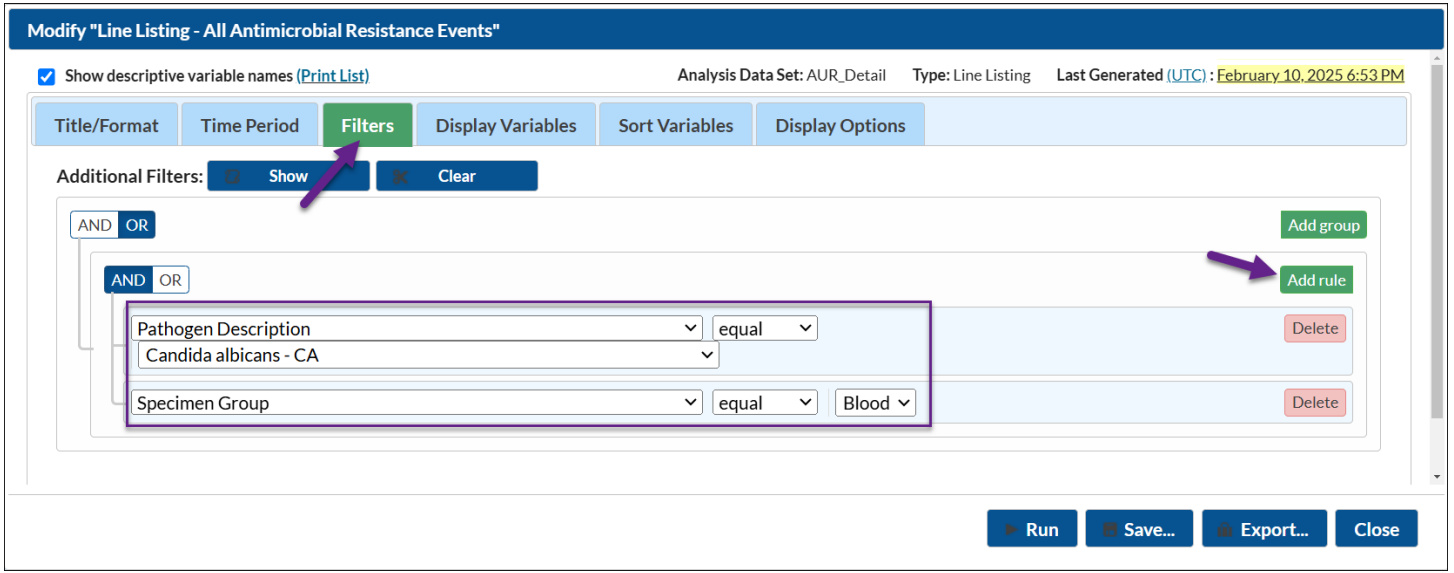
AR Event Line List – Modifications Screen: Time Period

- Line lists can be modified to show data for a specific time period
- Time Period tab of the Modifications screen
  - Example: Limiting the report to Specimen Date~Year beginning with 2025 to show only 2025 AR Events forward



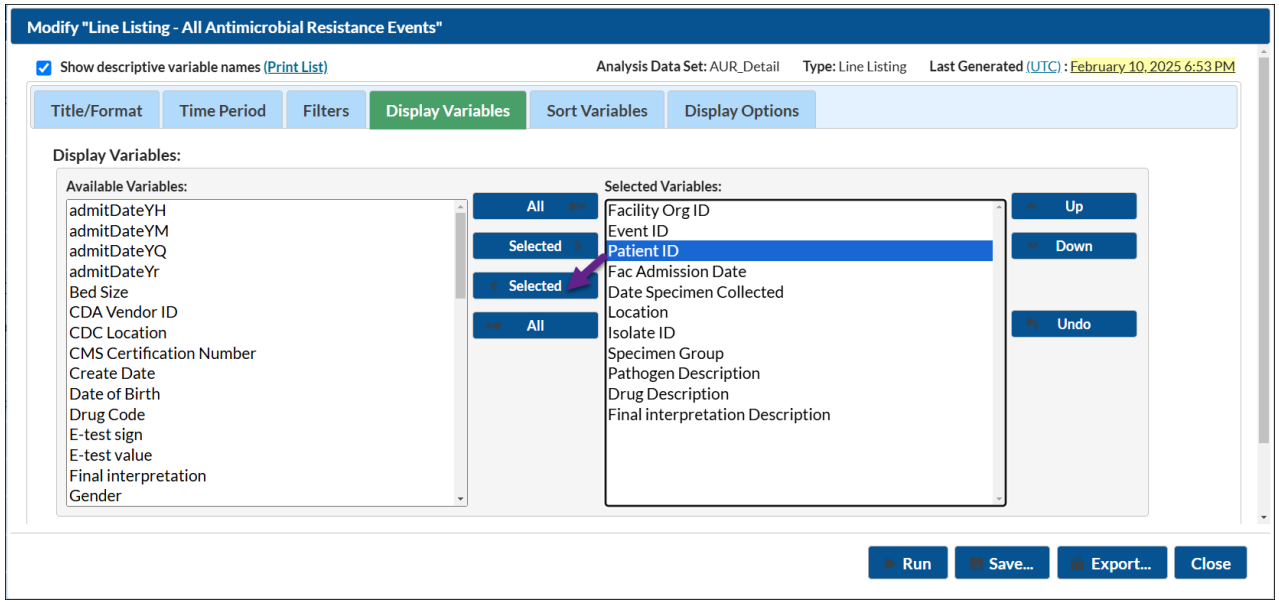
AR Event Line List – Modifications Screen: Filters

- Line lists can be modified to filter for specific AR Events
- Filters tab of the Modifications screen
  - Example: Filtering the report to review *Candida albicans* AR Events isolated from blood (click ‘Add rule’ to add additional filters)



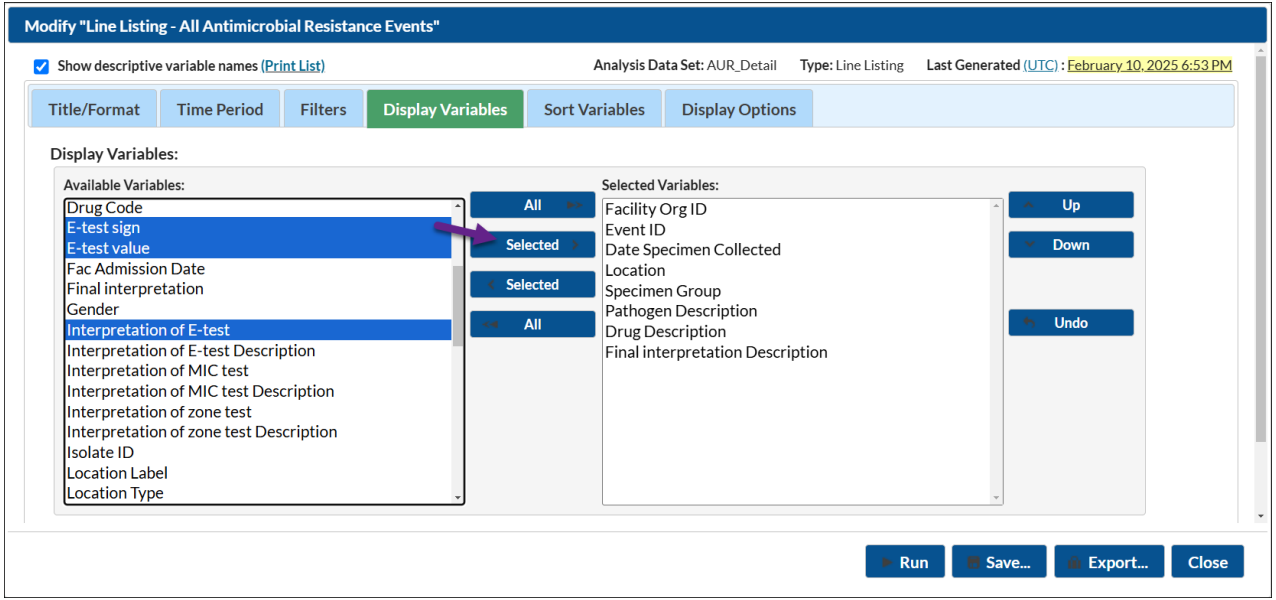
AR Event Line List – Modifications Screen: Display Variables

- Line lists can be modified to remove default variables
- Display Variables tab of the Modifications screen
  - Example: Remove Patient ID by selecting the variable on the right and clicking "< Selected" to move to the left



AR Event Line List – Modifications Screen: Display Variables

- Line lists can be modified to show additional variables
- Display Variables tab of the Modifications screen
  - Example: Add individual lab test sign, value, and interpretation (E-test) by selecting the variables and clicking “Selected >” to move to the right



AR Event Line List – Example Modifications

- Modified AR Event line list to show E-test sign, value, and interpretation

National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen
As of: February 12, 2025 at 2:45 PM UTC
Date Range: AUR_DETAIL SpecimenDateYr After and Including 2025
if (((PathogenDesc = "CA") AND (SpecimenGroup = "Blood")))

Pathogen Description=CA

Facility Org ID	Event ID	Date Specimen Collected	Location	Specimen Group	Pathogen Description	Drug Description	E-test sign	E-test value	Interpretation of E-test	Final interpretation Description
33617	71592812	01/01/2025	MSICU	Blood	Candida albicans - CA	AMPH - Amphotericin B	>	5.000	R	R - Resistant
33617	71592812	01/01/2025	MSICU	Blood	Candida albicans - CA	ANID - Anidulafungin	>	5.000	R	R - Resistant
33617	71592812	01/01/2025	MSICU	Blood	Candida albicans - CA	CASPO - Caspofungin	>	5.000	R	R - Resistant
33617	71592812	01/01/2025	MSICU	Blood	Candida albicans - CA	FLUCO - Fluconazole	>	5.000	R	R - Resistant
33617	71592812	01/01/2025	MSICU	Blood	Candida albicans - CA	MICA - Micafungin	>	5.000	R	R - Resistant
33617	71592812	01/01/2025	MSICU	Blood	Candida albicans - CA	POSAC - Posaconazole	>	5.000	R	R - Resistant
33617	71592812	01/01/2025	MSICU	Blood	Candida albicans - CA	VORI - Voriconazole		.	N	N - Not Tested

1. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Gentamicin high potency and Gentamicin are combined and displayed as Gentamicin high potency.
2. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Streptomycin high potency and Streptomycin are combined and displayed as Streptomycin high potency.
3. This line list shows a limited number of variables by default. To expand the number of variables shown, export the data out of NHSN or use the "modify" option to edit the line list.

