



# Using NHSN to Analyze Pathogens and Antimicrobial Resistance Data from HAIs

NHSN Methods and Analytics Team

Updated 2021

# Outline

- Reports to use when analyzing pathogens & antimicrobial resistance
- Unusual Susceptibility Alerts
- Antibiotic Resistance & Patient Safety Portal

\*Note: all screen shots and data used in this presentation are fictitious

**NHSN reports for pathogens &  
antimicrobial resistance**

# Review – Pathogen and Antibiotic Resistance Data Entry

- Results for each drug are entered as either S, I, S-DD, R, or N

Pathogen 2: Klebsiella oxytoca - KO 21 drugs required

* <u>AMK</u> ○ S ○ R ○ I ○ N	* <u>AMP</u> ○ S ○ R ○ I ○ N	* <u>CEFOX</u> ○ S ○ R ○ I ○ N	<u>CTET</u> ○ S ○ R ○ I ○ N	* <u>CIPRO</u> ○ S ○ R ○ I ○ N	<u>LEVO</u> ○ S ○ R ○ I ○ N	<u>MOXI</u> ○ S ○ R ○ I ○ N
* <u>COL</u> ○ S ○ R ○ N	<u>PB</u> ○ S ○ R ○ N	* <u>DORI</u> ○ S ○ R ○ I ○ N	<u>MERO</u> ○ S ○ R ○ I ○ N	* <u>DOXY</u> ○ S ○ R ○ I ○ N	<u>MINO</u> ○ S ○ R ○ I ○ N	<u>TETRA</u> ○ S ○ R ○ I ○ N
* <u>AMPSUL</u> ○ S ○ R ○ I ○ N	<u>AMXCLV</u> ○ S ○ R ○ I ○ N	* <u>CEFOT</u> ○ S ○ R ○ I ○ N	<u>CEFTRX</u> ○ S ○ R ○ I ○ N	* <u>AZT</u> ○ S ○ R ○ I ○ N	* <u>CEFAZ</u> ○ S ○ R ○ I ○ N	* <u>CEFEP</u> ○ S ○ R ○ I/S-DD ○ N
* <u>CEFTAZ</u> ○ S ○ R ○ I ○ N	* <u>CEFUR</u> ○ S ○ R ○ I ○ N	* <u>ERTA</u> ○ S ○ R ○ I ○ N	* <u>GENT</u> ○ S ○ R ○ I ○ N	* <u>IMI</u> ○ S ○ R ○ I ○ N	* <u>PIPTAZ</u> ○ S ○ R ○ I ○ N	* <u>TIG</u> ○ S ○ R ○ I ○ N
* <u>TMZ</u> ○ S ○ R ○ I ○ N	* <u>TOBRA</u> ○ S ○ R ○ I ○ N					

Add Drug

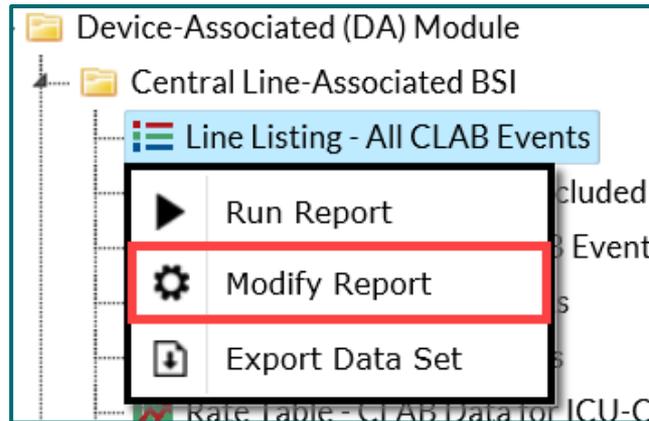
## FAQ from NHSN Helpdesk



- *“I am trying to determine which specific pathogens are common in my facility. How can I review the pathogens I have entered for HAIs? “*

# Option 1: Add Pathogen Variables to HAI Line List

- Step 1. Modify the line list
  - CLABSI line list used in this example



# Add Pathogen Variables to HAI Line List

- Step 2. Navigate to the “Display Variables” tab
- Move pathogen1/2/3 over to the right column
  - “Pathogen” = NHSN code for the organism
  - “PathogenDesc” = Full organism name (description)

The screenshot shows a software interface with a tabbed menu at the top: Title/Format, Time Period, Filters, Display Variables (active), Sort Variables, and Display Options. Below the tabs, the 'Display Variables' section is divided into three columns:

- Available Variables:** A list of variables including mdro, mdroIncompleteFlag, mdroInfPlan, medicareID, modifyDate, mrsa, msbp, mssa, OID, orgID, patGName, patInj, patMName, patRaceAAB, and patRaceAMIN.
- Selected:** A column with three buttons labeled 'Selected', 'Selected', and 'All'. The top 'Selected' button is highlighted with a red box.
- Selected Variables:** A list of variables including patID, eventDate, location, pathogen1, pathogen2, pathogen3, pathogenDesc1, pathogenDesc2, and pathogenDesc3.

