

AR Option Facility-Wide Antibigram and Percent Tested

Description

The Antimicrobial Resistance (AR) Option facility-wide antibiogram is a table that displays the calculated percent susceptible (%S) for each organism-antimicrobial combination reported from all locations (inpatient and outpatient) to the AR Option. Each organism reported to the AR Option has a specific antimicrobial panel for which NHSN requires facilities report antimicrobial susceptibility testing values. The specific panel requirements for each organism are in Appendix F of the [AUR Module protocol](#).

NHSN calculates %S for each organism-antimicrobial pairing using the following formula*:

$$\frac{\text{Number of isolates tested susceptible (S)}}{\text{Number of isolates tested}} = \%S$$

The default settings for the AR facility-wide antibiogram produce a report by quarter, but users can make modifications to display the data by month, half-year, year, or cumulative time periods. Additionally, NHSN includes all reported specimen types in the report by default but users can make modifications to show the susceptibility patterns for specific specimen types if desired. Keep in mind that antibiograms including data for 2024 and prior will include only isolates from blood, cerebrospinal fluid, urine, and lower respiratory specimens. Antibiograms including data for 2025 and forward will also include isolates from skin, soft tissue, wound and musculoskeletal specimens. The default output includes all isolates regardless of organism category (Gram Negative, Gram Positive, and Fungal), onset (healthcare facility and community-onset), patient population (neonatal, pediatric, and adult), and location, but these additional filters are also available to further modify the output.

In addition to the AR facility-wide antibiogram, within this same report, NHSN creates a table displaying the calculated percent tested (%Tested) for each organism-antimicrobial combination reported from all locations (inpatient and outpatient) to the AR Option.

NHSN calculates %Tested for each organism-antimicrobial pairing using the following formula*:

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

*Note: Susceptibility results include S, S-DD, I, R, or NS.

The %Tested table can be used to prompt users to investigate unexpected %Tested values. Selective or cascade reporting (SR/CR) of antimicrobial susceptibility testing (AST) results is a widely used antimicrobial stewardship strategy. SR/CR guides prescribers toward tailored treatments rather than broad-spectrum agents. Healthcare facilities selectively report AST results to their prescribers by suppressing the AST results for the drugs that they wish to reduce usage through algorithms built into the information systems. Many facilities also submit those partially suppressed AST data to the NHSN AR Option. While SR/CR serves its purpose as an antimicrobial stewardship tool, however, using the partially suppressed AST results can bias the cumulative antibiograms. Users can use the %Tested table to understand what is being sent to the NHSN AR Option. It is

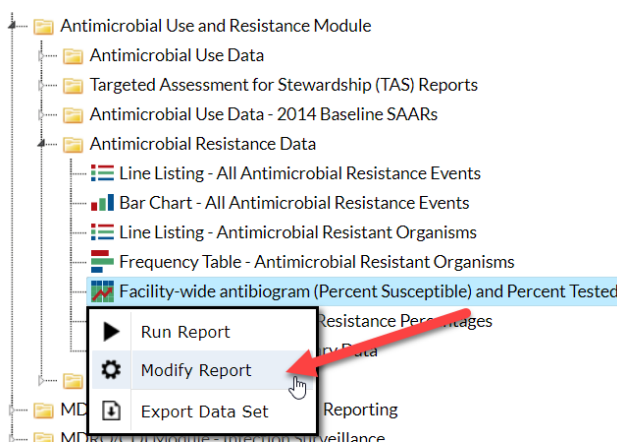


possible to extract complete data before SR/CR algorithms are applied to the data for surveillance purposes. If a low %Tested is found for the antimicrobials that are routinely tested in your lab, please contact your microbiology lab to discuss potential solutions for extracting complete data for surveillance. For more information about identifying data sources to use for AR surveillance to bypass SR/CR, please refer to the [AR Option Data Validation protocol](#).

Example

Suppose you want to review the resistance patterns for *Escherichia coli* and *Enterobacter* spp. You want this report to include healthcare facility-onset isolates from invasive specimen sources submitted to the AR Option for the entire calendar year of 2020.

After generating data sets, to run an AR Option Facility-wide Antibigram report, click Analysis > Reports > Antimicrobial Use and Resistance Module > Antimicrobial Resistance Data. After selecting the report—in this case, “Facility-wide Antibigram (Percent Susceptible) and Percent Tested”—a pop-up box will appear that will allow you to **Run Report**, **Modify Report**, or **Export Data Set**. Select **Modify Report** to customize your report.



Modifying the Report

For a general, step-by-step explanation of the NHSN modification screen, please refer to this [modification reference guide](#).

When you click **Modify Report**, the modification screen appears showing multiple tabs containing available modifications for the given report. The “Title/Format” tab allows you to update the report title and select the format in which you want the report displayed, such as HTML or PDF. To filter the data by time period, choose the “Time Period” tab at the top of the page. To display data for 2020 only, select Specimen Date~Year with beginning and ending dates of 2020 as shown in the screenshot below.