Sorted by PathogenDesc specimenDate

Data contained in this report were last generated on February 10, 2025 at 6:52 PM UTC to include all data .

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AR Event Line List – Interpretation

- *Candida albicans* was isolated from a blood specimen collected in the medical-surgical critical care unit (MSICU)

National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen
As of: February 7, 2025 at 11:32 PM UTC
Date Range: AUR_DETAIL SpecimenDateYr After and Including 2025
if (((PathogenDesc = "CA") AND (SpecimenGroup = "Blood")))

Pathogen Description=CA

Facility Org ID	Event ID	Patient ID	Fac Admission Date	Date Specimen Collected	Location	Isolate ID	Specimen Group	Pathogen Description	Drug Description	Final interpretation Description
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	AMPH - Amphotericin B	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	ANID - Anidulafungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	CASPO - Caspofungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	FLUCO - Fluconazole	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	MICA - Micafungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	POSAC - Posaconazole	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	VORI - Voriconazole	N - Not Tested

1. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Gentamicin high potency and Gentamicin are combined and displayed as Gentamicin high potency.
2. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Streptomycin high potency and Streptomycin are combined and displayed as Streptomycin high potency.
3. This line list shows a limited number of variables by default. To expand the number of variables shown, export the data out of NHSN or use the "modify" option to edit the line list.

Sorted by PathogenDesc specimenDate
Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

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AR Event Line List – Interpretation cont.

- This isolate was resistant to amphotericin B, anidulafungin, caspofungin, fluconazole, micafungin, and posaconazole; the isolate was not tested against voriconazole

National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen
As of: February 7, 2025 at 11:32 PM UTC
Date Range: AUR_DETAIL SpecimenDateYr After and Including 2025
if (((PathogenDesc = "CA") AND (SpecimenGroup = "Blood")))

Pathogen Description=CA

Facility Org ID	Event ID	Patient ID	Fac Admission Date	Date Specimen Collected	Location	Isolate ID	Specimen Group	Pathogen Description	Drug Description	Final interpretation Description
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	AMPH - Amphotericin B	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	ANID - Anidulafungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	CASPO - Caspofungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	FLUCO - Fluconazole	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	MICA - Micafungin	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	POSAC - Posaconazole	R - Resistant
33617	71592812	CA_BLOOD_2025	01/01/2025	01/01/2025	MSICU	CAlbicans_Blood	Blood	Candida albicans - CA	VORI - Voriconazole	N - Not Tested

1. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Gentamicin high potency and Gentamicin are combined and displayed as Gentamicin high potency.
2. For blood, CSF and lower respiratory specimen Enterococcus spp. isolates, results for Streptomycin high potency and Streptomycin are combined and displayed as Streptomycin high potency.
3. This line list shows a limited number of variables by default. To expand the number of variables shown, export the data out of NHSN or use the "modify" option to edit the line list.

Sorted by PathogenDesc specimenDate
Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

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Knowledge Check 2

Q: In the AR Event Line List, there is one row per AR Event (eventID). True or False?

A. True

B. False

Knowledge Check 2 – Answer

Q: In the AR Event Line List, there is one row per AR Event (eventID). True or False?

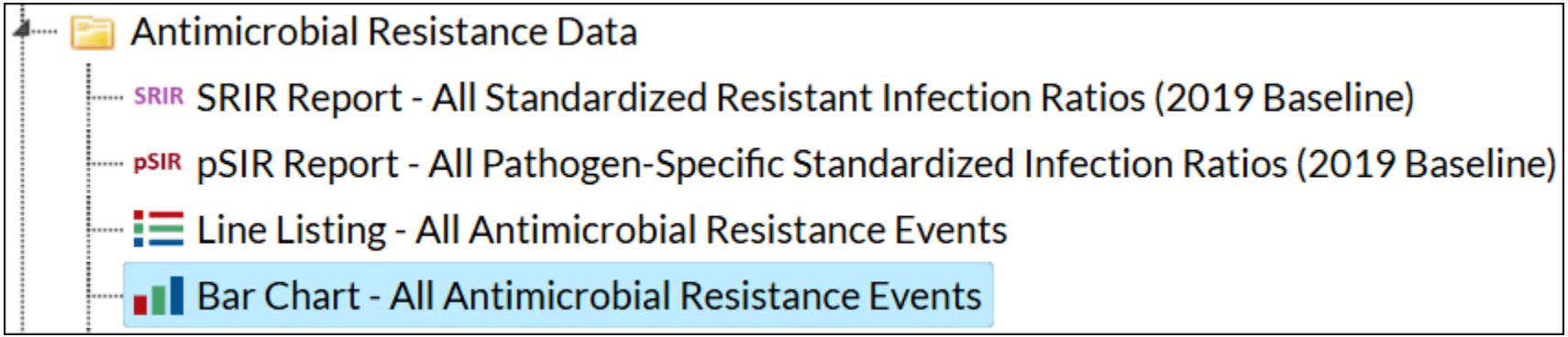
A. True

B. False

Explanation: In the AR Event Line List, there is one row **per drug susceptibility test** for each AR Event, so one eventID will have multiple rows.

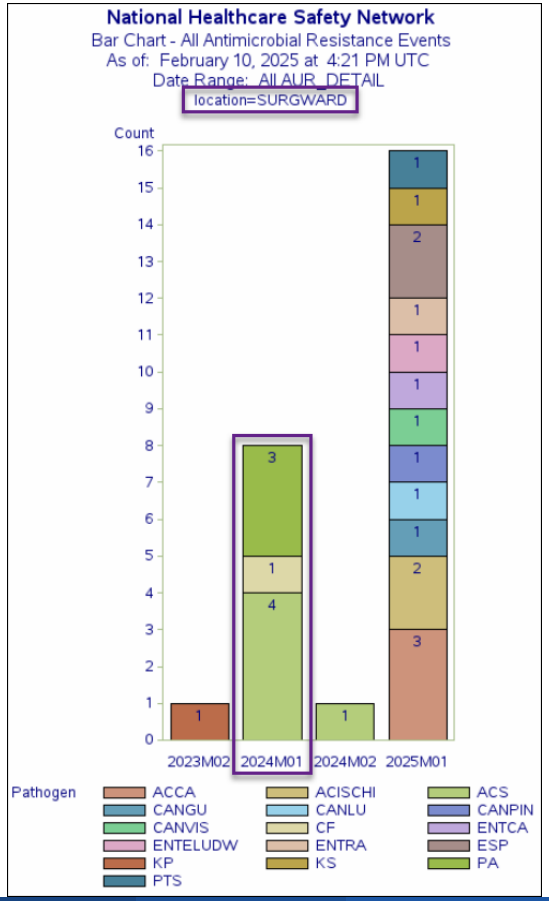
AR Event Bar Chart

- Graphically displays the number of AR Events submitted by location over time
- Defaults to display monthly AR Events by pathogen & location
- Shows a maximum of 12 time periods



AR Event Bar Chart – Interpreting the Output

- In January 2024, 8 AR Events were reported from the surgical ward (SURGWARD)



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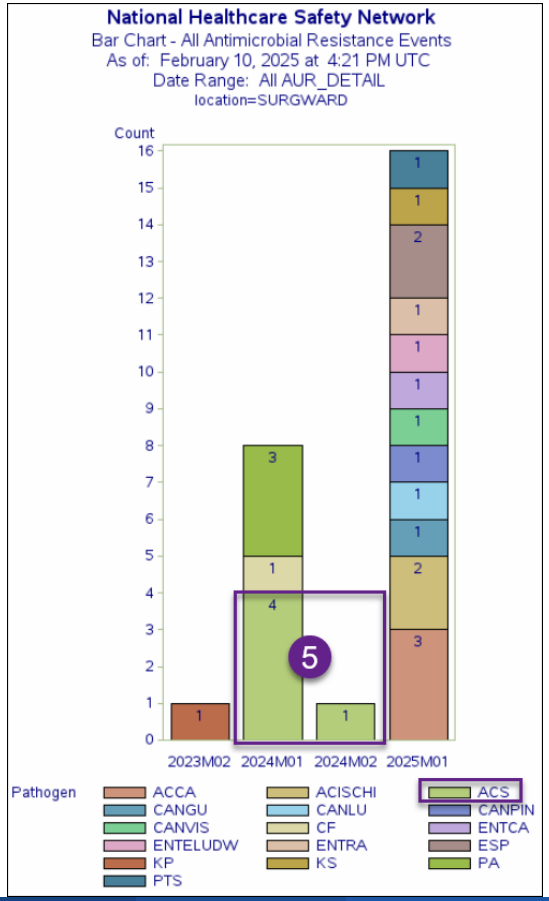
AR Event Bar Chart – Interpreting the Output cont.