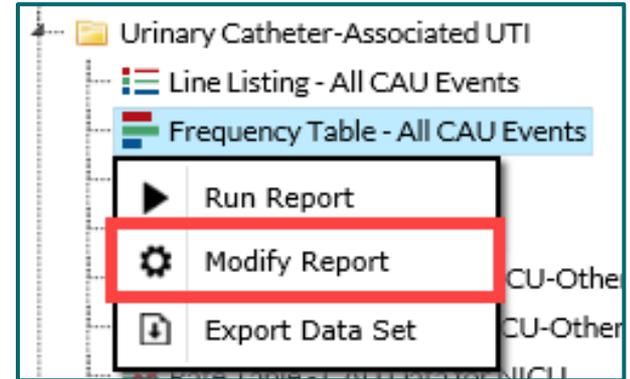
# CLABSI Line List Example Output

National Healthcare Safety Network Line Listing for All Central Line-Associated BSI Events								
As of: January 6, 2021 at 12:59 PM								
Date Range: All CLAB_EVENTS								
patiD	eventDate	location	pathogen1	pathogen2	pathogen3	pathogenDesc1	pathogenDesc2	pathogenDesc3
1234	01/01/2020	MED	EA			Klebsiella aerogenes - EA		
1234	01/15/2020	MED	EA			Klebsiella aerogenes - EA		
1234	01/30/2020	NONPSYCH	EA			Klebsiella aerogenes - EA		
1234	10/01/2020	NEURO	ACINNOSO			Acinetobacter nosocomialis - ACINNOSO		
1235	10/15/2020	MED	ACINNOSO			Acinetobacter nosocomialis - ACINNOSO		
1235	10/30/2020	ICU	ACINNOSO			Acinetobacter nosocomialis - ACINNOSO		
66666	10/01/2020	ICU	EC	KO		Escherichia coli - EC	Klebsiella oxytoca - KO	
7777	10/01/2020	ICU	EC	EA		Escherichia coli - EC	Klebsiella aerogenes - EA	
88888	10/01/2020	ICU	ACINNOSO	PA		Acinetobacter nosocomialis - ACINNOSO	Pseudomonas aeruginosa - PA	
99999	10/01/2020	ONC ICU	ACINNOSO	ACINPITT		Acinetobacter nosocomialis - ACINNOSO	Acinetobacter pittii - ACINPITT	
EB1	09/20/2020	NONPSYCH	ENTAU			Enterobacter amnigenus - ENTAU		

## Option 2: Add Pathogen to a Frequency Table

*“What types of pathogens were reported in our facility among CAUTIs?”*

- Modify CAUTI frequency table to show pathogenDesc1 as either the Row or Column variable
- Could repeat for pathogenDesc2 and pathogenDesc3



Title/Format	Time Period	Filters	Display Options
<b>Frequency Table Options:</b>			
Selected Variables to include in report:			
Row	Column	Page by	
evntDateYr	pathogenDesc1		
<b>Frequency Table Options:</b>			
<input checked="" type="checkbox"/> Table percent - Display cell frequency divided by table total			
<input type="checkbox"/> Missing - Include observations with missing values			
<input type="checkbox"/> Print the table in list form			

# CAUTI Frequency Table Example Output

- Counts of CAUTI pathogens reported during 2020

Table of evntDateYr by pathogenDesc1							
evntDateYr	pathogenDesc1						Total
	Acinetobacter pittii - ACINPITT	Klebsiella aerogenes - EA	Escherichia coli - EC	Pseudomonas aeruginosa - PA	Staphylococcus aureus - SA	Staphylococcus - SS	
<b>2020</b>	1	1	3	1	1	1	8
	12.50	12.50	37.50	12.50	12.50	12.50	100.00
	12.50	12.50	37.50	12.50	12.50	12.50	
	100.00	100.00	100.00	100.00	100.00	100.00	
<b>Total</b>	1	1	3	1	1	1	8
	12.50	12.50	37.50	12.50	12.50	12.50	100.00



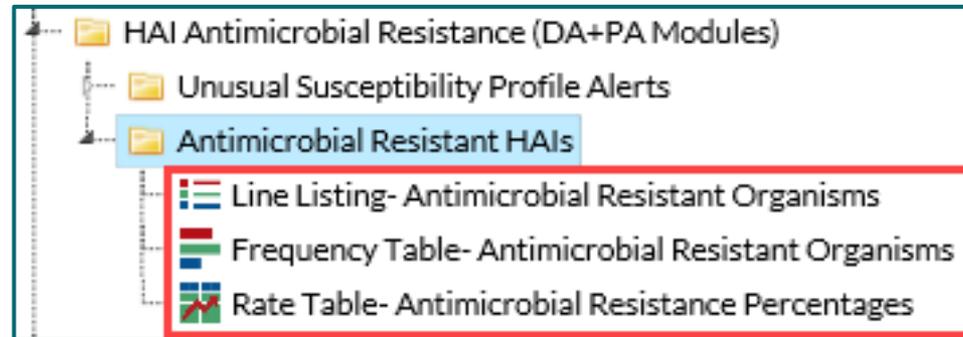
**Are any of these pathogens resistant to key antibiotics?**

# Antimicrobial Resistance (AR) Output Options

- Analysis reports are available that identify HAIs with antimicrobial resistance patterns (phenotype) of public health importance
- CDC identified 11 AR phenotypes of interest
  - CRE
  - MRSA
  - VRE
  - Multidrug-resistant organisms
  - ...etc.
- **Documentation available that identifies and defines each of the 11 phenotypes**
  - [http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype\\_definitions.pdf](http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype_definitions.pdf)

# Three Output Options

- Available in the “HAI Antimicrobial Resistance (DA+PA Modules)” analysis folder
- Line List, Frequency Table, and Rate Table
  - Include all HAIs (CLABSI, CAUTI, SSI, VAE, etc.)
  - All time periods
  - Available for Groups
  - Modify reports to select phenotype or time period of interest



