

# Comprehensive Antibigram Toolkit: Phase 2

## Antibiogram Specifications

This document outlines key specifications for antibiograms and recommendations for constructing a nursing home-specific antibiogram. The nursing home program champion or his/her designee should share this document with the affiliated laboratory. The specifications are based on the guidelines of the Clinical and Laboratory Standards Institute (CLSI) on Analysis and Presentation of Cumulative Antimicrobial Susceptibility Testing (Antibiograms; 3rd Ed.). The table below lists general data specifications and microorganism specifications to be considered when constructing an antibiogram. Detailed information on each specification follows the table. Finally, a checklist of the basic steps for developing an antibiogram is provided.

Antibiogram Specifications	
General Data Specifications	Analyze and present cumulative antibiogram, at least annually.
	Include only final, verified test results.
	Include only species with testing data for 30 or more isolates. If less than 30 isolates, include a note that “results must be interpreted with caution.”
	Include only diagnostic isolates (not surveillance).
	Eliminate duplicates by including only the first isolate of a species per patient, irrespective of body site or antimicrobial profile.
	Include only antimicrobial agents routinely tested.
	Report percentage sensitive (%S) and do not include percentage with intermediate susceptibility (%I).
Microorganism-Specific Recommendations	<i>Staphylococcus aureus</i> : List %S for all and methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) subset.
	<i>Streptococcus pneumoniae</i> and cefotaxime/ceftriaxone/ penicillin: List %S using both meningitis and nonmeningitis breakpoints; for penicillin, also indicate %S using oral breakpoint.
	<i>Viridans group streptococci</i> and penicillin: List both %I and %S.

### General Data Specifications

#### Analyze and present a cumulative antibiogram report at least annually.

For an antibiogram to represent effectively a community’s antimicrobial resistance patterns, it is important that it contain timely data. Antibiogram data should be collated and updated at least once per year, so that antibiogram reports are not older than 1 year. In nursing facilities with small sample sizes, it is reasonable to include more than 12 months of data, but the data still should be updated annually.

<sup>1</sup> For more Information on Antibigram Specifications from the CLSI, please review the most recent guideline *Staphylococcus aureus*: list percent S for all and methicillin-resistant *Staphylococcus aureus* (MRSA) subset.



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**Include only final, verified test results.**

Only final verified test results should be included in an antibiogram. This directive is included in the data request form for clinical labs and should not require attention from the nursing home staff.

Include only species with testing data for  $\geq 30$  isolates. For species with 10–30 isolates, it is reasonable to provide data with acknowledgment of the sample-size limitations.

Susceptibility data from small sample sizes can lead to unreliable and nonrepresentative antibiograms. Small sample sizes allow the individual resistance pattern of individuals to overly influence the estimate of resistance for an entire facility and thus miss important antibiotic-resistance patterns entirely. The recommendation from CLSI is to include only species with  $\geq 30$  isolates. Because many nursing homes will have smaller sample sizes, the result would be many species not being reported at all. We recommend reporting species with 10–30 specimens but clearly marking these species with a disclaimer. For example, “Organisms with  $< 30$  isolates should be interpreted with caution, as small numbers may bias the group susceptibilities.”

**Include only diagnostic isolates (not surveillance).**

The antibiogram should only include culture results from specimens that were taken to diagnose clinical disease. If a facility collects specimens for surveillance (e.g., screening patients’ nares for MRSA), these specimens should not be used in constructing an antibiogram.

**Eliminate duplicates by including only the first isolate of a species per patient, irrespective of body site or antimicrobial profile.**

Some patients receive multiple microbiological cultures during their stay in a nursing home. If all specimens from an individual are included in the antibiogram, the purported susceptibility would be biased. Therefore, only the first isolate of a species from each patient should be included in the antibiogram. This directive is included in the data request form for clinical labs and should not require attention from the nursing home staff.

**Include only antimicrobial agents routinely tested.**

If some antibiotics are tested occasionally, they should not be reported in the antibiogram, as their susceptibility will be biased compared with the entire sample.

**Report percentage sensitive (percent S) and do not include percent intermediate susceptibility (percent I).**

Antimicrobial sensitivity results from clinical culture specimens are frequently reported in three categories: “Susceptible,” “Intermediate,” and “Resistant.” The antibiogram should be reported as the percentage of each species that is susceptible to each antibiotic. Intermediate results should not be included in the susceptible percentage.

**Microorganism-Specific Recommendations**

The final three recommendations regarding reporting of specific antimicrobial sensitivities for specific organisms have been built into the data request to clinical laboratories.

***Staphylococcus aureus*: List percent S for all and methicillin-resistant *S. aureus* (MRSA) subset.**

MRSA is an important concern in the nursing-home setting, so this is an important specification to follow. *S. aureus* specimens should be reported as two populations: (1) all *S. aureus* isolates and (2) just MRSA isolates.

***Streptococcus pneumoniae* and cefotaxime/ceftriaxone/penicillin: List percent S using both meningitis and nonmeningitis breakpoints; for penicillin, also indicate percent S using oral breakpoint.**

Although the recommendation regarding meningitis is important for acute care hospitals, it is less applicable to nursing facilities, as nursing home providers would not be treating residents for meningitis empirically. Therefore, we do not recommend adding these details to a standard nursing-home antibiogram.

***Viridans group streptococci* and penicillin: List both percent I and percent S.**

As this recommendation will rarely influence the prescribing behavior in nursing homes, we do not recommend modifying the antibiogram to report both percent I and percent S for one organism. Keeping all antimicrobial resistance patterns as percent S will limit confusion of interpreting staff.

Steps for Developing an Antibiogram		Yes	No
Initial Preparation	Review data agreement (contract) with laboratory, and draft Letter of Agreement, if needed.	<input type="checkbox"/>	<input type="checkbox"/>
Submit Original Data Request With Clinical Laboratory	Verify that the laboratory antibiogram software is compatible with CLSI standards.	<input type="checkbox"/>	<input type="checkbox"/>
	Note nursing home name and unit location.		
	Name _____	<input type="checkbox"/>	<input type="checkbox"/>
	Location _____		
	Dates included (1 and 2 years are the most likely time periods to request).	<input type="checkbox"/>	<input type="checkbox"/>
	Request the following specifications:		
	Include only the first isolate of a species per patient, irrespective of body site or antimicrobial profile.	<input type="checkbox"/>	<input type="checkbox"/>
	Include only diagnostic isolates (not surveillance cultures).	<input type="checkbox"/>	<input type="checkbox"/>
	Include only final, verified test results.	<input type="checkbox"/>	<input type="checkbox"/>
Final Preparation	Review clinical summary data from laboratory.	<input type="checkbox"/>	<input type="checkbox"/>
	Transfer data to antibiogram template or development tool.	<input type="checkbox"/>	<input type="checkbox"/>
	Review data with “Checklist for Identifying Nursing Home-Specific Antibiogram Modifications.”	<input type="checkbox"/>	<input type="checkbox"/>

<sup>2</sup> CLSI recommendations that nursing homes may choose not to follow.