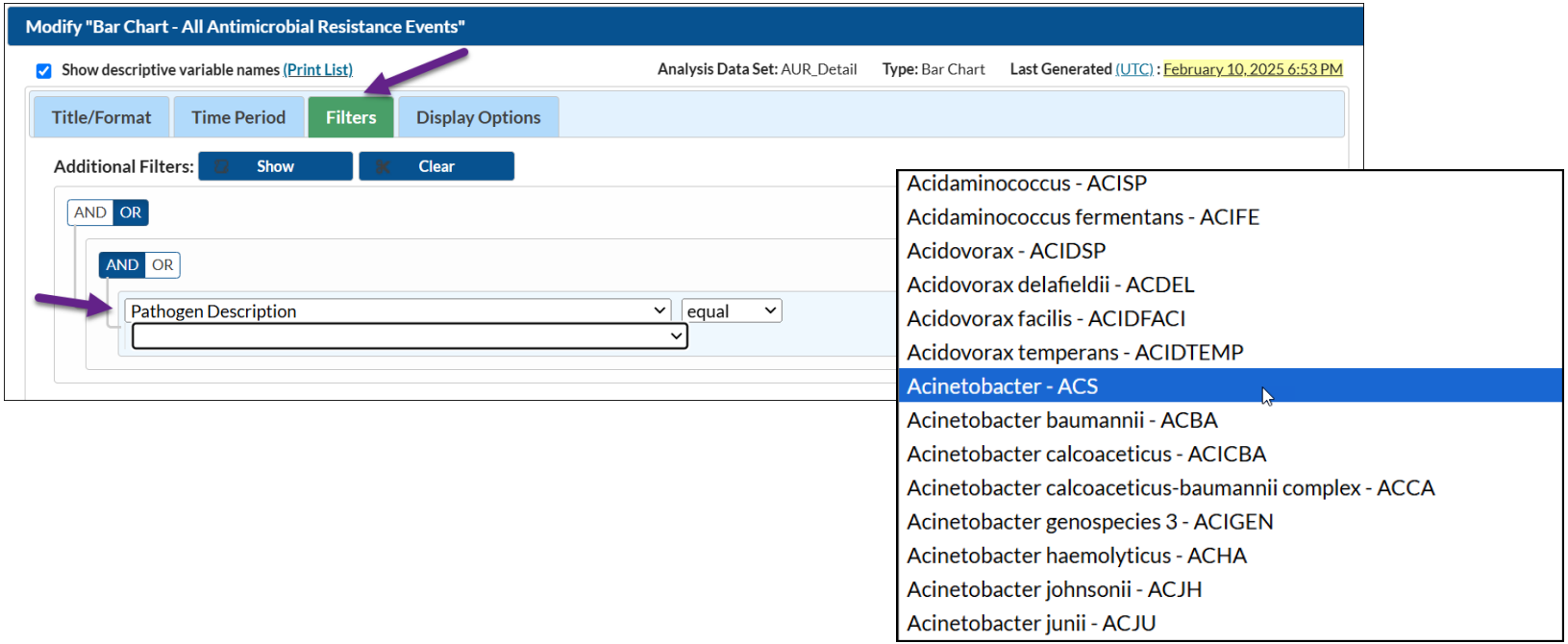
- In January 2024, 8 AR Events were reported from the surgical ward (SURGWARD)
- 5 total *Acinetobacter* events were reported from this location
  - 4 in January 2024
  - 1 in February 2024



*All data presented are fictitious and used for illustrative purposes only

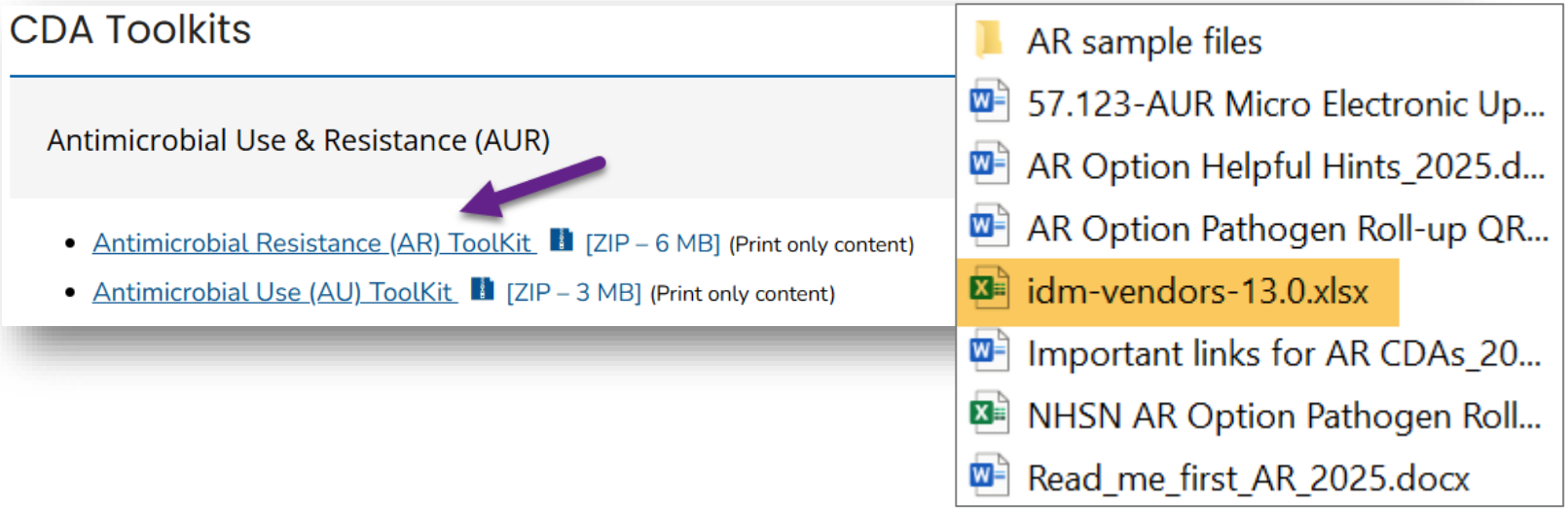
Pathogen Codes Defined: Modifications Screen

- On the modifications screen, use the Pathogen Description variable drop-down menu to determine what each pathogen code refers to



Pathogen Codes Defined: Information Data Model

- Download the AR CDA Toolkit and open the Information Data Model (IDM) spreadsheet within the toolkit: https://www.cdc.gov/nhsn/cdaportal/toolkits.html



Pathogen Codes Defined: Information Data Model cont.

- Go to the “Pathogen Codes 2025” tab. Filter the ARO Pathogen variable (column S) to ‘X’ to show all eligible AR Option pathogens. The New Code variable (column G) is displayed in NHSN analysis reports.

E	F	G	S
Description for Drop-down in App	**Old Code**	**New Code**	**ARO Pathogen**
Acinetobacter		ACS	X
multidrug resistant Acinetobacter		ACS*1	X
carbapenem resistant Acinetobacter		ACS*2	X
Acinetobacter baumannii		ACBA	X
Acinetobacter calcoaceticus		ACICBA	X
Acinetobacter calcoaceticus-baumannii complex		ACCA	X
Acinetobacter haemolyticus		ACHA	X
Acinetobacter johnsonii		ACJH	X
Acinetobacter junii		ACJU	X
Acinetobacter lwoffi		ACLW	X
Acinetobacter nosocomialis		ACINNOSO	X
Acinetobacter pittii		ACINPITT	X
Acinetobacter radioresistens		ACIRADI	X
Acinetobacter schindleri		ACISCHI	X
Acinetobacter ursingii		ACIURSI	X
Citrobacter		CS	X
Citrobacter amalonaticus		CITAM	X

Type | **Pathogen Codes 2025** | Pathogen Codes 2024 | Pathogen Codes 2024-Synonym | Pathogen Codes 2023-Preferred | Pathogen Codes

Knowledge Check 3

Q. What is the maximum number of time periods the AR Event Bar Chart can show?

A. 3
B. 4
C. 6
D. 8
E. 12

Knowledge Check 3 – Answer

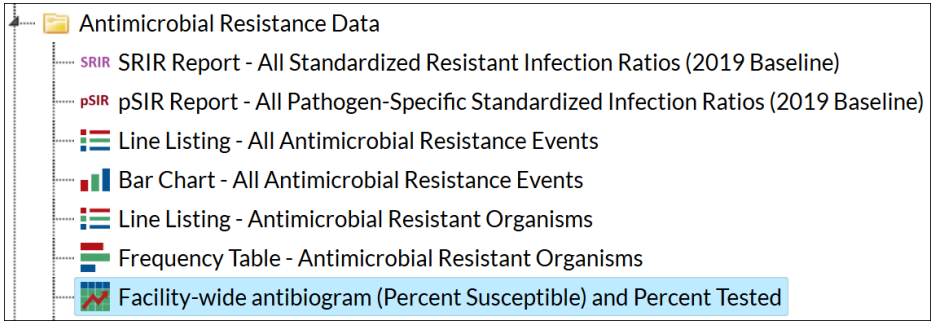
Q. What is the maximum number of time periods the AR Event Bar Chart can show?

A. 3
B. 4
C. 6
D. 8
E. 12

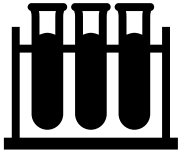
Explanation: The AR Event Bar Chart can show a maximum of 12 time periods.

AR Facility-wide Antibiogram and Percent Tested

- Provides two tables based on AR Events reported in NHSN
  - Percent susceptible (%S)
  - Percent tested (%Tested)
- Calculated for each organism-antimicrobial combination reported from:
  - All locations
  - All specimen types
  - All patient ages
- Defaults to show by quarter but can roll up to additional time groupings
- Available to both facilities and groups
- Filters allow for customization of the output



AR Facility-wide Antibiogram – Percent Susceptible

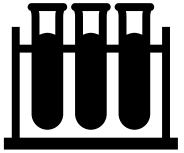


- The %S is calculated for each organism-antimicrobial pairing using the following formula:

$$\frac{Number\ isolates\ tested\ suceptible}{Number\ of\ isolates\ tested} \times 100 = \%S$$

- %S only calculated if at least 30 isolates are tested for the specific antimicrobial

AR Facility-wide Antibiogram – Percent Tested



- The %Tested is calculated for each organism-antimicrobial pairing using the following formula:

$$\frac{Number\ of\ isolates\ with\ a\ susceptiblity\ result}{Total\ number\ of\ isolates} \times 100 = \%\text{Tested}$$

- **Note:** Susceptibility results include S, S-DD, I, R, or NS
- %Tested only calculated if at least one isolate has been reported

AR Facility-wide Antibiogram – Output

National Healthcare Safety Network
Facility-wide antibiogram (Percent Susceptible) and Percentage of Isolates with Susceptibility Results
Percent Susceptible per 100 Isolates
As of: February 10, 2025 at 5:03 PM UTC
Date Range: AUR_SUMMARY SpecimenDateYr After and Including 2024