# Line List for Antimicrobial Resistant Organisms

By default,  
separate line  
lists are  
generated for  
each phenotype



National Healthcare Safety Network											
Line Listing- Antimicrobial Resistant Organisms											
CREall_HAI - Carbapenem-resistant Enterobacteriaceae											
As of: January 6, 2021 at 1:44 PM											
Date Range: All ANTI BIOGRAM_HAI											
orgID	patID	dob	gender	admitDate	eventID	eventDate	eventType	location	pathogenDesc	phenotype	
10401	1234	12/12/2007	M	12/15/2019	90658	01/01/2020	BSI	MED	Klebsiella aerogenes - EA	CREall_HAI	

Criteria used to define each phenotype can be found on the Patient Safety Analysis Resources webpage at: [https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype\\_definitions.pdf](https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype_definitions.pdf)  
The data in this table include all applicable pathogens entered for an HAI, and are not limited to the first pathogen.  
Sorted by orgID eventDate  
Data contained in this report were last generated on December 9, 2020 at 4:09 PM to include data beginning January 2020 through December 2020.

National Healthcare Safety Network											
Line Listing- Antimicrobial Resistant Organisms											
carbNS_PA_HAI - Carbapenem-non-susceptible Pseudomonas aeruginosa											
As of: January 6, 2021 at 1:44 PM											
Date Range: All ANTI BIOGRAM_HAI											
orgID	patID	dob	gender	admitDate	eventID	eventDate	eventType	location	pathogenDesc	phenotype	
10401	88888	12/01/2000	F	09/21/2020	99075	10/01/2020	BSI	ICU	Pseudomonas aeruginosa - PA	carbNS_PA_HAI	

Criteria used to define each phenotype can be found on the Patient Safety Analysis Resources webpage at: [https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype\\_definitions.pdf](https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype_definitions.pdf)  
The data in this table include all applicable pathogens entered for an HAI, and are not limited to the first pathogen.  
Sorted by orgID eventDate  
Data contained in this report were last generated on December 9, 2020 at 4:09 PM to include data beginning January 2020 through December 2020.

National Healthcare Safety Network											
Line Listing- Antimicrobial Resistant Organisms											
MDR_PA_HAI - Multidrug-resistant Pseudomonas aeruginosa											
As of: January 6, 2021 at 1:44 PM											
Date Range: All ANTI BIOGRAM_HAI											
orgID	patID	dob	gender	admitDate	eventID	eventDate	eventType	location	pathogenDesc	phenotype	
10401	88888	12/01/2000	F	09/21/2020	99075	10/01/2020	BSI	ICU	Pseudomonas aeruginosa - PA	MDR_PA_HAI	

Criteria used to define each phenotype can be found on the Patient Safety Analysis Resources webpage at: [https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype\\_definitions.pdf](https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype_definitions.pdf)  
The data in this table include all applicable pathogens entered for an HAI, and are not limited to the first pathogen.  
Sorted by orgID eventDate  
Data contained in this report were last generated on December 9, 2020 at 4:09 PM to include data beginning January 2020 through December 2020.

# Modify Antimicrobial Resistant Line List

- Use the Modify screen to identify phenotype of interest
  - Example: We are interested in viewing a line list of CRE HAIs

The screenshot displays the 'Filters' tab of a data modification interface. The navigation bar includes tabs for 'Title/Format', 'Time Period', 'Filters' (which is active), 'Display Variables', 'Sort Variables', and 'Display Options'. Below the navigation bar, there are 'Additional Filters' buttons for 'Show' and 'Clear'. A filter rule is defined with a logical operator 'AND' and a field 'phenotype' set to 'equal' to the value 'CREall\_HAI - Carbapenem-resistant Enterobacteriaceae'.

Hint: Each phenotype has a code in NHSN. Refer to resources at the end of the presentation.

# CRE Line List

- Includes 3 Enterobacteriaceae species: *Klebsiella*, *E.coli*, and *Enterobacter*

Line Listing- Antimicrobial Resistant Organisms											
CREall_HAI - Carbapenem-resistant Enterobacteriaceae											
As of: January 6, 2021 at 2:38 PM											
Date Range: All ANTIBIOGRAM_HAI											
orgID	patID	dob	gender	admitDate	eventID	eventDate	eventType	location	pathogenDesc	phenotype	
10401	ESC1	10/20/1951	M	12/15/2018	86980	01/01/2019	BSI	ICU	Klebsiella oxytoca - KO	CREall_HAI	
10401	1234	12/12/2007	M	02/01/2019	87661	02/15/2019	BSI	4W	Escherichia coli - EC	CREall_HAI	
10401	1002	01/04/2001	M	01/01/2019	88362	01/05/2019	BSI	ICU	Klebsiella aerogenes - EA	CREall_HAI	
10401	1002	01/04/2001	M	02/01/2019	88363	02/09/2019	BSI	NEURO	Enterobacter intermedium - ENTIN	CREall_HAI	
10401	1234	12/12/2007	M	09/15/2019	89465	10/01/2019	BSI	2N	Klebsiella pneumoniae ozaenae - KLEOZ	CREall_HAI	
10401	1234	12/12/2007	M	12/15/2019	90658	01/01/2020	BSI	MED	Klebsiella aerogenes - EA	CREall_HAI	

Note: Unless you make specifications on the Modify screen, this report will be inclusive of all HAI types and time periods.