Tip: For more descriptive variable labels on your report, check the box “Show descriptive variable names” that appears near the top of the modification window (recommended).

A screenshot of a web-based modification window titled "Modify 'Facility-wide antibiogram (Percent Susceptible) and Percent Tested'". At the top, there is a checkbox for "Show descriptive variable names (Print List)" which is checked. To the right, it shows "Analysis Data Set: AUR_Summary", "Type: Rate Table", and "Last Generated: August 8, 2022 12:58 PM". Below this is a tabbed interface with four tabs: "Title/Format", "Time Period" (which is active and highlighted in green), "Filters", and "Display Options". Under the "Time Period" tab, there is a section labeled "Time Period:" containing a "Date Variable" dropdown menu set to "Specimen Date~Year", and two input fields for "Beginning" and "Ending" dates, both containing the year "2020". There is a "Clear Time Period" button to the right of these fields. Below the input fields is an unchecked checkbox labeled "Enter Date variable/Time period at the time you click the Run button". At the bottom of the window, there are four buttons: "Run", "Save...", "Export...", and "Close".

The “Filters” tab allows you to filter the data displayed in the report. For our example, we want to filter the report to show data for healthcare facility-onset *Escherichia coli* and *Enterobacter* spp. isolates. Select **Pathogen** as the variable and use the “in” operator to specify more than one value. Use the drop-down menu to select the pathogens of interest. Refer to the [AR Option Analysis Cheat Sheet](#) to obtain the list of all pathogens codes in a specific grouping. Next, click **Add Rule** and select Onset as the variable. Use the “equal” operator and use the drop-down menu to select HO-Healthcare Facility-Onset. Next click **Add Rule** again and select **Specimen Category** as the variable. Use the “equal” operator and then use the drop-down menu to select **Invasive**.

Modify "Facility-wide antibiogram (Percent Susceptible) and Percent Tested"

☒ Show descriptive variable names ([Print List](#)) Analysis Data Set: AUR_Summary Type: Rate Table Last Generated (UTC): April 16, 2025 12:46 PM

Title/Format Time Period **Filters** Display Options

AND OR Add rule

Pathogen	Operator	Value	Delete
Escherichia coli - EC	in	Enterohemorrhagic Escherichia coli, serotype O157:H7 - ECO157	X
Enteropathogenic Escherichia coli - ECEP	X	Enterobacter - ESP	X
Enterobacter amnigenus - ENTAU	X	Enterobacter amnigenus biogroup I - ENTA1	X
Enterobacter amnigenus biogroup II - ENTA2	X	Enterobacter asburiae - ENTAB	X
Enterobacter cancerogenus - ENT CAN	X	Enterobacter cloacae - ENC	X
Enterobacter cloacae complex - ENCCX	X	Enterobacter cloacae dissolvens - ENTEDISS	X
Enterobacter hormaechei - ENTHO	X	Enterobacter intermedius - ENTIN	X
Enterobacter kobei - ENTEKOB	X	Enterobacter ludwigii - ENTELUDW	X
Enterobacter pyrinus - ENTEPYRI	X		

Onset equal HO - Healthcare Facility-Onset Delete

Specimen Category equal Invasive Delete

Run Save... Export... Close

The “Display Options” tab allows you to pick how you’d like the tables displayed in your final report. For this example, we’d like the %S and %Tested tables to include the entire 2020 calendar year instead of displaying one table per quarter. To do this, select **Specimen Date~Year** as the Group by value.

Modify "Facility-wide antibiogram (Percent Susceptible) and Percent Tested"

☒ Show descriptive variable names ([Print List](#)) Analysis Data Set: AUR_Summary Type: Rate Table Last Generated: August 8, 2022 12:58 PM

Title/Format Time Period Filters **Display Options**

Rate Table Options:

Group by: Specimen Date~Year

Run Save... Export... Close

Final Report

The example antibiogram and percent tested tables shown below are the result of the modifications shown in this document.

Note: This example uses fictitious data for illustrative purposes only.

Percent Susceptible (%S) Table

National Healthcare Safety Network Facility-wide antibiogram (Percent Susceptible) and Percentage of Isolates with Susceptibility Results

Percent Susceptible per 100 Isolates

As of: May 27, 2025 at 5:55 PM UTC

Date Range: AUR_SUMMARY SpecimenDateYr 2020 to 2020

if (((Pathogen IN ("EC", "ECO157", "ECEP", "ESP", "ENTAU", "ENTA1", "ENTA2", "ENTAB", "ENTCAN", "ENC", "ENCCX", "ENTEDISS", "ENTHO", "ENTIN", "ENTEKOBE", "ENTELUDW", "ENTEPYRI")) AND (onset = "HO") AND (SpecimenCategory = "Invasive")))