		Pathogen (Number of Isolates Reported)											
		Gram-Negative											
Drug Class	Drug	Acinetobacter baumannii & calcoaceticus-baumannii complex (15)	Acinetobacter spp. (105)	Citrobacter amalonaticus, freundii, koseri, & diversus (15)	Enterobacter spp. (25)	Escherichia coli (20)	Klebsiella aerogenes (1)	Klebsiella oxytoca (9)	Klebsiella pneumoniae (3)	Morganella morganii (1)	Proteus mirabilis (2)	Pseudomonas aeruginosa (67)	Stenotrophomonas maltophilia (20)
Aminoglycosides	AMK	.	20.0	.	.	.	.	.	.	.	.	28.0	
	GENTA	.	16.0										
	PLAZO												
	TOBRA	.	33.0										

National Healthcare Safety Network
Facility-wide antibiogram (Percent Susceptible) and Percentage of Isolates with Susceptibility Results
Percent Tested per 100 Isolates
As of: February 10, 2025 at 5:03 PM UTC
Date Range: AUR_SUMMARY SpecimenDateYr After and Including 2024

		Pathogen (Number of Isolates Reported)											
		Gram-Negative											
Drug Class	Drug	Acinetobacter baumannii & calcoaceticus-baumannii complex (15)	Acinetobacter spp. (105)	Citrobacter amalonaticus, freundii, koseri, & diversus (15)	Enterobacter spp. (25)	Escherichia coli (20)	Klebsiella aerogenes (1)	Klebsiella oxytoca (9)	Klebsiella pneumoniae (3)	Morganella morganii (1)	Proteus mirabilis (2)	Pseudomonas aeruginosa (67)	Stenotrophomonas maltophilia (20)
Aminoglycosides	AMK	93.0	89.0	88.0	76.0	95.0	0	100	100	0	50.0	93.0	
	GENTA	93.0	88.0	88.0	88.0	100	0	100	100	100	100	97.0	
	PLAZO			75.0	93.0	100		100					
	TOBRA	47.0	76.0	88.0	80.0	30.0	0	11.0	67.0	100	100	69.0	

*All data presented are fictitious and used for illustrative purposes only

Knowledge Check 4

Q: In the facility-wide antibiogram and percent tested report, percent tested is only calculated when at least 30 isolates were reported. True or False?

A. True

B. False

Knowledge Check 4 – Answer

Q: In the facility-wide antibiogram and percent tested report, percent tested is only calculated when at least 30 isolates were reported. True or False?

A. True

B. False

Explanation: Percent tested (%Tested) is calculated if at least one isolate has been reported.

AR Organism Reports

Line List, Frequency Table, Rate Table

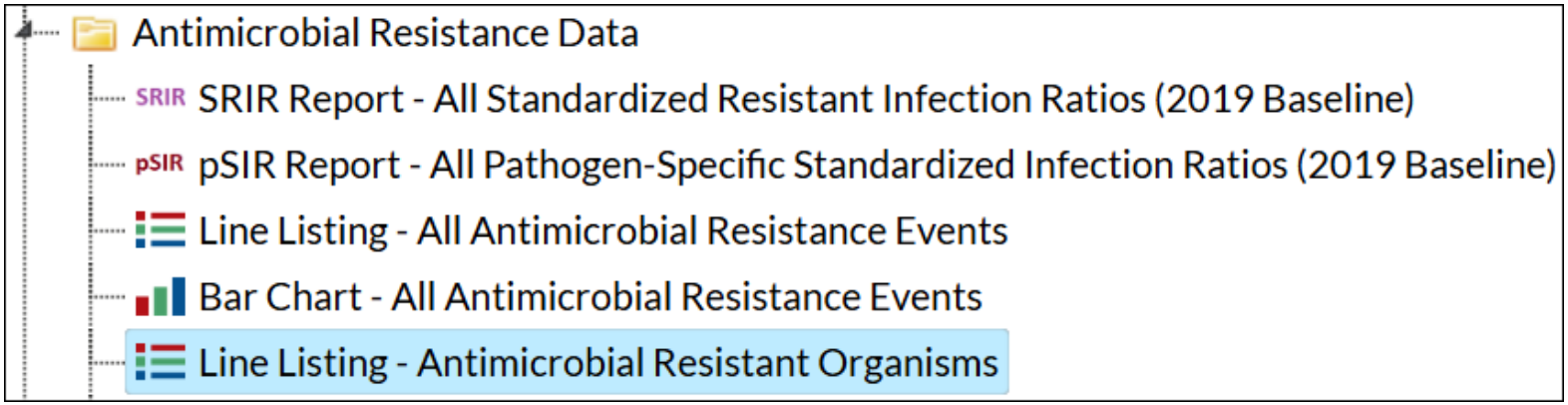
Antimicrobial Resistant Phenotype Definitions

- Reported AR Events are assigned a phenotype if they meet the NHSN-defined susceptibility testing criteria
  - Appendix I of the NHSN AUR Module Protocol (https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf)

Phenotype Name	Phenotype Code	Phenotype Definition[a]
Methicillin-resistant *Staphylococcus aureus*[b]	MRSA_AR	*Staphylococcus aureus* that has tested Resistant (R) to at least one of the following: oxacillin or cefoxitin
Carbapenem-resistant Enterobacterales (expanded)	CREexpanded_AR	Any *Citrobacter* spp., *Enterobacter* spp., *E. coli*, *Klebsiella* spp., and *Serratia marcescens* that has tested Resistant (R) to at least one of the following: imipenem, meropenem, doripenem[d], ertapenem, meropenem/vaborbactam, or imipenem/relebactam OR Any *Proteus* spp., and *Morganella morganii* that has tested Resistant (R) to at least one of the following: meropenem, doripenem[d], ertapenem, or meropenem/vaborbactam Note: Beginning in January 2022, this phenotype was expanded to include meropenem/vaborbactam and imipenem/relebactam. Note: Beginning in January 2023, this phenotype was expanded to add *Citrobacter braakii*, *Citrobacter freundii* complex, and *Citrobacter youngae*. Prior to January 2023, this phenotype only included *Citrobacter amalonaticus*, *Citrobacter freundii*, and *Citrobacter koseri*. Note: Beginning in January 2025, this phenotype was expanded to all species within the *Citrobacter*, *Klebsiella*, and *Proteus* genus.

AR Organisms Line List

- Lists all AR Events that meet an AR Organism phenotype definition
- Includes patient & specimen information



AR Organisms Line List – Interpretation

- 8 AR Events collected in the Emergency Department met the NHSN AR Option definition for CRE (expanded)
- 5 specimens were *E. coli* and 3 were *K. oxytoca*

National Healthcare Safety Network
Line Listing - Antimicrobial Resistant Organisms
CREexpanded_AR - Carbapenem-resistant Enterobacterales (expanded)

As of: February 10, 2025 at 5:20 PM UTC
Date Range: ANTIBIOGRAM_AR specDateYr After and Including 2025
if (((phenotype_AR IN ("MRSA_AR", "ESCecoli_AR", "ESCklebsiella_AR", "carbNS_Acine_AR", "carbNS_PA_AR", "MDR_Acine_AR", "MDR_PA_AR", "VREfaecium_AR", "VREfaecalis_AR", "CREexpanded_AR", "FR_Candi_AR", "DR_SP_AR")) AND (locCDC = "OUT:ACUTE:ED")))

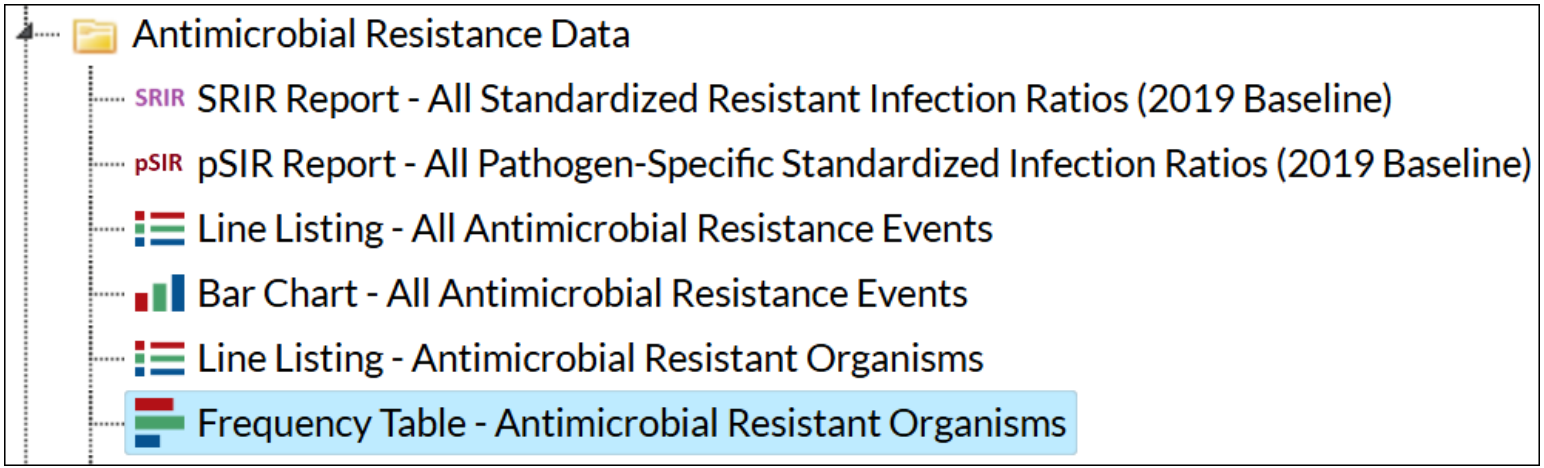
Facility Org ID	Patient ID	Date of Birth	Fac Admission Date	Event ID	Date Specimen Collected	Event Type	Location	Pathogen Description
33617	ECOLI_20252	01/25/1974	01/01/2025	71408486	01/01/2025	AR	ED	Escherichia coli - EC
33617	ECOLI_2025TIS2	01/25/1974	01/01/2025	71408487	01/01/2025	AR	ED	Escherichia coli - EC
33617	KLEBOXY_20252	07/25/1989	01/01/2025	71408488	01/01/2025	AR	EMER	Klebsiella oxytoca - KO
33617	ECOLI_JAN2025	01/25/1974	01/01/2025	71592227	01/01/2025	AR	ED	Escherichia coli - EC
33617	KLEBOXY_JAN2025	07/25/1989	01/01/2025	71592258	01/01/2025	AR	EMER	Klebsiella oxytoca - KO
33617	ECOLI_2025	01/25/1974	01/01/2025	71593346	01/01/2025	AR	ED	Escherichia coli - EC
33617	ECOLI_2025TIS	01/25/1974	01/01/2025	71593347	01/01/2025	AR	ED	Escherichia coli - EC
33617	KLEBOXY_2025	07/25/1989	01/01/2025	71593348	01/01/2025	AR	EMER	Klebsiella oxytoca - KO