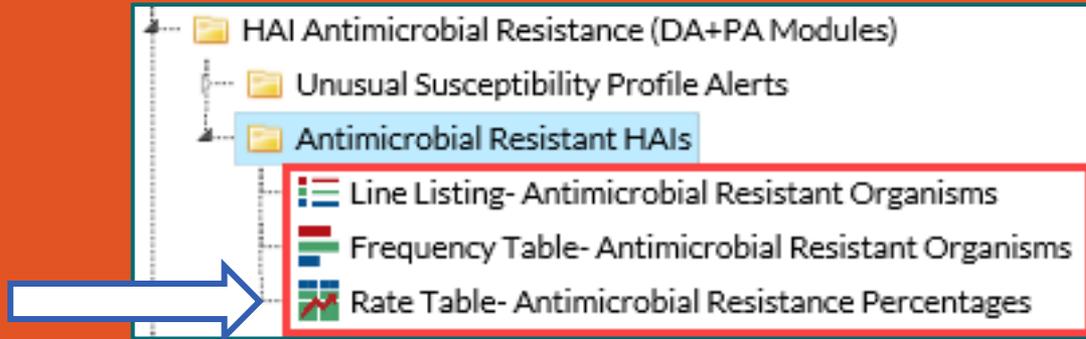
# Frequency Table for Antimicrobial Resistant Organisms

- By default: counts of each phenotype by HAI type
- Use the Modify screen to change the row/column variables

National Healthcare Safety Network  
Frequency Table- Antimicrobial Resistant Organisms  
As of: January 14, 2021 at 12:19 PM  
Date Range: All ANTIBIOGRAM\_HAI

Frequency Row Pct	Table of phenotype by eventType			
	phenotype	eventType		
		BSI	SSI	Total
	CREall_HAI	6	0	6
		100.00	0.00	
	CREecoli_HAI	1	0	1
		100.00	0.00	
	CREenterobacter_HAI	1	0	1
		100.00	0.00	
	CREklebsiella_HAI	4	0	4
		100.00	0.00	
	ESCEcoli_HAI	1	0	1
		100.00	0.00	
	ESCKlebsiella_HAI	2	0	2
		100.00	0.00	
	MDR_Acine_HAI	1	0	1
		100.00	0.00	
	carbNS_Acine_HAI	2	0	2
		100.00	0.00	
	Total	18	0	18

Frequency Missing = 5



# Antimicrobial Resistance Percentages (Rate Table)

# Antimicrobial Resistance (AR) Percentages

- Calculated for each phenotype, similar to a hospital's antibiogram report
- Percent of specific pathogens that are resistant to identified drugs (% R)

$$\frac{\text{\# of resistant organisms}}{\text{total \# of organisms tested}} \times 100 \%$$

- Example: CRE

$$\frac{\text{\# Enterobacteriaceae resistant to carbapenems}}{\text{\# Enterobacteriaceae tested for susceptibility to carbapenems}} \times 100\%$$

# Example: CRE Resistance Percentage

## Rate Table- Antimicrobial Resistance Percentages

As of: January 14, 2021 at 12:33 PM

Date Range: All ANTIBIOGRAM\_RATE\$HAI

orgID=10401 phenotypeDesc=CREall\_HAI - Carbapenem-resistant Enterobacteriaceae

orgID	phenotype	numIsolated	numTested	numResistant	pctResistant	pctResistant_CI
10401	CREall_HAI	27	25	12	48.0	29.2,67.2

- NumIsolated = 27 Enterobacteriaceae reported to NHSN
- NumTested = 25 Enterobacteriaceae tested for carbapenems
- NumResistant = 12 Enterobacteriaceae resistant to carbapenems (CRE)
- PctResistant =  $(12/25 * 100) = 48\%$  of Enterobacteriaceae tested in the facility were resistant to carbapenems
- 95% confidence interval around percentage to indicate precision (29.2%, 67.2%)

# More about AR Percentages

- **Percentages are only calculated when at least 20 organisms have been tested (i.e., denominator must be  $\geq 20$ )**
  - Rate tables only calculated at the quarter-level or higher
  - “Group by” a wider time variable to include more data
- **Detailed footnotes beneath the rate tables**
  - Provide definition for the phenotype and important details about the percentage calculation
- **National benchmarks for antimicrobial resistance are available**
  - <http://www.cdc.gov/nhsn/dataStat.html>

# Quick Reference Guides Available

- Phenotype Definitions
- Line List
- Frequency Table
- Rate Table (%R)

Analysis Quick Reference Guides	
General Tips	+
Troubleshooting Guides	+
Frequently Requested Output/Reports	+
Targeted Assessment Prevention (TAP) Strategy Reports	+
Antimicrobial Use and Resistance Module Reports	+
Output/Report Option Types	+
Tips for Customizing Your Output/Reports	+
Detailed Guides for Specific Analysis Options	+

<http://www.cdc.gov/nhsn/ps-analysis-resources/reference-guides.html>

# National AR Report

- Provides information on the most common pathogens reported to NHSN
- National pathogen distributions and resistance data for device-associated HAIs and surgical site infections

**Table 3.** Distribution and Rank Order of the 15 Most Frequently Reported Pathogens Across All Types of Adult Healthcare-Associated Infections (HAIs), 2015–2017

Pathogen <sup>a</sup>	No. (%) Pathogens	Rank
<i>Escherichia coli</i>	62,571 (17.5)	1
<i>Staphylococcus aureus</i>	42,132 (11.8)	2
Selected <i>Klebsiella</i> spp	31,530 (8.8)	3
<i>Pseudomonas aeruginosa</i>	28,513 (8.0)	4
<i>Enterococcus faecalis</i> <sup>b</sup>	28,236 (7.9)	5
Coagulase-negative staphylococci	24,199 (6.8)	6
<i>Enterobacter</i> spp	16,568 (4.6)	7
<i>Enterococcus faecium</i> <sup>b</sup>	13,687 (3.8)	8