SpecimenDateYr=2020

		Pathogen (Number of Isolates Reported)	
		Gram-Negative	
Drug Class	Drug	Enterobacter spp. (16)	Escherichia coli (65)
Aminoglycosides	AMK	.	75.0
	GENTA	.	75.0
	TOBRA	.	.
B-lactam/ B-lactamase inhibitor combination	AMOXWC	.	75.0
	AMPIWS	.	0
	CEFTAVI	.	75.0
	CEFTOTAZ	.	75.0
	PIPERWT	.	75.0
Carbapenems	DORI	.	75.0
	ERTA	.	75.0
	IMIPWC	.	52.0
	MERO	.	75.0

1. The title of the report specifies which table is being displayed below. Here, we are looking at the AR facility-wide antibiogram, which displays percent susceptible per 100 isolates.
2. NHSN displays the applied filters in the last line of the title of the report. This line states the output includes *Escherichia coli* and *Enterobacter* spp. isolates with healthcare facility-onset, in the invasive specimen category.
3. NHSN sorts Pathogens by organism category (Gram-Negative, Gram-Positive, Antifungal). This report shows that both *Escherichia coli* and *Enterobacter* are Gram-Negative organisms.
4. NHSN displays the number of isolates reported for each pathogen displayed in parenthesis as part of the column heading. Sixteen *Enterobacter* and 65 *Escherichia coli* isolates were reported.
5. The report shows all antimicrobial susceptibility tests NHSN requires be included in the CDA file for the organisms in the report, sorted by drug class. Full drug test names can be found in the [AR Option Analysis Cheat Sheet](#).
6. A "." will be displayed if there were less than 30 isolates tested for that pathogen-drug combination, as shown here with the drug Tobramycin (TOBRA) for both pathogens *Escherichia coli* and *Enterobacter* spp.
7. For 2020, there were 65 *Escherichia coli* isolates from hospital-onset sources and 75% of those *Escherichia coli* isolates tested were susceptible to Ceftolozane/Tazobactam (CEFTOTAZ).
 - a. To see the total number of isolates tested, from the Modify screen, click Export. Then select "Export Analysis Data Set using Modifications."

Note: Cells will appear shaded in grey for non-valid pathogen/drug test combinations. Refer to the AUR Protocol for all valid pathogen/drug test combinations.

Percent Tested (%Tested) Table

National Healthcare Safety Network

Facility-wide antibiogram (Percent Susceptible) and Percentage of Isolates with Susceptibility Results

Percent Tested per 100 Isolates 1

As of: May 27, 2025 at 5:55 PM UTC

Date Range: AUR_SUMMARY SpecimenDateYr 2020 to 2020

if (((Pathogen IN ("EC", "ECO157", "ECEP", "ESP", "ENTAU", "ENTA1", "ENTA2", "ENTAB", "ENTCAN", "ENC", "ENCCX", "ENTEDISS", "ENTHO", "ENTIN", "ENTEKOB", "ENTELUDW", "ENTEPLYR")) AND (onset = "HO") AND (SpecimenCategory = "Invasive")))

SpecimenDateYr=2020

		Pathogen (Number of Isolates Reported)	
		Gram-Negative	
Drug Class	Drug	Enterobacter spp. (16)	Escherichia coli (65)
Aminoglycosides	AMK	100	100
	GENTA	100	100
	TOBRA	0 2	0
B-lactam/ B-lactamase inhibitor combination	AMOXWC	100	100
	AMPIWS	100	100
	CEFTAVI	100	100
	CEFTOTAZ	100 3	100
	PIPERWT	100	100
Carbapenems	DORI	100	100
	ERTA	100	100
	IMIPWC	100	100
	MERO	100	100

The overall format of the %Tested table is similar to the %Susceptible table.

1. The title of the report will specify which table is being displayed below. Here, we are looking at the %Tested table, which displays percent tested per 100 isolates.
2. A "0" will be displayed if none of the isolates reported were tested for a specific drug, as shown here with the drug Tobramycin (TOBRA) for both pathogens *Enterobacter* spp. and *Escherichia coli*.
3. For 2020, there were 65 hospital-onset *Escherichia coli* isolates and 16 hospital-onset *Enterobacter* spp., and all of them (100%) were tested for Ceftolozane/Tazobactam (CEFTOTAZ) and produced a susceptibility result. Further investigation may be warranted if the percent tested is unexpected for a particular pathogen/drug test.
 - a. To see the total number of isolates tested, from the Modify screen, click Export. Then select "Export Analysis Data Set using Modifications."

Notes:

Cells will appear shaded in grey for non-valid pathogen/drug test combinations. Refer to the AUR protocol for all valid pathogen/drug test combinations.

Cells with a missing value "." indicate no isolates reported for the given pathogen in the time period displayed.



Additional Resources

NHSN AR Option Analysis Cheat Sheet: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/ar-cheat-sheet-508.pdf>

NHSN AUR Training: <https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html>

How to Export Data from NHSN: <http://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/exportdata.pdf>

AUR Module Protocol: <https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf>

Surveillance for AU and AR Options: <https://www.cdc.gov/nhsn/acute-care-hospital/aur/>