1. Please find the document containing Phenotype_AR definitions at https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/ar-phenotype-definitions-508.pdf
Sorted by orgID specimenDate
Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

*All data presented are fictitious and used for illustrative purposes only

AR Organisms Frequency Table

- Table displaying counts of AR Events meeting NHSN-defined phenotype definitions
- Defaults to show totals by month



AR Organisms Frequency Table – Interpretation

- From Jan 2024-Jan 2025, 51 AR Events met the definition of multidrug-resistant *Pseudomonas aeruginosa*
  - 23 events met the criteria in Jan 2024
  - 1 event met the criteria in Feb, May, Aug, and Dec 2024, respectively
  - 24 events met the criteria in Jan 2025

National Healthcare Safety Network
Frequency Table - Antimicrobial Resistant Organisms
As of: February 10, 2025 at 5:29 PM UTC
Date Range: ANTIBIOGRAM_AR specDateYr After and Including 2024

if (((phenotype_AR IN ("MRSA_AR", "ESCecoli_AR", "ESCklebsiella_AR", "carbNS_Acine_AR", "carbNS_PA_AR", "MDR_Acine_AR", "MDR_PA_AR", "VREfaecium_AR", "VREfaecalis_AR", "CREexpanded_AR", "FR_Candi_AR", "DR_SP_AR"))))

Frequency

Table of phenotype_AR by specDateYM

phenotype_AR(Resistant Organism)	specDateYM(Spec Collected~Yr/Mon)								
	2024M01	2024M02	2024M04	2024M05	2024M08	2024M10	2024M12	2025M01	Total
CREexpanded_AR	14	6	1	2	0	6	2	25	56
DR_SP_AR	3	0	0	1	0	0	2	14	20
ESCecoli_AR	2	2	0	1	0	2	1	10	18
ESCklebsiella_AR	3	4	0	1	0	0	1	3	12
FR_Candi_AR	3	0	0	1	0	0	1	4	9
MDR_Acine_AR	40	6	0	5	0	2	1	30	84
MDR_PA_AR	23	1	0	1	1	0	1	24	51
MRSA_AR	7	0	0	2	0	0	2	13	24
carbNS_Acine_AR	34	7	0	5	0	2	1	24	73
carbNS_PA_AR	22	1	0	1	1	0	1	27	53
Total	151	27	1	20	2	12	13	174	400

1. Please find the document containing Phenotype_AR definitions at https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/ar-phenotype-definitions-508.pdf

Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

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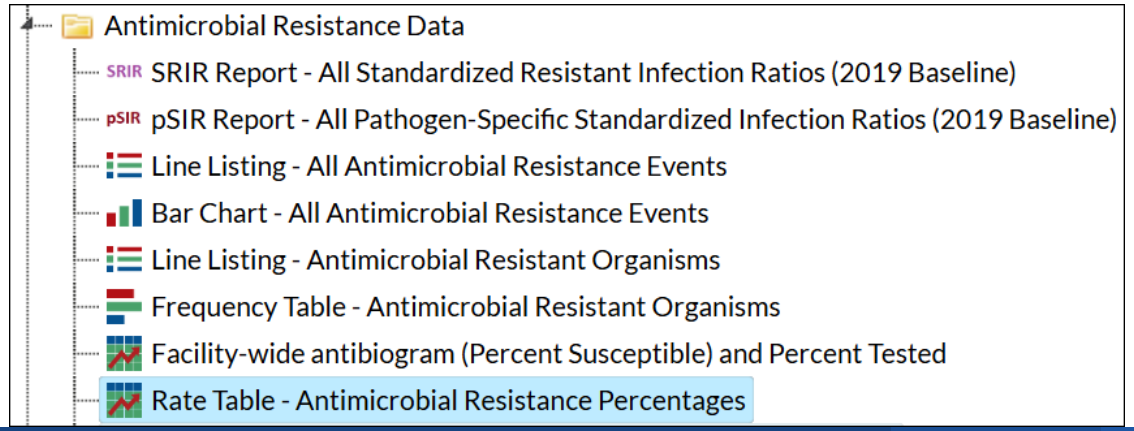
AR Organism Percentages

- Displays # isolated, # tested, and # resistant by month
- Displays % of isolates that tested non-susceptible or resistant to certain antimicrobials for each defined phenotype
- Calculated if at least 30 isolates were tested

$$\frac{\#\ Isolates\ tested\ NS\ or\ R\ to\ specific\ antimicrobials}{\#\ Isolates\ tested\ for\ susceptibilty\ to\ specific\ antimicrobials} \times 100$$



AR Organism Percentages – Number Isolated

- In January 2025: 46 *Acinetobacter* spp. AR Events were reported

National Healthcare Safety Network
Rate Table - Antimicrobial Resistance Percentages
As of: February 10, 2025 at 5:41 PM UTC
Date Range: ANTIBIOGRAM_RATESAR specDateYr After and Including 2023

Facility Org ID=33617 Phenotype Description=Multidrug-resistant Acinetobacter spp.

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
33617	MDR_Acine_AR	2023M06	32	31	31	100.0	90.8,100.0
33617	MDR_Acine_AR	2024M01	56	56	55	98.2	91.5,99.9
33617	MDR_Acine_AR	2025M01	46	44	40	90.9	79.5,97.0

1. This phenotype includes any Acinetobacter spp. that has tested either Intermediate (I) or Resistant (R) to at least one drug in at least three of seven select antimicrobial categories.
2. Percent resistant is only calculated when at least 30 isolates have been tested.
3. If the percent of isolates tested is less than 70%, caution should be used when interpreting the percent resistant.

Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

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AR Organism Percentages – # Tested/Resistant

- In January 2025: 44 of those were tested and 40 tested intermediate or resistant to at least one drug in at least three of seven select antimicrobial categories

National Healthcare Safety Network
Rate Table - Antimicrobial Resistance Percentages
As of: February 10, 2025 at 5:41 PM UTC
Date Range: ANTIBIOGRAM_RATESAR specDateYr After and Including 2023

Facility Org ID=33617 Phenotype Description=Multidrug-resistant Acinetobacter spp.

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
33617	MDR_Acine_AR	2023M06	32	31	31	100.0	90.8,100.0
33617	MDR_Acine_AR	2024M01	56	56	55	98.2	91.5,99.9
33617	MDR_Acine_AR	2025M01	46	44	40	90.9	79.5,97.0

1. This phenotype includes any Acinetobacter spp. that has tested either Intermediate (I) or Resistant (R) to at least one drug in at least three of seven select antimicrobial categories.
2. Percent resistant is only calculated when at least 30 isolates have been tested.
3. If the percent of isolates tested is less than 70%, caution should be used when interpreting the percent resistant.

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AR Organism Percentages – Percent Resistant

- In January 2025: 90.9% (40 resistant/44 tested) of the ACS events reported met the NHSN AR Option definition for multi-drug-resistant *Acinetobacter* spp.

National Healthcare Safety Network
Rate Table - Antimicrobial Resistance Percentages
As of: February 10, 2025 at 5:41 PM UTC
Date Range: ANTIBIOGRAM_RATESAR specDateYr After and Including 2023

Facility Org ID=33617 Phenotype Description=Multidrug-resistant Acinetobacter spp.

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
33617	MDR_Acine_AR	2023M06	32	31	31	100.0	90.8,100.0
33617	MDR_Acine_AR	2024M01	56	56	55	98.2	91.5,99.9
33617	MDR_Acine_AR	2025M01	46	44	40	90.9	79.5,97.0

1. This phenotype includes any Acinetobacter spp. that has tested either Intermediate (I) or Resistant (R) to at least one drug in at least three of seven select antimicrobial categories.
2. Percent resistant is only calculated when at least 30 isolates have been tested.
3. If the percent of isolates tested is less than 70%, caution should be used when interpreting the percent resistant.

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AR Organism Percentages – 95% Confidence Interval

- In January 2025: The 95% Confidence Interval for the percent resistant was calculated to be 79.5 and 97.0.

National Healthcare Safety Network
Rate Table - Antimicrobial Resistance Percentages
As of: February 10, 2025 at 5:41 PM UTC
Date Range: ANTIBIOGRAM_RATESAR specDateYr After and Including 2023

Facility Org ID=33617 Phenotype Description=Multidrug-resistant Acinetobacter spp.

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
33617	MDR_Acine_AR	2023M06	32	31	31	100.0	90.8,100.0
33617	MDR_Acine_AR	2024M01	56	56	55	98.2	91.5,99.9
33617	MDR_Acine_AR	2025M01	46	44	40	90.9	79.5,97.0

1. This phenotype includes any Acinetobacter spp. that has tested either Intermediate (I) or Resistant (R) to at least one drug in at least three of seven select antimicrobial categories.
2. Percent resistant is only calculated when at least 30 isolates have been tested.
3. If the percent of isolates tested is less than 70%, caution should be used when interpreting the percent resistant.

Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

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Knowledge Check 5

Q: In the AR Organism Percentages report, will percent resistant for MRSA be calculated if only 20 *S. aureus* isolates were tested against oxacillin or cefoxitin?

A. Yes

B. No

Knowledge Check 5 – Answer

Q: In the AR Organism Percentages report, will percent resistant for MRSA be calculated if only 20 *S. aureus* isolates were tested against oxacillin or cefoxitin?