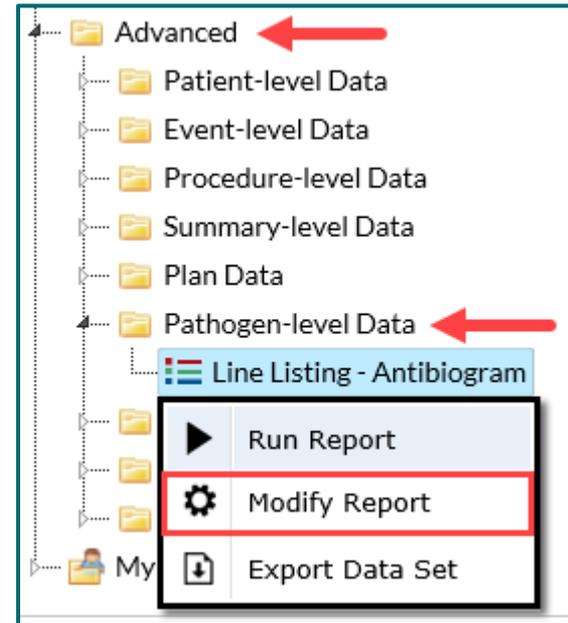
**Table 10.** Percentage of Pathogens Reported from Adult Healthcare-Associated Infections (HAIs) in Acute-Care Hospitals<sup>a</sup> that Tested Nonsusceptible<sup>b</sup> (NS) to Selected Antimicrobial Agents, by Infection Category, 2015–2017

Pathogen, Antimicrobial	Device-Associated HAIs <sup>c</sup>			Surgical Site Infections		
	No. Reported	% Tested	% NS <sup>b</sup>	No. Reported	% Tested	% NS <sup>b</sup>
<i>Staphylococcus aureus</i>	13,594			26,970		
OX/CEFOX/METH (MRSA)		92.3	48.4*		94.2	41.9
<i>Enterococcus faecium</i>	7,682			4,515		
Vancomycin (VRE)		95.1	82.1*		95.9	55.6
<i>Enterococcus faecalis</i>	13,643			12,267		
Vancomycin (VRE)		92.9	7.2*		92.7	3.4
Selected <i>Klebsiella</i> spp	19,947			7,789		
ESCs		84.7	21.1*		81.9	13.7
Carbapenems (CRE)		74.7	6.9*		72.6	3.1
MDR		93.2	13.2*		93.2	6.3

<https://doi.org/10.1017/ice.2019.296>

## Other Drug Results

- Individual drug susceptibilities can be found in the Antibigram Line List (Advanced folder)
- Use this to review each drug result for each pathogen



Advanced > Pathogen-level Data > Line Listing - Antibigram

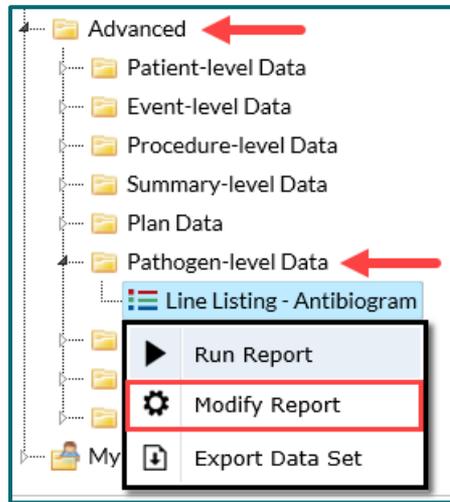
## Example Antibigram Line List



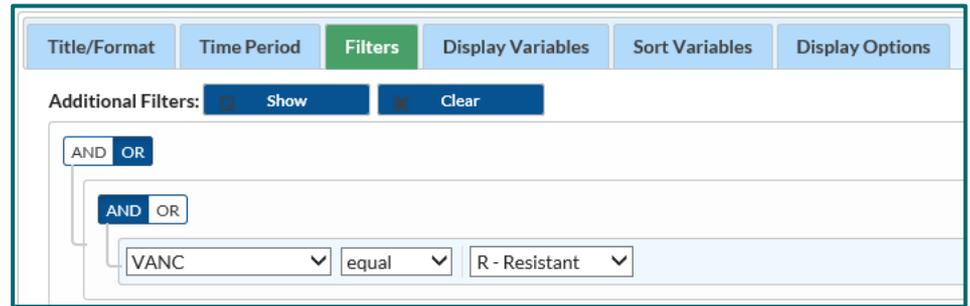
- Your hospital pharmacist is interested in the types of resistance patterns seen among HAIs in your facility, and would like to know if any HAI pathogens tested resistant to vancomycin.
- Because you are an expert at NHSN analysis, you volunteered to help!

# Goal: Create a line list showing only those pathogens resistant to vancomycin

1. Click “Modify” next to the Antibigram Line List



2. Use the Filters to set “VANC” = ‘R - Resistant’



Hint: Each drug has an abbreviation in NHSN. Refer to the NHSN data dictionary.

# Antibiogram Line List: Modify Screen

3. By default, the line list will include ALL antibiotics. Remove the antibiotics you don't need for this report by transferring them to the LEFT column.

The screenshot displays the 'Display Variables' configuration screen. At the top, there are tabs for 'Title/Format', 'Time Period', 'Filters', 'Display Variables' (which is active), 'Sort Variables', and 'Display Options'. Below the tabs, the 'Display Variables' section is divided into two main areas: 'Available Variables' and 'Selected Variables'. The 'Available Variables' list contains the following items: admitDate, AMK, AMP, AMPSUL, AMXCLV, ANID, AZITH, AZT, birthWt, birthWtCode, birthWtCodeDesc, CASPO, CCN, CEFAZ, and CEFEP. The 'Selected Variables' list contains: orgID, eventID, eventType, eventDate, procCode, pathogenDesc, and VANC. Between the two lists are four buttons: 'All', 'Selected', 'Selected', and 'All'. The second 'Selected' button is highlighted with a red rectangle. To the right of the 'Selected Variables' list are three buttons: 'Up', 'Down', and 'Undo'.

# Line List of Vancomycin-Resistant HAIs

**National Healthcare Safety Network**  
**Line Listing - Antibioqram**  
As of: February 1, 2021 at 3:24 PM  
Date Range: All ANTIBIOGRAM



orgID	eventID	eventType	eventDate	procCode	pathogenDesc	VANC
10401	101414	BSI	01/19/2020		Staphylococcus aureus - SA	R
10401	101416	UTI	01/22/2020		Staphylococcus, coagulase negative - CNS	R

**Hint:** Consider sorting the line list by eventType or by pathogenDesc.

**More information on how to modify a line list:** [https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/linelist\\_qrg.pdf](https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/linelist_qrg.pdf)

# Unusual Susceptibility Alerts

# Alert for an Unusual Susceptibility Profile

- Highlights reporting of an epidemiologically important pathogen
  - Prompt infection control interventions
  - Assist with data cleaning
- User will be notified when unusual susceptibility profiles are entered into NHSN for in-plan events
- Will be notified immediately after saving the event

Pathogen 1: *Klebsiella pneumoniae* - KP 21 drugs required

* <u>AMK</u> ⊙ S ⊙ R ○ I ○ N	* <u>AMP</u> ○ S ○ R ○ I ⊙ N	* <u>CEFOX</u> ○ S ○ R ○ I ○ N	<u>CTET</u> ⊙ S ⊙ R ○ I ○ N	* <u>CIPRO</u> ○ S ○ R ○ I ○ N	<u>LEVO</u> ⊙ S ⊙ R ○ I ○ N	<u>MOXI</u> ○ S ○ R ⊙ I ○ N
* <u>COL</u> ○ S ⊙ R ○ N	<u>PB</u> ○ S ⊙ R ○ N	* <u>DORI</u> ○ S ⊙ R ○ I ○ N	<u>MERO</u> ○ S ○ R ○ I ⊙ N	* <u>DOXY</u> ○ S ○ R ⊙ I ○ N	<u>MINO</u> ○ S ⊙ R ○ I ○ N	<u>TETRA</u> ○ S ○ R ⊙ I ○ N
* <u>AMPSUL</u> ⊙ S ○ R ○ I ○ N	<u>AMXCLV</u> ○ S ○ R ○ I ○ N	* <u>CEFOT</u> ○ S ○ R ⊙ I ○ N	<u>CEFTRX</u> ○ S ○ R ○ I ⊙ N	* <u>AZI</u> ⊙ S ○ R ○ I ○ N	* <u>CEFAZ</u> ○ S ○ R ○ I ⊙ N	* <u>CEFEP</u> ○ S ○ R ⊙ I/S-DD ○ N
* <u>CEFTAZ</u> ○ S ○ R ○ I ⊙ N	* <u>CEFUR</u> ○ S ○ R ⊙ I ○ N	* <u>ERTA</u> ⊙ S ○ R ○ I ○ N	* <u>GENT</u> ○ S ⊙ R ○ I ○ N	* <u>IMI</u> ○ S ○ R ⊙ I ○ N	* <u>PIPTAZ</u> ⊙ S ○ R ○ I ○ N	* <u>TIG</u> ○ S ○ R ⊙ I ○ N
* <u>TMZ</u> ○ S ○ R ⊙ I ○ N	* <u>TOBRA</u> ○ S ○ R ⊙ I ○ N					

# Unusual Susceptibilities as Defined by NHSN

## Unusual Susceptibility Profiles

Carbapenem resistant Enterobacteriaceae

Carbapenem intermediate or resistant *Acinetobacter baumannii*,  
*Pseudomonas aeruginosa*

Highly Drug Resistant \* Enterobacteriaceae, *Pseudomonas aeruginosa*  
*Acinetobacter baumannii*

Colistin/Polymyxin B-resistant *Acinetobacter baumannii*, *Pseudomonas aeruginosa*

Daptomycin-susceptible-dose dependent, resistant, or non-susceptible, and Linezolid-resistant *Enterococcus* spp.

Vancomycin-resistant *Staphylococcus aureus* (VISA)

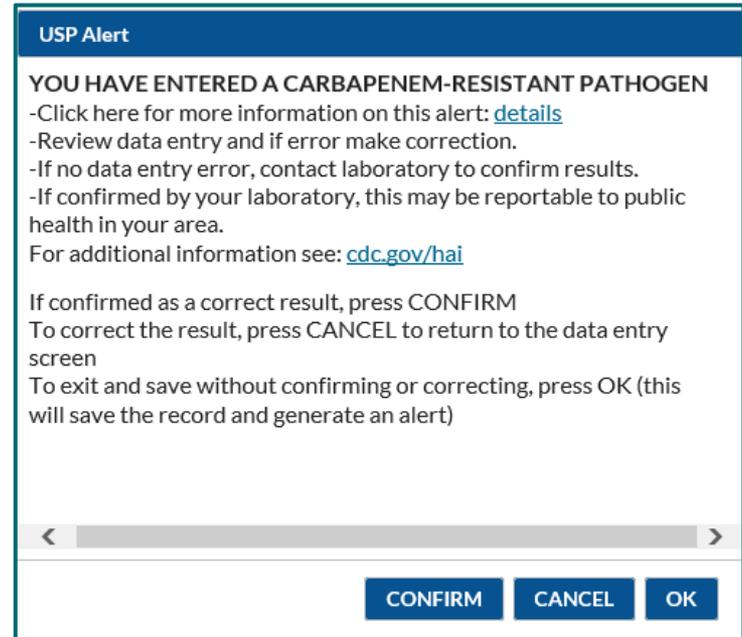
Daptomycin-non-susceptible and Linezolid-resistant and Vancomycin-intermediate *Staphylococcus aureus*

Vancomycin-resistant *Staphylococcus*, coagulase negative (VRSE)

\*all defined drug classes have at least one drug within the class reported as either Intermediate (I) or Resistant (R)

# Unusual Susceptibility Profile Alert

- Upon saving an event, a pop-up window will appear
- Click details to view more information about this specific alert
- The user can confirm accurate data entry and susceptibility reporting by clicking confirm, or amend data entry by clicking cancel
- Click OK to acknowledge the alert and save the record without immediately confirming the result



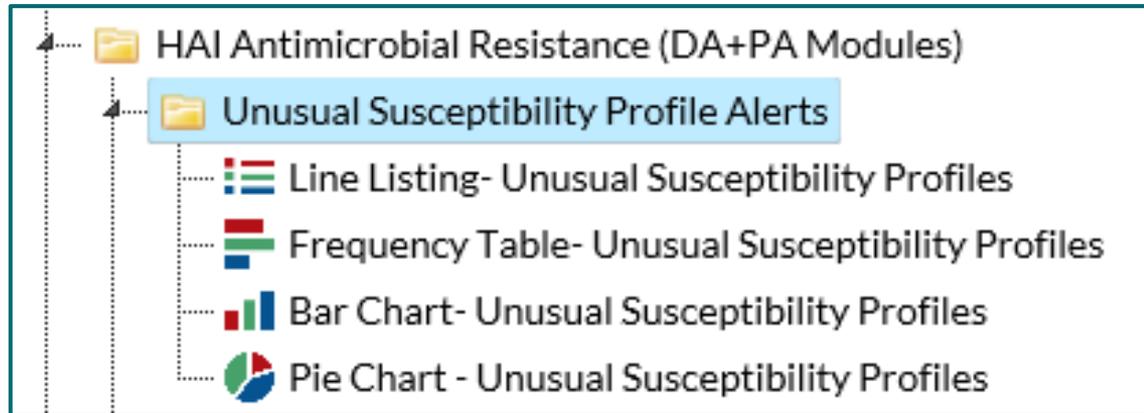
# If you click “OK” ....

- You are tentatively saving the event – but confirmation of data entry is still needed!
- You will receive an Alert on your home screen
- To clear the alert, you must
  - Confirm the resistance profile
  - Or, modify the susceptibilities on the event form with corrected data

The screenshot displays a dashboard titled "Action Items". Under the heading "COMPLETE THESE ITEMS", there is a card for "Confer Rights" with a status of "Not Accepted". Below this, under the heading "ALERTS", there is a row of seven alert cards: "Incomplete Events", "Missing Events", "Incomplete Summary Items", "Missing Summary Items", "Missing Procedures", "Missing Procedure-Associated Events", and "Unusual Susceptibility Profiles". The "Unusual Susceptibility Profiles" card shows a count of "2" and is highlighted with a red arrow pointing down to it.

# Analysis of Unusual Susceptibility Profiles

- Analysis options are available that track all unusual susceptibility alerts in a facility that have been confirmed or are pending confirmation





# More Guidance on Unusual Susceptibility Alerts

- Information on unusual phenotypes
- How to run analysis reports for these data
- Steps to take if you receive an alert

<http://www.cdc.gov/nhsn/pdfs/gen-support/usp-alert-current.pdf>

## Explore and Visualize Data on Antibiotic Resistance and Healthcare-Associated Infections



ANTIBIOTIC RESISTANCE



ANTIBIOTIC USE AND STEWARDSHIP



HEALTHCARE-ASSOCIATED INFECTIONS



GEOGRAPHIC LOCATION

# Antibiotic Resistance & Patient Safety Portal

# Background: Antibiotic Resistance & Patient Safety Portal (AR&PSP)

- An interactive web-portal open to the public that allows exploration of national, regional, and state antimicrobial resistance data
- Agency goal to increase public availability of AR data
  - Improve access of AR data to wide audiences with multiple uses
- National Action Plan to Combat Antimicrobial Resistant Bacteria (CARB)

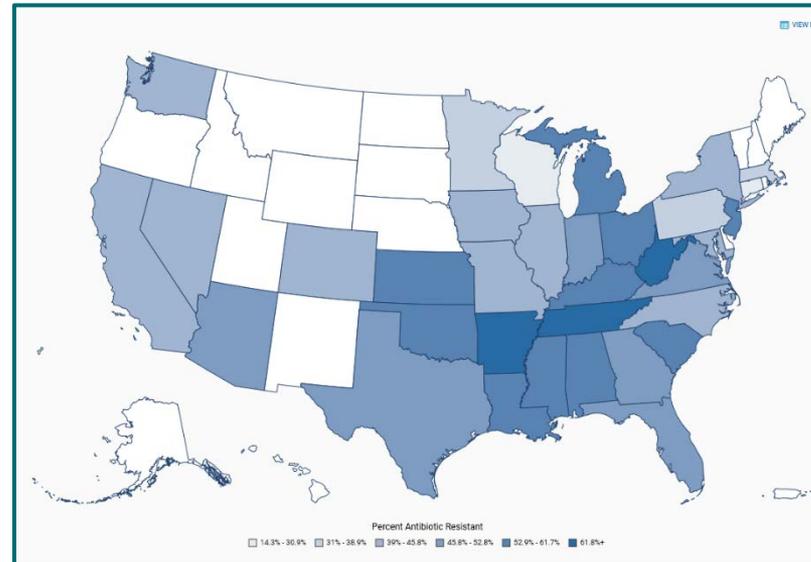
<https://arpsp.cdc.gov/>

## Data Included

- Pathogen and drug susceptibility information are taken from CLABSIs, CAUTIs, and SSIs reported to NHSN
  - Does not capture all resistance in the community or within a hospital
- National, state, and regional resistance data
- Can view %R for different years, age groups, facility types, and HAI types in your state

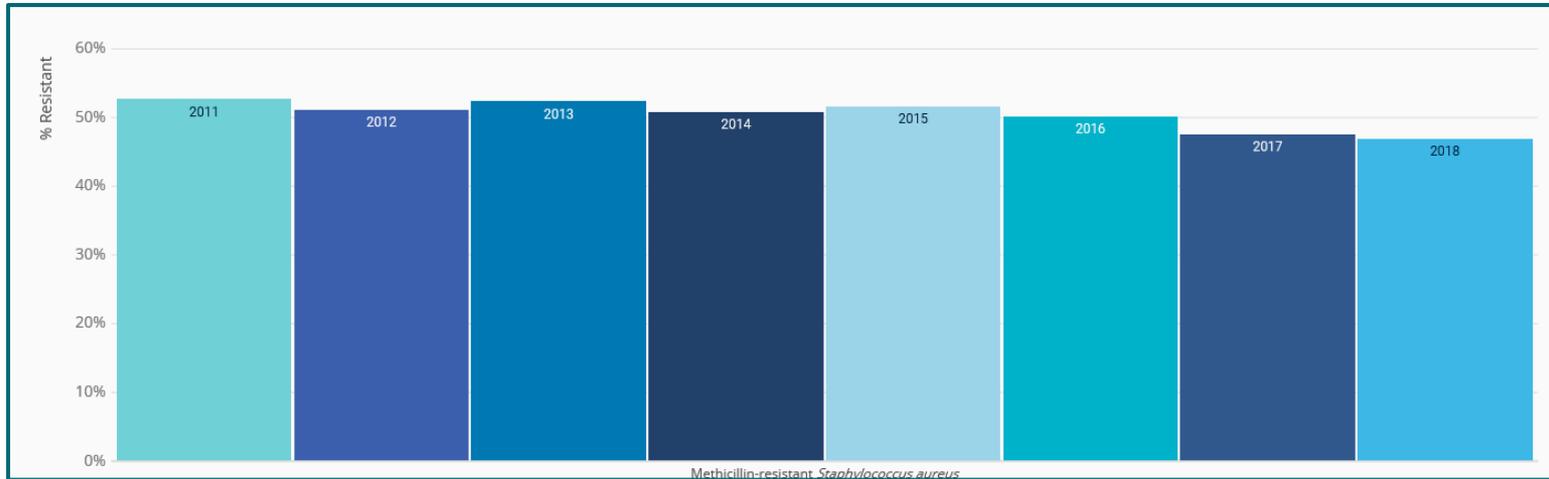
# AR&PSP Example: Geographic Location of MRSA

- This map shows the variation in % methicillin resistance among *Staphylococcus aureus* associated with CLABSIs in 2018



# PSP Example: Changes over time in MRSA

- This graph displays percent resistance (%R) for MRSA CLABSIs, from 2011 to 2018



# Resources

**-NHSN Data Dictionary (antibiotic codes):**

<https://www.cdc.gov/nhsn/xls/analysis/nhsn-data-dictionary.xlsx>

**-Reference Guide for AR Line List:**

[http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/linelist\\_qrg.pdf](http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/linelist_qrg.pdf)

**-Reference Guide for AR Frequency Table:**

[http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/freqtable\\_qrg.pdf](http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/freqtable_qrg.pdf)

**-Reference Guide for AR Rate Table:**

[https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/ratetable\\_qrg\\_cre.pdf](https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/ratetable_qrg_cre.pdf)

**-Codes and Definitions for NHSN Phenotypes:**

[http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype\\_definitions.pdf](http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype_definitions.pdf)

**-CDC's 2019 AR Threat Report:**

<https://www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf>

**-National Action Plan to Combat Antibiotic-Resistant Bacteria (CARB):**

<https://www.cdc.gov/drugresistance/us-activities/national-action-plan.html>

**-CDC's Vital Signs on HAIs and Antimicrobial Resistance:** <https://www.cdc.gov/vitalsigns/containing-unusual-resistance/index.html>

# Send questions to:

## NHSN@cdc.gov

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

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