A. Yes

B. No

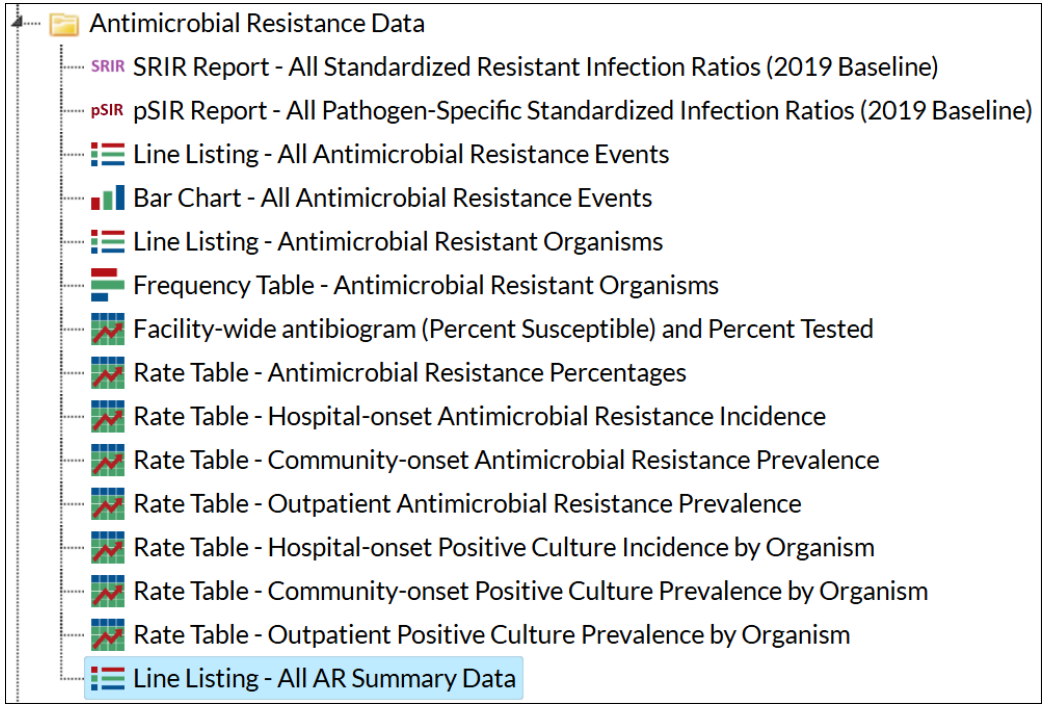
Explanation: The percent resistant is only calculated if at least 30 isolates were tested against the specific antimicrobials.

AR Summary (Denominator) Report

Line List

AR Summary (Denominator) Line List

- Lists the AR Summary data by month & location
  - FacWideIN: Patient Days & Admissions
  - Outpatient locations: Encounters
- Includes the “Report No Events” variable



AR Summary (Denominator) Line List – Interpretation

- In Jan 2025, there were 2,289 total patient days and 486 admissions for FacWideIN (all inpatient locations combined) and AR Events were reported (No AR Events = N)

National Healthcare Safety Network
Line Listing for All AR Summary Data
As of: February 10, 2025 at 5:58 PM UTC
Date Range: AR_SUMMARY summaryYr After and Including 2022

Facility Org ID	CMS Certification Number	Summary Year/Month	Location	Survey Patient Days	Admissions	Total Facility Encounters	No AR Events
33617	00M2016	2022M11	EMER			375	Y
33617	00M2016	2023M04	EMER			750	
33617	00M2016	2024M01	ED			754	N
33617	00M2016	2024M05	ED			579	N
33617	00M2016	2024M05	FACWIDEIN	2289	486		N
33617	00M2016	2024M10	FACWIDEIN	14	0		N
33617	00M2016	2024M12	ED			599	N
33617	00M2016	2025M01	ED			579	N
33617	00M2016	2025M01	FACWIDEIN	2289	486		N

Sorted by orgID summaryYM location
Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

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AR Summary (Denominator) Line List – Interpretation cont.

- In Nov 2022, there were 375 total encounters in EMER and the “Report No Events” box was clicked (No AR Events = Y)

National Healthcare Safety Network
Line Listing for All AR Summary Data
As of: February 10, 2025 at 5:58 PM UTC
Date Range: AR_SUMMARY summaryYr After and Including 2022

Facility Org ID	CMS Certification Number	Summary Year/Month	Location	Survey Patient Days	Admissions	Total Facility Encounters	No AR Events
33617	00M2016	2022M11	EMER			375	Y
33617	00M2016	2023M04	EMER			750	
33617	00M2016	2024M01	ED			754	N
33617	00M2016	2024M05	ED			579	N
33617	00M2016	2024M05	FACWIDEIN	2289	486		N
33617	00M2016	2024M10	FACWIDEIN	14	0		N
33617	00M2016	2024M12	ED			599	N
33617	00M2016	2025M01	ED			579	N
33617	00M2016	2025M01	FACWIDEIN	2289	486		N

Sorted by orgID summaryYM location

Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

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AR Summary (Denominator) Line List – Interpretation cont.

- The facility has not yet reported AR Events for the EMER for Apr 2023 and has not clicked the “Report No Events” box for that month (No AR Events = (blank))

National Healthcare Safety Network
Line Listing for All AR Summary Data
As of: February 10, 2025 at 5:58 PM UTC
Date Range: AR_SUMMARY summaryYr After and Including 2022

Facility Org ID	CMS Certification Number	Summary Year/Month	Location	Survey Patient Days	Admissions	Total Facility Encounters	No AR Events
33617	00M2016	2022M11	EMER			375	Y
33617	00M2016	2023M04	EMER			750	
33617	00M2016	2024M01	ED			754	N
33617	00M2016	2024M05	ED			579	N
33617	00M2016	2024M05	FACWIDEIN	2289	486		N
33617	00M2016	2024M10	FACWIDEIN	14	0		N
33617	00M2016	2024M12	ED			599	N
33617	00M2016	2025M01	ED			579	N
33617	00M2016	2025M01	FACWIDEIN	2289	486		N

Sorted by orgID summaryYM location

Data contained in this report were last generated on February 5, 2025 at 3:25 PM UTC to include all data .

*All data presented are fictitious and used for illustrative purposes only

Knowledge Check 6

Q: If a facility has not reported AR Events or clicked the “Report No Events” box for the location/month, then what is shown for the No AR Events variable in the AR Denominator Line List?

A. Blank

B. Y

C. N

Knowledge Check 6 – Answer

Q: If a facility has not reported AR Events or clicked the “Report No Events” box for the location/month, then what is shown for the No AR Events variable in the AR Denominator Line List?

A. Blank

B. Y

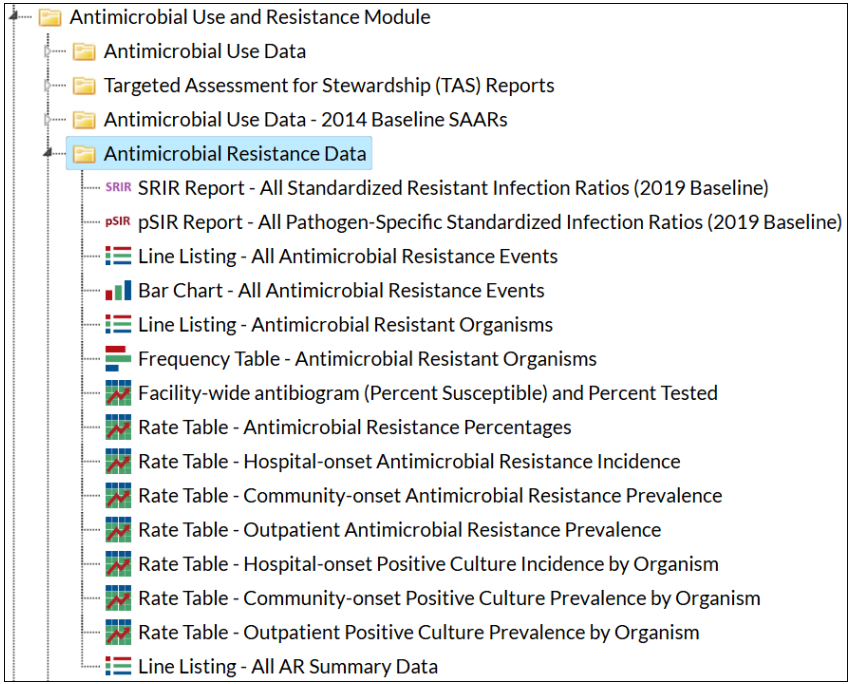
C. N

Explanation: If the facility has not yet reported AR Events for the location/month and has not clicked the “Report No Events” box for that month, No AR Events = blank. If AR Events were reported, then No AR Events = N. If the box was clicked, then No AR Events = Y.

Determine the best report to run for each scenario

Knowledge Check 7

Q: Which report can I run if I wanted to graphically display how many *Acinetobacter* spp. isolates were reported in a location (*e.g.*, ED) over the last 12 months?



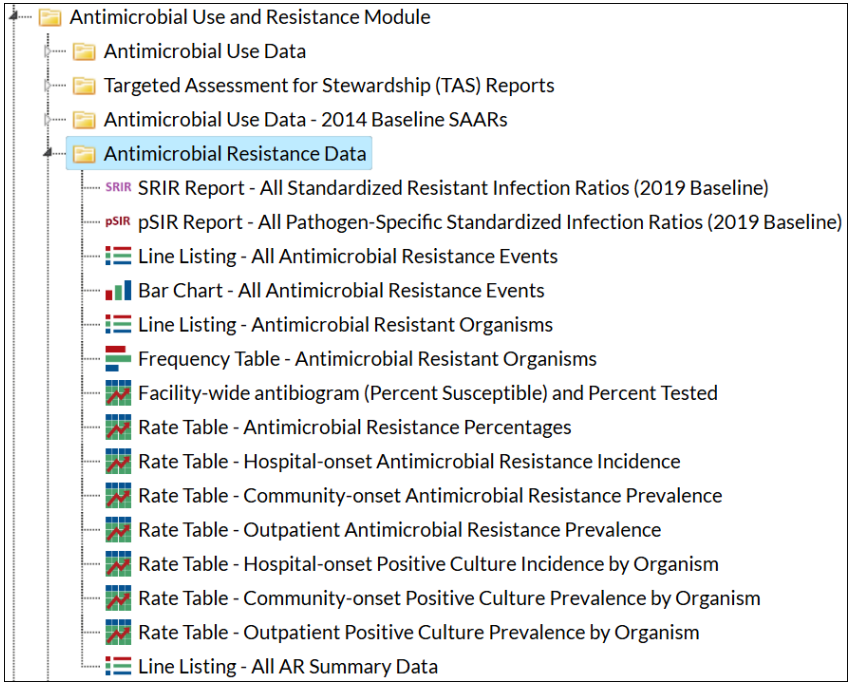
Knowledge Check 7 – Answer

Q: Which report can I run if I wanted to graphically display how many *Acinetobacter* spp. isolates were reported in a location (*e.g.*, ED) over the last 12 months?

A: Bar Chart – All Antimicrobial Resistance Events

Knowledge Check 8

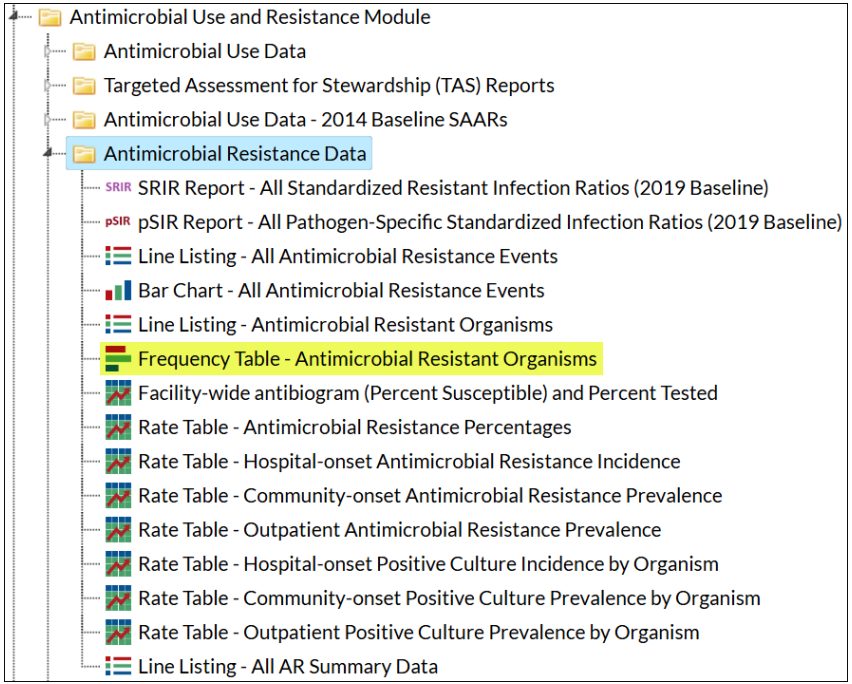
Q: Which report can I run if I wanted to see a count of multi-drug-resistant *Acinetobacter* spp. isolates that were reported in a location (*e.g.*, ED) over the last 12 months?



Knowledge Check 8 – Answer

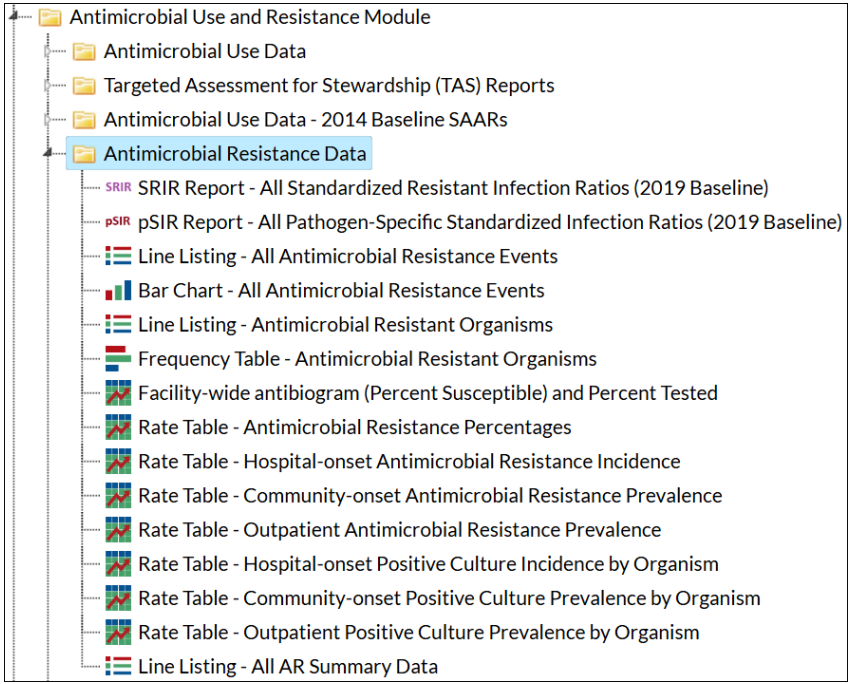
Q: Which report can I run if I wanted to see a count of multi-drug-resistant *Acinetobacter* spp. isolates that were reported in a location (*e.g.*, ED) over the last 12 months?

A: Frequency Table – Antimicrobial Resistant Organisms



Knowledge Check 9

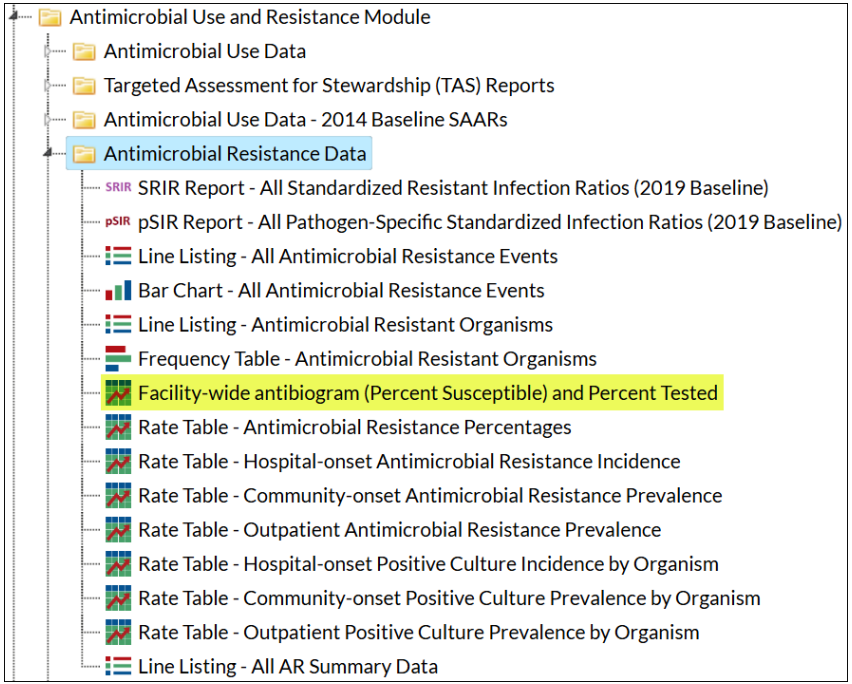
Q: Which report can I run if I wanted to see the percentage of *E. coli* isolates that were susceptible to gentamicin in 2024?



Knowledge Check 9 – Answer

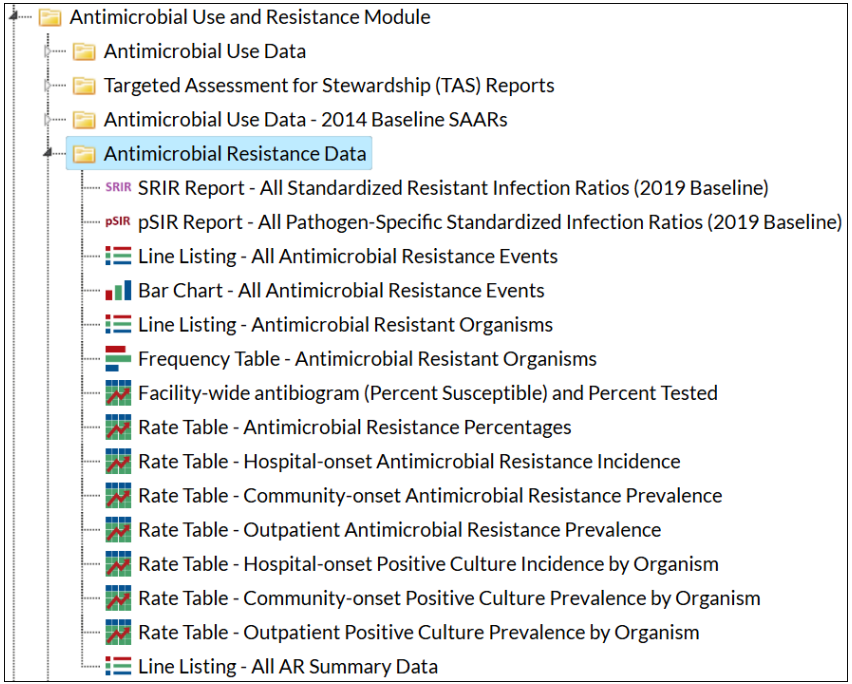
Q: Which report can I run if I wanted to see the percentage of *E. coli* isolates that were susceptible to gentamicin in 2024?

A: Facility-wide antibiogram (Percent Susceptible) and Percent Tested



Knowledge Check 10

Q: Which report can I run if I wanted to review all the AR Events that I submitted for January 2025 to validate that the data are accurate?



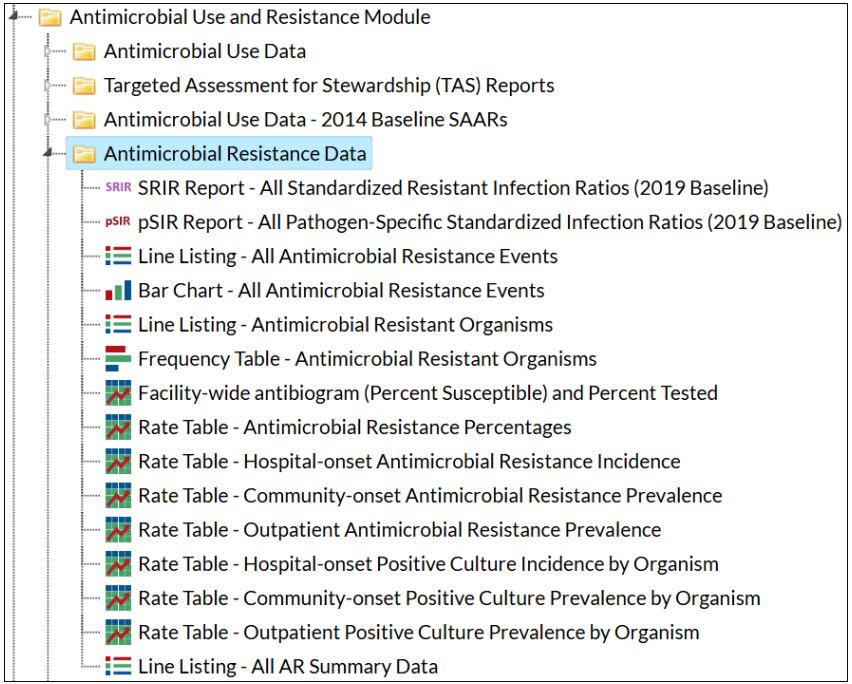
Knowledge Check 10 – Answer

Q: Which report can I run if I wanted to review all the AR Events that I submitted for January 2025 to validate that the data are accurate?

A: Line Listing – All Antimicrobial Resistance Events

Knowledge Check 11

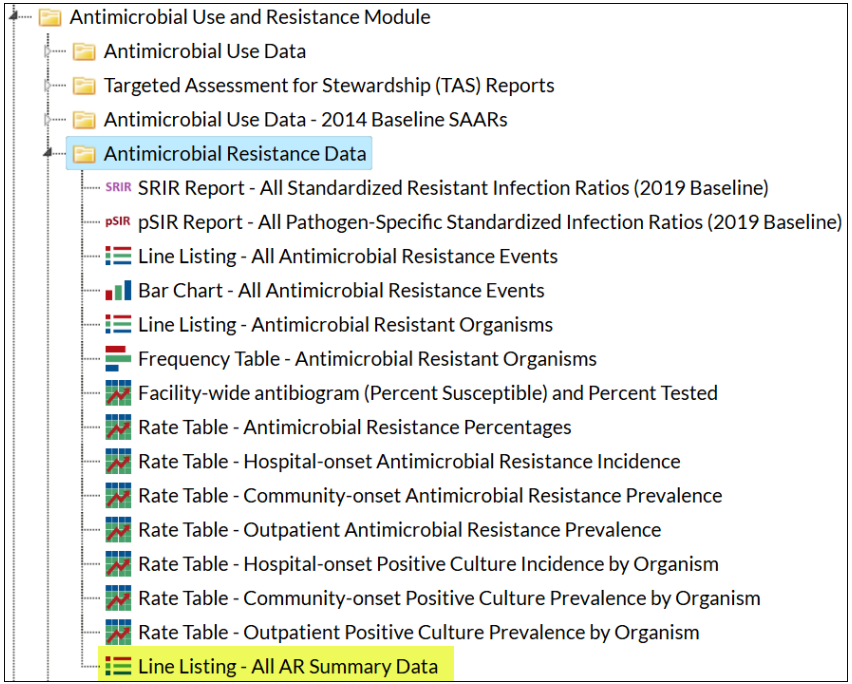
Q: Which report can I run if I wanted to validate that the data for FacWideIN patient days & admissions and outpatient encounters are accurate for each month?



Knowledge Check 11 – Answer

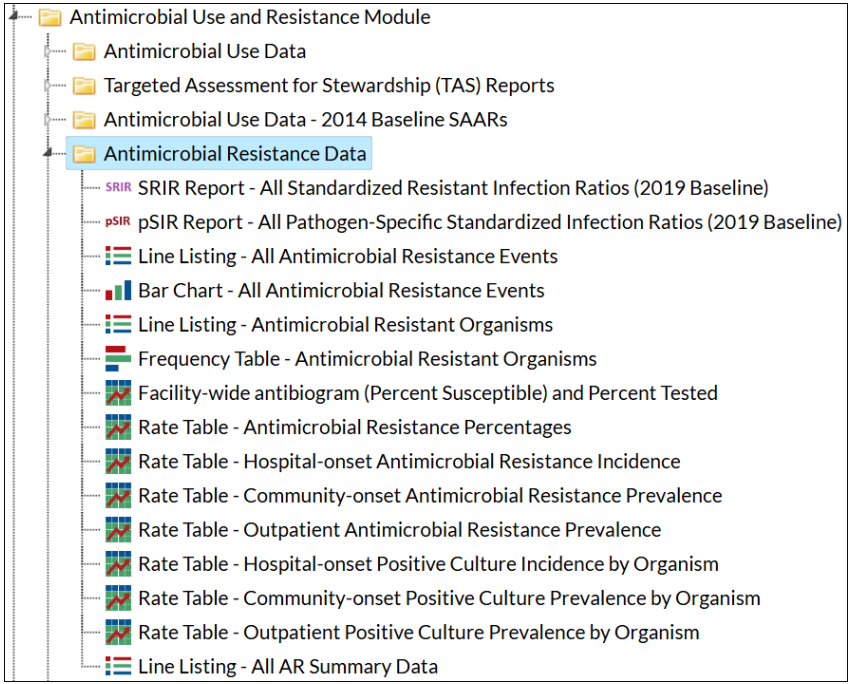
Q: Which report can I run if I wanted to validate that the data for FacWideIN patient days & admissions and outpatient encounters are accurate for each month?

A: Line Listing – All AR Summary Data



Knowledge Check 12

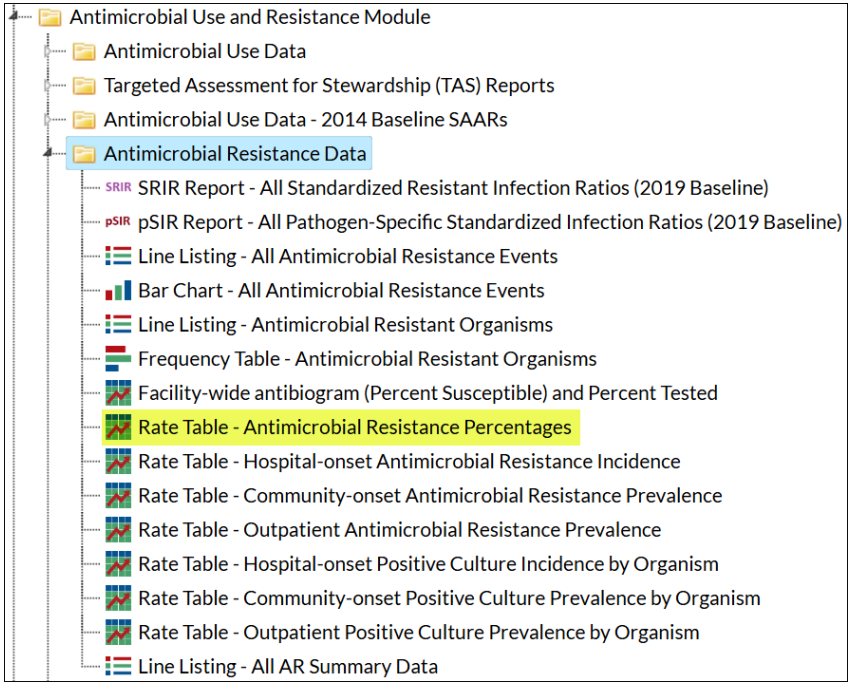
Q: Which report can I run if I wanted to see the percentage of reported *S. aureus* isolates that met the phenotype definition for MRSA for December 2024?



Knowledge Check 12 – Answer

Q: Which report can I run if I wanted to see the percentage of reported *S. aureus* isolates that met the phenotype definition for MRSA for December 2024?

A: Rate Table – Antimicrobial Resistance Percentages



AR Option Analysis Report Cheat Sheet

AR Option Report	Notes
Line Listing – All Antimicrobial Resistance Events	Isolate-level information (All AR Events submitted to NHSN)
Bar Chart – All Antimicrobial Resistance Events	Graphically displays count of AR Events by pathogen and location
Facility-wide Antibiogram and Percent Tested	Percent susceptible and percent tested for each organism-drug susceptibility combination
Line Listing – Antimicrobial Resistant Organisms	List of AR Events that met an NHSN-defined phenotype definition (*e.g.*, MRSA, CRE)
Frequency Table – Antimicrobial Resistant Organisms	Count of AR Events that met an NHSN-defined phenotype definition
Rate Table – Antimicrobial Resistance Percentages	Percentage of AR Events that met an NHSN-defined phenotype definition
Line Listing – All AR Summary Data	Summary information including patient days, admissions, encounters, and report no events

AR Option Reporting Resources

AUR Module Webpage

- Direct link: https://www.cdc.gov/nhsn/psc/aur/index.html
- One-stop shop for:
  - Protocol
  - Validation materials
  - Link to training resources
  - Link to Analysis Quick Reference Guides
  - Link to FAQs
  - Link to CDA Toolkits

AR Option Analysis Resources

- NHSN AUR Protocol:
  - https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf
- NHSN Analysis Quick Reference Guides:
  - https://www.cdc.gov/nhsn/ps-analysis-resources/reference-guides.html
- NHSN AUR Training (recordings and Quick Learns):
  - https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html

For NHSN questions or concerns, contact the NHSN Helpdesk

- **NHSN-ServiceNow** to submit questions to the NHSN Help Desk.
- Access new portal at **https://servicedesk.cdc.gov/nhsncsp** .
- If you do not have a SAMS login, or are unable to access ServiceNow, you can still email the NHSN Help Desk at nhsn@cdc.gov.

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov