



NHSN Antimicrobial Resistance (AR) Option: Reporting & Analysis

Annual NHSN Training – March 29, 2019

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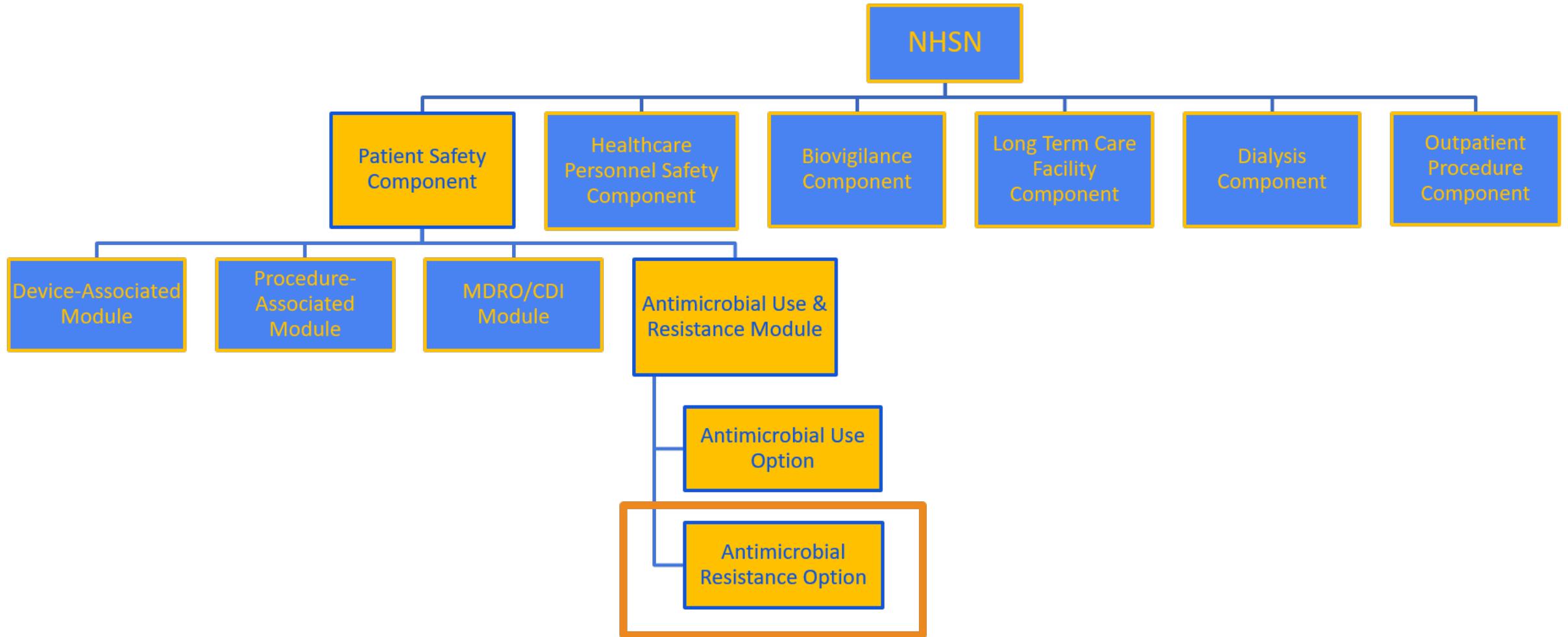
Public Health Analyst

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Objectives

- Outline the requirements for participation in the NHSN AR Option
- Discuss the data elements collected in the NHSN AR Option
- Describe the analysis reports currently available within the NHSN AR Option

NHSN Structure



Antimicrobial Resistance Data in NHSN

	AR Option	MDRO Module	Device & Procedure-Associated Modules
Events reported			
Type of susceptibility data			
Denominator; Metric(s)			
Benefits			
Drawbacks			

Antimicrobial Resistance Data in NHSN

	AR Option	MDRO Module	Device & Procedure-Associated Modules
Events reported	AR Events from blood, CSF, urine, & lower respiratory specimens		
Type of susceptibility data	Over 20 specific organisms; detailed lab test results & final interpretation		
Denominator; Metric(s)	# Isolates tested; facility antibiogram with %NS; resistance percentages		
Benefits	Wide-spread, 'whole-house' coverage; no manual entry		
Drawbacks	Requires set-up by vendor/homegrown system		

Antimicrobial Resistance Data in NHSN

	AR Option	MDRO Module	Device & Procedure-Associated Modules
Events reported	AR Events from blood, CSF, urine, & lower respiratory specimens	Laboratory Identified (LabID) & Infection Surveillance Events	
Type of susceptibility data	Over 20 specific organisms; detailed lab test results & final interpretation	Positive specimens (i.e., MRSA, CDI, CRE) defined by NHSN criteria	
Denominator; Metric(s)	# Isolates tested; facility antibiogram with %NS; resistance percentages	# Patient days; rates # Predicted; SIRs (LabID Only)	
Benefits	Wide-spread, 'whole-house' coverage; no manual entry	Simplified reporting; LabID MRSA & CDI national benchmarks	
Drawbacks	Requires set-up by vendor/homegrown system	Small number of organisms followed	

Antimicrobial Resistance Data in NHSN

	AR Option	MDRO Module	Device & Procedure-Associated Modules
Events reported	AR Events from blood, CSF, urine, & lower respiratory specimens	Laboratory Identified (LabID) & Infection Surveillance Events	CLABSI, CAUTI, pedVAP, pedVAE VAE, SSI Events
Type of susceptibility data	Over 20 specific organisms; detailed lab test results & final interpretation	Positive specimens (i.e., MRSA, CDI, CRE) defined by NHSN criteria	Susceptibility results for specific antibiotics
Denominator; Metric(s)	# Isolates tested; facility antibiogram with %NS; resistance percentages	# Patient days; rates # Predicted; SIRs (LabID Only)	# Isolates tested; facility & national %R
Benefits	Wide-spread, 'whole-house' coverage; no manual entry	Simplified reporting; LabID MRSA & CDI national benchmarks	Infection control software; data can be manually entered; national AR data published (%R)
Drawbacks	Requires set-up by vendor/homegrown system	Small number of organisms followed	Only get susceptibility info for events that meet NHSN definitions

Antimicrobial Resistance (AR) Option

- Released in July 2014
- Purpose:
 - Facilitate evaluation of AR data using standardized approach & definitions
 - Provide facilities with improved awareness of AR issues to aid in clinical decision making and prioritize transmission prevention efforts
- Voluntary reporting
 - Not part of CMS Quality Reporting Programs
 - *Included as one option for Public Health Registry reporting for Promoting Interoperability (previously Meaningful Use [MU])
 - Missouri state requirement (SB 579)

*MU 3 Final Rule: <https://www.federalregister.gov/articles/2015/10/16/2015-25595/medicare-and-medicaid-programs-electronic-health-record-incentive-program-stage-3-and-modifications>

*NHSN MU3 page: <https://www.cdc.gov/nhsn/cdaportal/meaningfuluse.html>

AR Option Reporting

Requirements for AR Data Submission

Who Can Participate?

- Hospitals* that have:
 - Electronic Laboratory Information System (LIS) and
 - Admission Discharge Transfer (ADT) System
 - *Or electronic access to required data elements*

AND

- Ability to collect and package data using HL7 standardized format: Clinical Document Architecture <https://www.cdc.gov/nhsn/cdaportal/index.html>

*General acute care hospitals, long-term acute care hospitals (LTAC), inpatient rehabilitation facilities (IRF), oncology hospitals, critical access hospitals enrolled in NHSN & participating in the Patient Safety Component

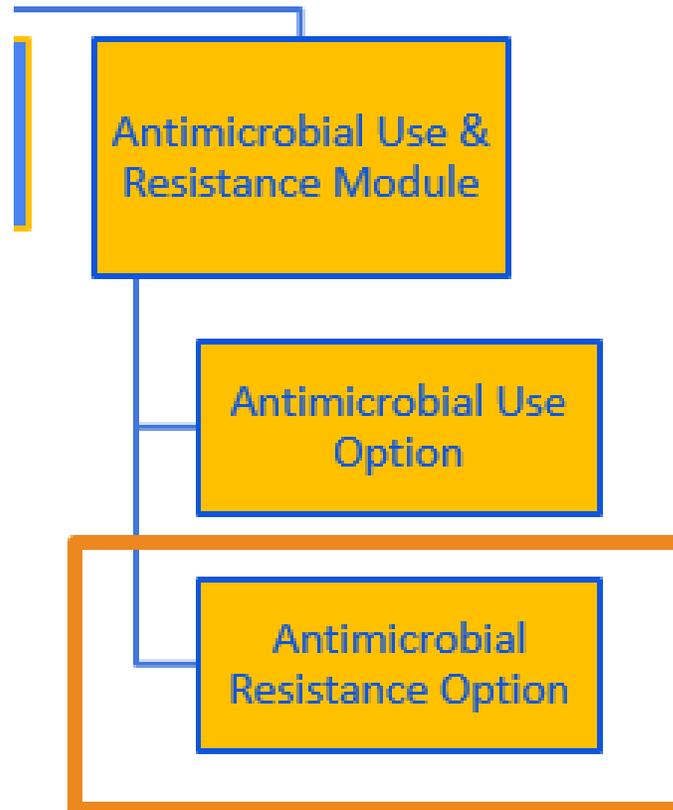
Does my facility have to report data into the AR Option if we are reporting data into the AU Option?

Yes: Both AU and AR data have to be reported together

No: AU data submission is completely separate from AR data submission and we can do one or the other or both

Knowledge Check: Rationale

- **No:** AU data submission is completely separate from AR data submission and we can do one or the other or both



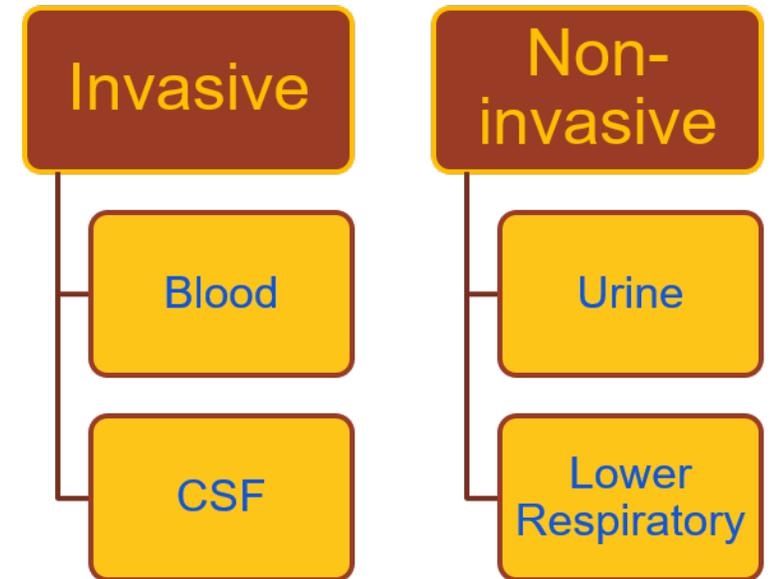
AR Data Elements

What Data Are Collected?

- Two separate file types (similar to MDRO FacWideIN LabID reporting):
 - AR Event files – contain all information associated with the individual isolate
 - Each AR Event is a separate, individual file
 - Reported from:
 - All inpatient locations
 - 3 outpatient location types: ED, pediatric ED & 24-hour observation area
 - AR Summary files – contain summary-level patient day and admission counts
 - Reported for FacWideIN only
 - Not submitted for individual inpatient or outpatient locations

AR Events – What Qualifies?

- Event data: Isolate-level susceptibility results for specific organisms
- Qualifying isolate criteria for an AR Event:
 1. Collected from one of four specimen types:
 - Blood
 - Cerebral spinal fluid (CSF)
 - Urine
 - Lower respiratory
 2. One of over 20 organisms identified
 - See list on next slide
 3. Antimicrobial susceptibility testing must be completed
 - Qualifies for submission regardless of susceptibility results



Eligible Organisms

- All *Acinetobacter* species
- *Candida albicans; auris; glabrata; parapsilosis; tropicalis*
- *Citrobacter amalonaticus; freundii; koseri*
- All *Enterobacter* species
- *Enterococcus faecalis; faecium*
- *Enterococcus* spp. (when not specified to the species level)
- *Escherichia coli*
- Group B *Streptococcus*
- *Klebsiella oxytoca; pneumoniae*
- *Morganella morganii*
- *Proteus mirabilis; penneri; vulgaris*
- *Pseudomonas aeruginosa*
- *Serratia marcescens*
- *Staphylococcus aureus*
- *Stenotrophomonas maltophilia*
- *Streptococcus pneumoniae*

Organism/Agent Combinations

- Selected antimicrobial agents are required to be reported/included in the CDA file for each of the organisms per specimen type
 - Full list (i.e., drug panels) can be found in the NHSN AUR Module Protocol: <http://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf>

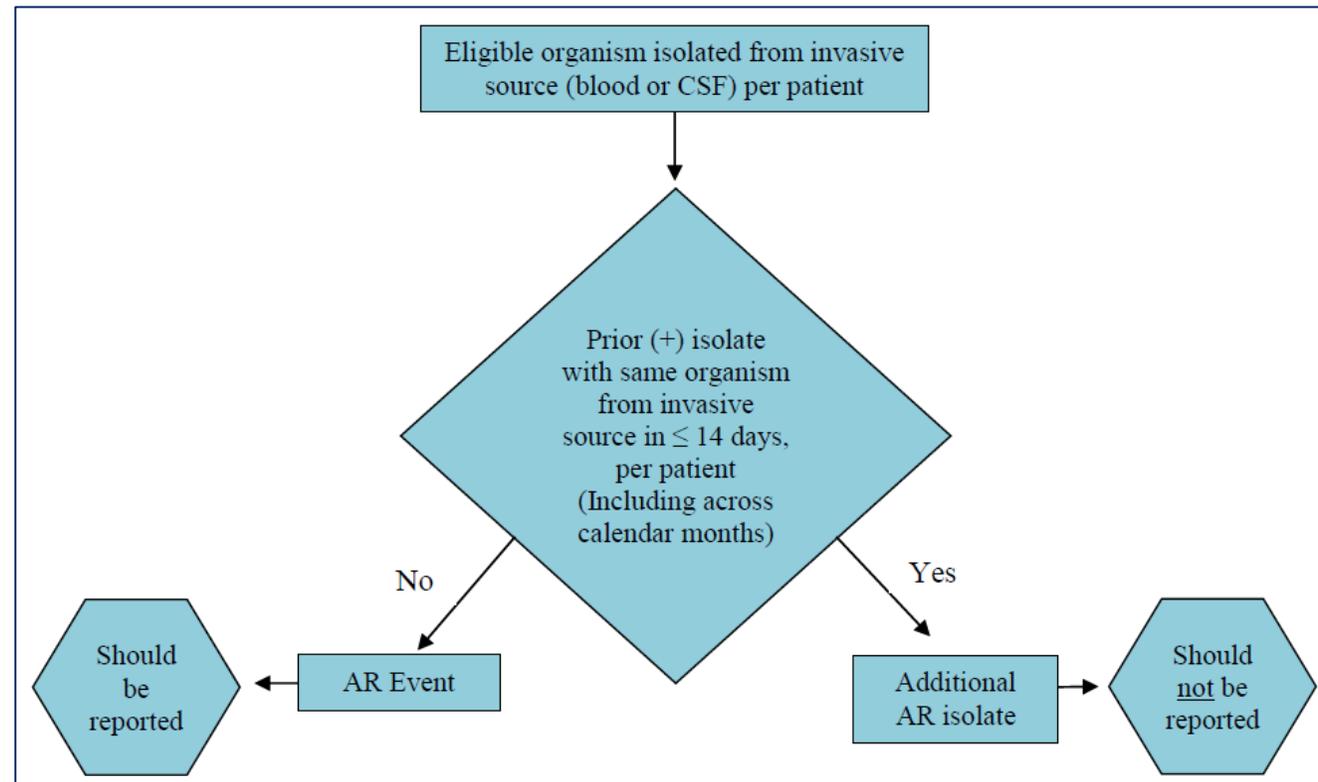
Organism	Specimen Type	Antimicrobial Agents
<i>Acinetobacter</i> (All <i>Acinetobacter</i> species noted in the IDM/Pathogen Codes tab listed in the ARO Pathogen column)	Blood, Urine, Lower Respiratory, CSF	Amikacin Ampicillin-sulbactam Cefepime Cefotaxime Ceftazidime Ceftriaxone Ciprofloxacin Colistin Doripenem Doxycycline Gentamicin Imipenem with Cilastatin Levofloxacin Meropenem Minocycline Piperacillin-tazobactam Polymyxin B Tobramycin Trimethoprim-sulfamethoxazole
	Additional Agents for Urine	Tetracycline

AR Event Required Fields

- Patient information
 - DOB, gender, date admitted to facility, location during specimen collection
- Specimen information
 - Collection date, specimen source
- Organism & antimicrobial susceptibility testing information
 - For each antimicrobial required for the isolated organism/specimen type
 - Sign, value and interpretation for E-test, MIC, and/or Disk diffusion (KB)*
 - Final lab interpretation
 - Susceptible, Susceptible-Dose Dependent, Intermediate, Resistant, Non-Susceptible, Not Tested

Reporting Rules – Invasive Sources

- Per 14 day period: Same organism from invasive specimen source (blood & CSF) reported once per patient



Reporting Rules – Invasive Sources Example

- 14 day rule for invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	Staph aureus isolated from blood culture	Yes	Patient's first blood culture of admission; <i>Staph aureus</i> is isolated; AR event reported

Reporting Rules – Invasive Sources Example

- 14 day rule for invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	Staph aureus isolated from blood culture	Yes	Patient's first blood culture of admission; <i>Staph aureus</i> is isolated; AR event reported
January 4	Staph aureus isolated from blood culture	No	<14 days since last positive culture (Jan 1) of <i>Staph aureus</i>

Reporting Rules – Invasive Sources Example

- 14 day rule for invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	Staph aureus isolated from blood culture	Yes	Patient's first blood culture of admission; <i>Staph aureus</i> is isolated; AR event reported
January 4	Staph aureus isolated from blood culture	No	<14 days since last positive culture (Jan 1) of <i>Staph aureus</i>
January 16	Staph aureus isolated from CSF culture	No	<14 days since last positive culture (Jan 4) of <i>Staph aureus</i>

Reporting Rules – Invasive Sources Example

- 14 day rule for invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	Staph aureus isolated from blood culture	Yes	Patient's first blood culture of admission; <i>Staph aureus</i> is isolated; AR event reported
January 4	Staph aureus isolated from blood culture	No	<14 days since last positive culture (Jan 1) of <i>Staph aureus</i>
January 16	Staph aureus isolated from CSF culture	No	<14 days since last positive culture (Jan 4) of <i>Staph aureus</i>
January 31	Staph aureus isolated from blood culture	Yes	>14 days since last positive culture (Jan 16) of <i>Staph aureus</i> ; AR event reported

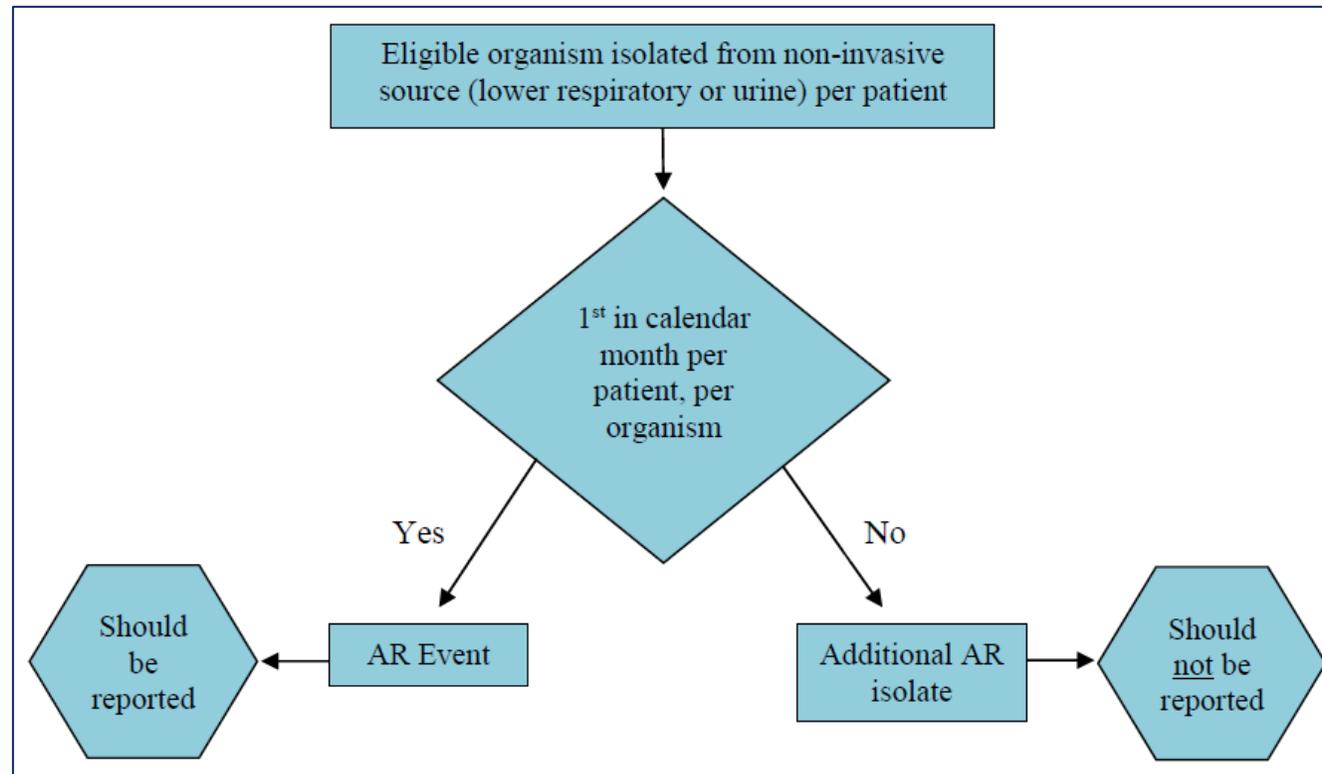
Reporting Rules – Invasive Sources Example

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January 1	Staph aureus isolated from blood culture	Yes	Patient's first blood culture of admission; <i>Staph aureus</i> is isolated; AR event reported
January 4	Staph aureus isolated from blood culture	No	<14 days since last positive culture (Jan 1) of <i>Staph aureus</i>
January 16	Staph aureus isolated from CSF culture	No	<14 days since last positive culture (Jan 4) of <i>Staph aureus</i>
January 31	Staph aureus isolated from blood culture	Yes	>14 days since last positive culture (Jan 16) of <i>Staph aureus</i> ; AR event reported

Reporting Rules – Non-Invasive Sources

- Per calendar month: Same organism from non-invasive source (urine & lower respiratory) reported once per patient



Reporting Rules – Non-Invasive Sources Example

- 1 per month rule for non-invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	<i>E.Coli</i> isolated from urine culture	Yes	Patient's first urine culture of admission; <i>E.Coli</i> is isolated; AR event reported

Reporting Rules – Non-Invasive Sources Example

- 1 per month rule for non-invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	<i>E.Coli</i> isolated from urine culture	Yes	Patient's first urine culture of admission; <i>E.Coli</i> is isolated; AR event reported
January 4	<i>E.Coli</i> isolated from urine culture	No	Only 1 AR event from non-invasive source per organism per month submitted

Reporting Rules – Non-Invasive Sources Example

- 1 per month rule for non-invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	<i>E.Coli</i> isolated from urine culture	Yes	Patient's first urine culture of admission; <i>E.Coli</i> is isolated; AR event reported
January 4	<i>E.Coli</i> isolated from urine culture	No	Only 1 AR event from non-invasive source per organism per month submitted
January 16	<i>E.Coli</i> isolated from lower respiratory culture	No	Only 1 AR event from non-invasive source per organism per month submitted

Reporting Rules – Non-Invasive Sources Example

- 1 per month rule for non-invasive sources:

Date	Lab Result	Reported to NHSN?	Justification
January 1	<i>E.Coli</i> isolated from urine culture	Yes	Patient's first urine culture of admission; <i>E.Coli</i> is isolated; AR event reported
January 4	<i>E.Coli</i> isolated from urine culture	No	Only 1 AR event from non-invasive source per organism per month submitted
January 16	<i>E.Coli</i> isolated from lower respiratory culture	No	Only 1 AR event from non-invasive source per organism per month submitted

A urine specimen was collected and E.coli was isolated but it was susceptible to all drugs tested. Does this isolate still get reported?

Yes

No

Knowledge Check: Rationale

- **Yes** – A urine specimen was collected and *E.coli* was isolated but it was susceptible to all drugs tested. Does this isolate still get reported?
- Meets all three criteria:
 1. Isolate was from a urine specimen
 2. *E.coli* was identified
 3. Susceptibility testing was performed
- Reported to the AR Option even if it tested susceptible to all drugs tested by the lab

AR Summary Files

- Summary record: patient days & admissions
 - Submitted for facility-wide only (aka FacWideIN)
 - Use same definitions as HAI Modules
 - Summary records are not submitted for:
 - Individual inpatient locations
 - Individual or combined outpatient locations
 - Only 1 AR Summary file submitted per facility, per month

Requirements for AR Data Submission

Who Can Participate?

- Hospitals* that have:
 - Electronic Laboratory Information System (LIS) and
 - Admission Discharge Transfer (ADT) System
 - *Or electronic access to required data elements*

AND

- Ability to collect and package data using standardized format: Clinical Document Architecture <https://www.cdc.gov/nhsn/cdaportal/index.html>

*General acute care hospitals, long-term acute care hospitals, inpatient rehabilitation facilities, oncology hospitals, critical access hospitals enrolled in NHSN

Clinical Document Architecture (CDA)

- Data must be uploaded via CDA
 - Too much data to enter by hand!
- Health Level 7 (HL7) standard
- Provides facilities with standardized way to package & upload data
 - AR, AU, & HAI
- CDA ≠ CSV (Excel)
 - CDA uses XML

```
</participant>
<!-- Number of Patient-present Days -->
<entryRelationship typeCode="COMP">
  <observation classCode="OBS" moodCode="EVN">
    <templateId root="2.16.840.1.113883.10.20.5.6.69"/>
    <code codeSystem="2.16.840.1.113883.6.277"
          codeSystemName="cdcNHSN"
          code="2525-4"
          displayName="Number of Patient-present Days"/>
    <statusCode code="completed"/>
    <value xsi:type="PQ" unit="d" value="700"/>
  </observation>
</entryRelationship>
<!-- the Drug, aggregate data, no specified route of administration -->
<entryRelationship typeCode="COMP">
  <observation classCode="OBS" moodCode="EVN">
    <templateId root="2.16.840.1.113883.10.20.5.6.69"/>
    <code codeSystem="2.16.840.1.113883.6.277"
          codeSystemName="cdcNHSN"
          code="2524-7"
          displayName="Number of Therapy Days"/>
    <statusCode code="completed"/>
    <value xsi:type="PQ" unit="d" value="3"/>
    <participant typeCode="CSM" <!-- antimicrobial Drug -->
      <participantRole classCode="MANU">
        <code codeSystem="2.16.840.1.113883.6.88"
              codeSystemName="RxNorm"
              code="620"
              displayName="Amantadine"/>
      </participantRole>
    </participant>
  </observation>
</entryRelationship>
<!-- stratified data: Drug + route -->
```

AR Option CDA

- Data must be submitted via CDA
- Two CDA file types for AR Option:
 - Event: 1 CDA file per AR Event (patient, specimen & susceptibility data)
 - Summary: 1 CDA file with FacWideIN patient day & admission counts

```
<!--Begin Final interpretation -->
<component><!-- This observation specifies the Final Interpretation result. -->
  <observation classCode="OBS" moodCode="EVN"><!-- Antimicrobial Susceptibility Final Interpretation Result -->
    <templateId root="2.16.840.1.113883.10.20.5.6.175"/><!-- Consolidated CDA Result Observation template -->
    <templateId root="2.16.840.1.113883.10.20.22.4.2"/>
    <id nullFlavor="NA"/>
    <code code="365705006" displayName="Final Interpretation Result"
      codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED-CT"/>
    <statusCode code="completed"/>
    <effectiveTime nullFlavor="NA"/>
    <value xsi:type="CD" codeSystem="2.16.840.1.113883.5.83"
      codeSystemName="HL7 Observation Interpretation" code="S" displayName="Susceptible"/>
  </observation>
</component>
```

Monthly AR Data Submission

- Recommend: Upload within 30 days following the completion of the month
- 1 CDA file per AR Event & 1 CDA file for summary data
 - Example:
 - 50 separate CDA files for 50 separate AR Events identified per NHSN definitions in the month
 - 1 CDA for facility-wide summary (patient days and admissions for all inpatient locations combined)
 - All CDA files can be uploaded within 1 Zip file
 - Maximum: 1000 CDAs or file size of 2 MB per zip file

Monthly Reporting Plans

- Add locations to monthly reporting plan prior to uploading data
 - Selecting FacWideIN allows AR Events to be reported from all mapped inpatient locations
 - Each outpatient location is listed separately
- Same monthly reporting plan used for HAI reporting

Antimicrobial Use and Resistance Module

	Locations	Antimicrobial Use	Antimicrobial Resistance
	FACWIDEIN - Facility-wide Inpatient (FacWIDEIn) ▼	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	ER - EMERGENCY DEPARTMENT - AU ▼	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	24HROBS - 24-HR OBS. ▼	<input type="checkbox"/>	<input checked="" type="checkbox"/>



Monthly Reporting Plans (cont.)

Device-Associated Module

	Locations	CLABSI	VAE	CAUTI	CLIP	PedVAP (<18 years)
	5MEDWARD - MEDICAL WARD ON THE 5TH FLOOR <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ICU - MED/SURG <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	NICU - NICU-2/3 <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ONCGEN - ONC-HEM- GENERAL WARD <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Procedure-Associated Module

	Procedures	SSI
	<input type="text" value="v"/>	IN: <input type="checkbox"/> OUT: <input type="checkbox"/>

Antimicrobial Use and Resistance Module

	Locations	Antimicrobial Use	Antimicrobial Resistance
	FACWIDEIN - Facility-wide Inpatient (FacWIDEIn) <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	5MEDWARD - MEDICAL WARD ON THE 5TH FLOOR <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ICU - MED/SURG <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	NICU - NICU-2/3 <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ONCGEN - ONC-HEM- GENERAL WARD <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	24HROBS - 24-HR OBS. <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	EMERG - EMERGENCY DEPT <input type="text" value="v"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

When reporting data into NHSN for the AUR Module, I should use the exact same locations already set up for my HAI reporting.

True

False

Knowledge Check: Rationale

- When reporting data into NHSN for the AUR Module, I should use the exact same locations already set up for my HAI reporting: **True**
 - Same locations should be used for all NHSN reporting
 - Includes HAI and AUR
 - 1 NHSN location per 1 physical patient care location in the facility
 - Do not have “3 North_HAI” and “3 North_AUR”
 - AU/AR reporting locations in reporting plan can/will often exceed HAI reporting locations since AU/AR reporting is completed for the entire facility while CMS reporting programs only require HAI reporting from specific locations

My NHSN PS Monthly Reporting Plan is used for both HAI and AUR data.

True

False

Knowledge Check: Rationale

- My NHSN PS Monthly Reporting Plan is used for both HAI and AUR data: **True**
- It is okay to report from a different amount of locations for HAI vs AUR reporting

Device-Associated Module

	Locations	CLABSI	VAE	CAUTI	CLIP	PedVAP (<18 years)
	5MEDWARD - MEDICAL WARD ON THE 5TH FLOOR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ICU - MED/SURG	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	NICU - NICU-2/3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ONCGEN - ONC-HEM- GENERAL WARD	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Add Row Clear All Rows Copy from Previous Month

Procedure-Associated Module

	Procedures	SSI
		IN: <input type="checkbox"/> OUT: <input type="checkbox"/>

Add Row Clear All Rows Copy from Previous Month

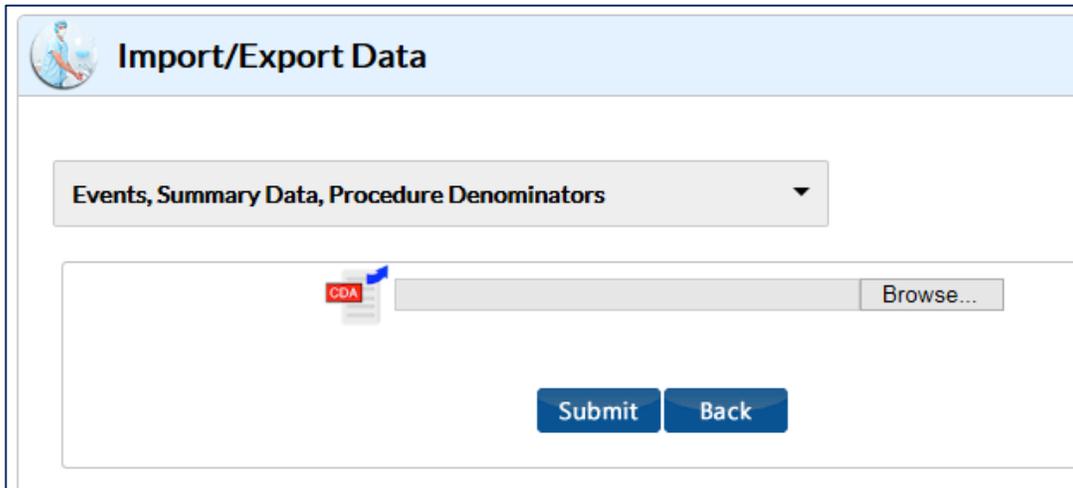
Antimicrobial Use and Resistance Module

	Locations	Antimicrobial Use	Antimicrobial Resistance
	FACWIDEIN - Facility-wide Inpatient (FacWIDEIn)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	5MEDWARD - MEDICAL WARD ON THE 5TH FLOOR	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ICU - MED/SURG	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	NICU - NICU-2/3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ONCGEN - ONC-HEM- GENERAL WARD	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	24HROBS - 24-HR OBS.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	EMERG - EMERGENCY DEPT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Add Row Clear All Rows Copy from Previous Month

Importing CDA Files into NHSN

- Manual upload
- Automatic upload from vendor/IT solution using DIRECT CDA Automation

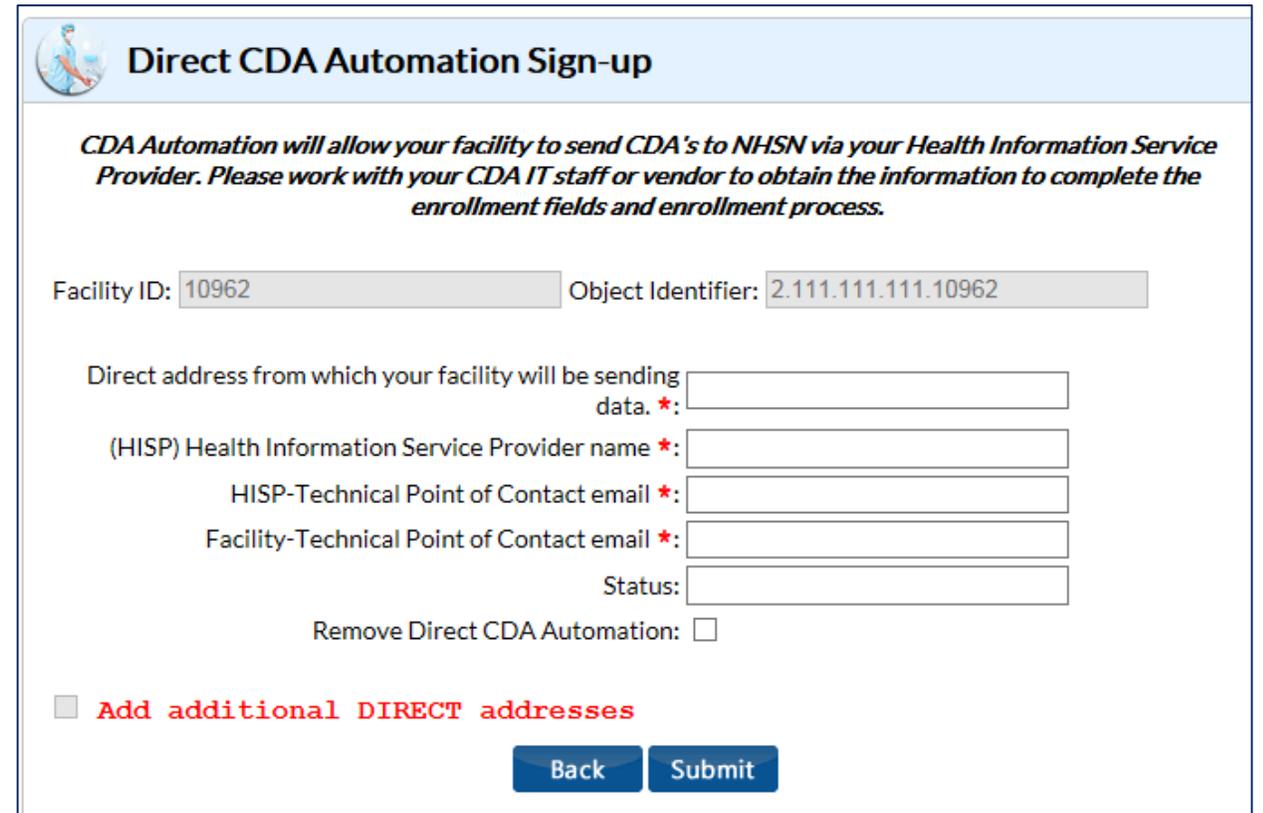


Import/Export Data

Events, Summary Data, Procedure Denominators

CDA Browse...

Submit Back



Direct CDA Automation Sign-up

CDA Automation will allow your facility to send CDA's to NHSN via your Health Information Service Provider. Please work with your CDA IT staff or vendor to obtain the information to complete the enrollment fields and enrollment process.

Facility ID: 10962 Object Identifier: 2.111.111.111.10962

Direct address from which your facility will be sending data. *:

(HISP) Health Information Service Provider name *:

HISP-Technical Point of Contact email *:

Facility-Technical Point of Contact email *:

Status:

Remove Direct CDA Automation:

Add additional DIRECT addresses

Back Submit

How to upload CDA files:

<https://www.youtube.com/watch?v=T4DLtimpB5M>

Flow of AR Data: From Bedside to NHSN



Specimen is collected



LIS/EHR & ADT



Vendor/Homegrown System

- Isolate-level susceptibility results
- Summary data from FacWideIN
 - Patient days & admissions



Report in standard format



NHSN Servers



Immediate local access of data: NHSN Analysis & data sharing via NHSN Group

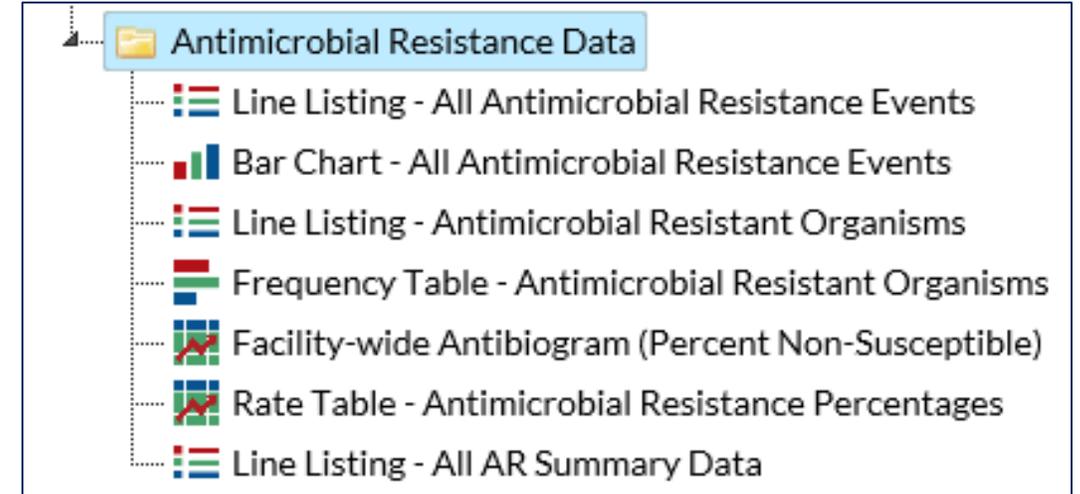


Review AR Events, AR Organisms, & Facility-wide antibiogram

AR Option Analysis

AR Option Report Types

- AR Event reports
 - Line list, bar chart, antibiogram
- AR Organism reports*
 - Line list, frequency table, rate table
- AR Denominator
 - Line list



*Antimicrobial Resistant Phenotype Definitions for AR Option Data: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/ar-phenotype-definitions-508.pdf>

AR Event Line List

- Lists AR events by pathogen
 - Includes patient, specimen, organism, & susceptibility testing variables

National Healthcare Safety Network

Line Listing - Antimicrobial Resistance Events by Pathogen

As of: January 25, 2018 at 4:59 PM

Date Range: All AUR_DETAIL

Pathogen Description=Candida auris - CAAUR

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
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	ANID - Anidulafungin	NS - Non-Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	CASPO - Caspofungin	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	FLUCO - Fluconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	FLUCY - Flucytosine	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	ITRA - Itraconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	MICA - Micafungin	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	POSAC - Posaconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	VORI - Voriconazole	N - Not Tested

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 January 17, 2018 at 2:01 PM.

AR Event Line List

- Line lists can be modified to show additional variables included in the AR Event
 - Examples: individual lab test sign, value and interpretation

National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen
 As of: January 25, 2018 at 5:24 PM
 Date Range: All AUR_DETAIL

Pathogen Description=Candida auris - CAAUR

Facility Org ID	Event ID	Date Specimen Collected	Location	Specimen Group	Pathogen Description	Drug Description	MIC sign	MIC value	Interpretation of MIC test	Final interpretation Description
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	ANID - Anidulafungin	<=	0.100	S	MS - Non-Susceptible
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	CASPO - Caspofungin	<=	0.100	S	S - Susceptible
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	FLUCO - Fluconazole	<=	0.100	S	S - Susceptible
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	FLUCY - Flucytosine	<=	0.100	S	S - Susceptible
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	ITRA - Itraconazole	<=	0.100	S	S - Susceptible
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	MICA - Micafungin	<=	0.100	S	S - Susceptible
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	POSAC - Posaconazole	<=	0.100	S	S - Susceptible
13860	59582	09/13/2016	MICU	Blood	Candida auris - CAAUR	VORI - Voriconazole			N	N - Not Tested

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 January 17, 2018 at 2:01 PM.

*Data for example only

AR Event Line List

- *Candida auris* was isolated from a blood specimen collected in the MICU

National Healthcare Safety Network Line Listing - Antimicrobial Resistance Events by Pathogen

As of: January 25, 2018 at 4:59 PM

Date Range: All AUR_DETAIL

Pathogen Description=Candida auris - CAAUR

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
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	ANID - Anidulafungin	NS - Non-Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	CASPO - Caspofungin	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	FLUCO - Fluconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	FLUCY - Flucytosine	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	ITRA - Itraconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	MICA - Micafungin	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	POSAC - Posaconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	VORI - Voriconazole	N - Not Tested

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 January 17, 2018 at 2:01 PM.

*Data
for
example
only

AR Event Line List

- *Candida auris* was isolated from a blood specimen collected in the MICU
- This isolate was non-susceptible to anidulafungin; susceptible to caspofungin, fluconazole, flucytosine, itraconazole, micafungin, posaconazole; and not tested against voriconazole

National Healthcare Safety Network Line Listing - Antimicrobial Resistance Events by Pathogen

As of: January 25, 2018 at 4:59 PM
Date Range: All AUR_DETAIL

Pathogen Description=Candida auris - CAAUR

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
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	ANID - Anidulafungin	NS - Non-Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	CASPO - Caspofungin	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	FLUCO - Fluconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	FLUCY - Flucytosine	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	ITRA - Itraconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	MICA - Micafungin	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	POSAC - Posaconazole	S - Susceptible
13860	59582	123-45-6789	09/01/2016	09/13/2016	MICU	123456-7	Blood	Candida auris - CAAUR	VORI - Voriconazole	N - Not Tested

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 January 17, 2018 at 2:01 PM.

*Data
for
example
only

Knowledge check: How many AR Events are displayed in this report?

- A. 1
- B. 6
- C. I don't know

**National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen**

As of: February 23, 2019 at 10:55 PM
Date Range: All AUR_DETAIL

Pathogen Description=STEMA

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
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	CEFTAZ - Ceftazidime	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	CHLOR - Chloramphenicol	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	LEVO - Levofloxacin	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	MINO - Minocycline	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	SULFAET - Sulfamethoxazole with Trimethoprim	N - Not Tested
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	TICARWC - Ticarcillin with Clavulanate	S - Susceptible

How many AR Events are displayed in this report?

1
6
I don't know

Knowledge check: How many AR Events are displayed in this report?

- Just 1 AR Event; note the Event ID

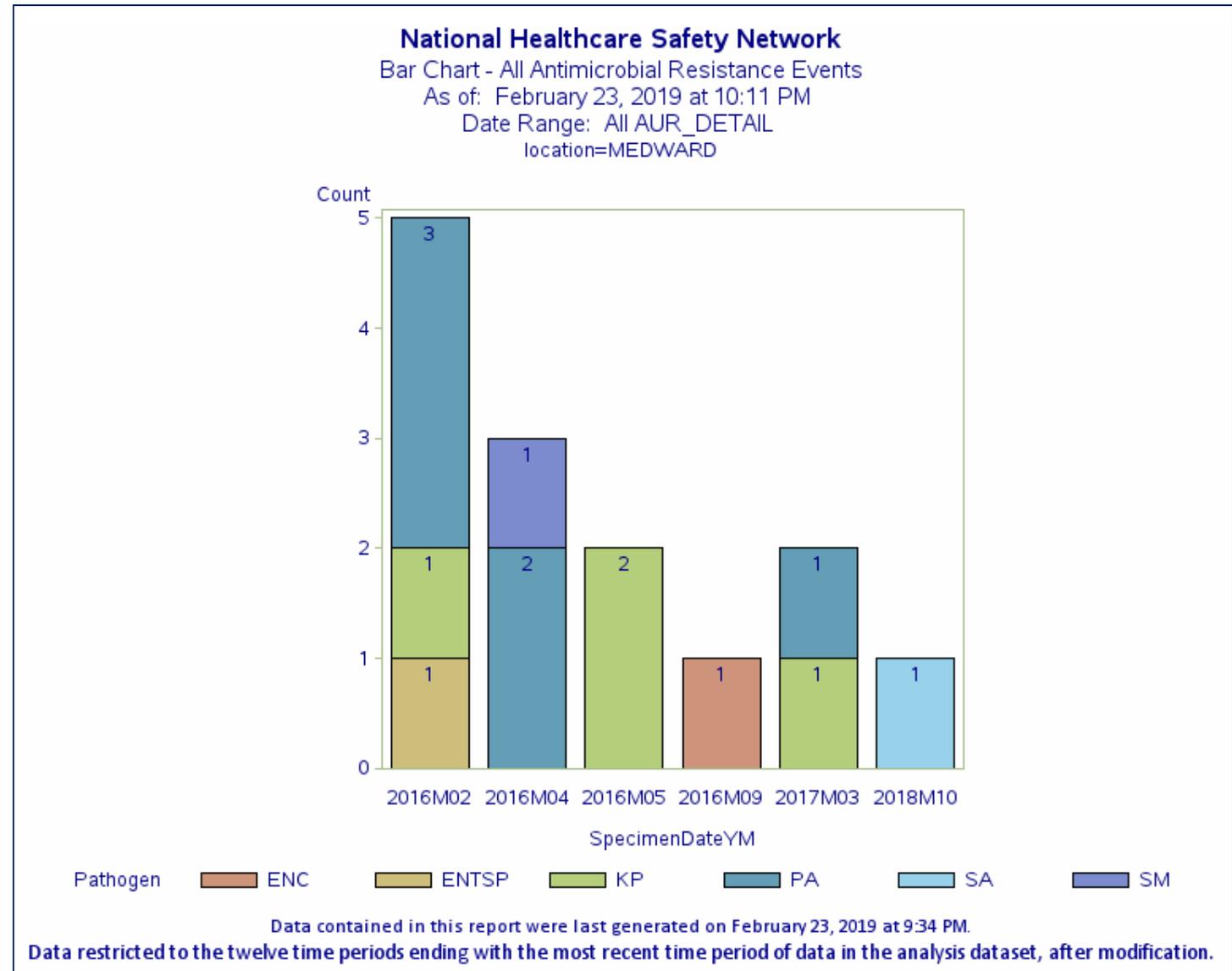
National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen
 As of: February 23, 2019 at 10:55 PM
 Date Range: All AUR_DETAIL

Pathogen Description=STEMA

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
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	CEFTAZ - Ceftazidime	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	CHLOR - Chloramphenicol	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	LEVO - Levofloxacin	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	MINO - Minocycline	S - Susceptible
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	SULFAET - Sulfamethoxazole with Trimethoprim	N - Not Tested
13860	59760	STMALT_DA_0726	01/15/2013	01/21/2016	1029-8	20130125-abd	Blood	Stenotrophomonas maltophilia - STEMA	TICARWC - Ticarcillin with Clavulanate	S - Susceptible

AR Event Bar Chart

- Shows the number of AR Events submitted by location over time



Facility-wide Antibigram

- Shows the pathogens from the isolates reported into the AR Option for a given month
- Lists each antimicrobial in the drug panel and the percent of isolates that were non-susceptible (R, I, or NS) to the pathogen

$$\frac{\text{Total isolates R} + \text{Total isolates I} + \text{Total isolates NS}}{\text{Total isolates tested}} \times 100$$

National Healthcare Safety Network Facility-wide Antibigram (Percent Non-Susceptible)

Rate per 100 Isolates

As of: March 5, 2019 at 10:01 PM

Date Range: AUR_SUMMARY SpecimenDateYM 2018M08 to 2018M08 if (((Pathogen IN (ESP, EC)))))

orgID=13860 CCN=999999

SpecimenDateYM=2018M08

Drug	Pathogen	
	Enterobacter - ESP	Escherichia coli - EC
AMK	43.0	0
AMOXWC	6.0	0
AMP	100	100
AMPIWS	100	100
AZT	0	0
CEFAZ	0	0
CEFEP	37.0	21.0
CEFT	0	16.0
COM	0	34.0
ERTA	100	29.0
FOSFO		

Facility-wide Antibigram

- Percent non-susceptible only calculated when ≥ 30 isolates have been tested for a particular drug. Cells with "." represent pathogen-drug combinations for which there were less than 30 isolates tested.
- Cells shaded in grey represent non-valid pathogen/drug combinations (i.e., drugs not in the panel for that pathogen—see protocol for complete panels)

National Healthcare Safety Network Facility-wide Antibigram (Percent Non-Susceptible)

Rate per 100 Isolates

As of: March 5, 2019 at 10:01 PM

Date Range: AUR_SUMMARY SpecimenDateYM 2018M08 to 2018M08 if (((Pathogen IN (ESP, EC)))))

orgID=13860 CCN=999999

SpecimenDateYM=2018M08

Drug	Pathogen	
	Enterobacter - ESP	Escherichia coli - EC
AMK	43.0	0
AMOXWC	6.0	0
AMP	100	100
AMPWS	100	100
AZT	0	0
CEFAZ	0	0
CEFEP	37.0	21.0
CEFTAT	0	16.0
COM	0	34.0
ERTA	100	29.0
FOSFO	.	.

**National Healthcare Safety Network
Facility-wide Antibiogram (Percent Non-Susceptible)**

Rate per 100 Isolates

As of: March 5, 2019 at 10:01 PM
Date Range: AUR_SUMMARY SpecimenDateYM 2018M08 to 2018M08 if (((Pathogen IN (ESP, EC))))

orgID=13860 CCN=999999
SpecimenDateYM=2018M08

Drug	Pathogen	
	Enterobacter - ESP	Escherichia coli - EC
AMK	43.0	0
AMOXWC	6.0	0
AMP	100	100
AMPWS	100	100
AZT	0	0
CEFAZ	0	0
CEFEP	37.0	21.0
CEFT	0	16.0
COM	0	34.0
ERTA	100	29.0
FOSFO		

Facility-wide Antibiogram

- In August 2018, 43.0% of *Enterobacter* spp. isolates tested were non-susceptible (R, I or NS) to Amikacin

*Data for example only

**National Healthcare Safety Network
Facility-wide Antibigram (Percent Non-Susceptible)**

Rate per 100 Isolates

As of: March 5, 2019 at 10:01 PM
Date Range: AUR_SUMMARY SpecimenDateYM 2018M08 to 2018M08 if (((Pathogen IN (ESP, EC))))

orgID=13860 CCN=999999
SpecimenDateYM=2018M08

	Pathogen	
Drug	Enterobacter - ESP	Escherichia coli - EC
AMK	43.0	0
AMOXWC	6.0	0
AMP	100	100
AMPWS	100	100
AZT	0	0
CEFAZ	0	0
CEFEP	37.0	21.0
CEFT	0	16.0
COM	0	34.0
ERTA	100	29.0
FOSFO		

Facility-wide Antibigram

- In August 2018, 43.0% of *Enterobacter* spp. isolates tested were non-susceptible (R, I or NS) to Amikacin
- 0% of *E.coli* isolates were non-susceptible (100% were susceptible) to Amikacin

*Data for example only

Antimicrobial Resistant Phenotype Definitions

- <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/ar-phenotype-definitions-508.pdf>

Antimicrobial Resistant Phenotype Definitions		
NHSN Analysis Reports for AR Option data		
Phenotype Name	Phenotype Code	Phenotype Definition
Methicillin-resistant <i>Staphylococcus aureus</i>	MRSA_AR	<i>Staphylococcus aureus</i> that has tested Resistant (R) to at least one of the following: oxacillin or ceftazidime
Carbapenem-resistant Enterobacteriaceae (expanded)	CREexpanded_AR	Any <i>Citrobacter amalonaticus</i> , <i>Citrobacter freundii</i> , <i>Citrobacter koseri</i> , <i>Enterobacter</i> spp., <i>E. coli</i> , <i>Klebsiella oxytoca</i> , <i>Klebsiella pneumoniae</i> , and <i>Serratia marcescens</i> that has tested Resistant (R) to at least one of the following: imipenem, meropenem, doripenem, or ertapenem OR Any <i>Proteus mirabilis</i> , <i>Proteus penneri</i> , <i>Proteus vulgaris</i> , and <i>Morganella morganii</i> that has tested Resistant (R) to at least one of the following: meropenem, doripenem, or ertapenem
Carbapenem-resistant Enterobacteriaceae (<i>E. coli</i> , <i>Klebsiella</i> , or <i>Enterobacter</i>)	CREall_AR	Any <i>Escherichia coli</i> , <i>Klebsiella oxytoca</i> , <i>Klebsiella pneumoniae</i> , or <i>Enterobacter</i> spp. that has tested Resistant (R) to at least one of the following: imipenem, meropenem, doripenem, or ertapenem
Carbapenem-resistant <i>E.coli</i>	CREecoli_AR	Any <i>Escherichia coli</i> that has tested Resistant (R) to at least one of the following: imipenem, meropenem, doripenem, or ertapenem
Carbapenem-resistant <i>Enterobacter</i> spp.	CREenterobacter_AR	Any <i>Enterobacter</i> spp. that has tested Resistant (R) to at least one of the following: imipenem, meropenem, doripenem, or ertapenem

AR Organisms Line List

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

National Healthcare Safety Network
Line Listing - Antimicrobial Resistant Organisms
CREall_AR - Carbapenem-resistant Enterobacteriaceae (E. coli, Klebsiella, or Enterobacter)
 As of: February 23, 2019 at 10:26 PM
 Date Range: All ANTIBIOGRAM_AR
 if (((phenotype_AR = CREall_AR)))

Facility Org ID	Patient ID	Date of Birth	Gender	Fac Admission Date	Event ID	Date Specimen Collected	Event Type	Location	Pathogen Description
13860	CREALL_2018_1	11/25/1979	M	01/02/2018	79671	01/05/2018	AR	MSICU	Escherichia coli - EC
13860	CREEX_2018_7	01/29/1963	M	01/04/2018	79680	01/09/2018	AR	MSICU	Klebsiella pneumoniae - KP
13860	CREALL_2018_2	01/01/1960	M	01/13/2018	79672	01/16/2018	AR	MSICU	Klebsiella oxytoca - KO
13860	CREEX_2018_6	01/29/1959	M	01/04/2018	79679	01/22/2018	AR	MSICU	Klebsiella oxytoca - KO
13860	CREEX_2018_3	12/31/1959	M	01/21/2018	79673	01/25/2018	AR	MSICU	Klebsiella pneumoniae - KP
13860	CREEX_2018_4	12/31/1959	M	01/21/2018	79677	01/25/2018	AR	MSICU	Enterobacter - ESP
13860	CREALL_2018_4	12/31/1959	M	01/26/2018	79674	01/29/2018	AR	MSICU	Enterobacter - ESP
13860	CREEX_2018_5	10/29/1959	M	01/26/2018	79678	01/29/2018	AR	MSICU	Escherichia coli - EC
13860	CREALL_2019_5	01/01/1960	M	08/01/2018	79329	08/06/2018	AR	MSICU	Escherichia coli - EC

AR Organisms Frequency Table

- Provides summary counts of all AR Events meeting AR Organism definitions

National Healthcare Safety Network
Frequency Table - Antimicrobial Resistant Organisms
As of: March 5, 2019 at 10:24 PM
Date Range: ANTIBIOGRAM_AR specDateYr 2018 to 2018
 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		
	specDateYM(Spec Collected~Yr/Mon)		
phenotype_AR(Resistant Organism)	2018M01	2018M08	Total
CREexpanded_AR	12	83	95
DR_SP_AR	1	3	4
ESCecoli_AR	4	4	8
ESCklebsiella_AR	4	4	8
FR_Candi_AR	3	7	10
MDR_Acine_AR	4	0	4
MDR_PA_AR	2	4	6
MRSA_AR	2	36	38
VREfaecalis_AR	7	4	11
VREfaecium_AR	1	1	2
carbNS_Acine_AR	4	4	8
carbNS_PA_AR	3	7	10
Total	47	157	204

AR Organism Percentages

- Displays % of organisms that tested non-susceptible or resistant to certain antimicrobials for each defined phenotype

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

National Healthcare Safety Network

Rate Table - Antimicrobial Resistance Percentages

As of: March 5, 2019 at 10:28 PM

Date Range: ANTIBIOGRAM_RATESAR specDateYr 2018 to 2018

Facility Org ID=13860 Phenotype Description=Carbapenem-resistant Enterobacteriaceae (E. coli, Klebsiella, or Enterobacter)

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
13860	CREall_AR	2018M01	16	16	8	.	
13860	CREall_AR	2018M08	84	81	73	90.1	82.1,95.3

1. CREall includes any Escherichia coli, Klebsiella oxytoca, Klebsiella pneumoniae, or Enterobacter spp. that has tested Resistant ('R') to at least 1 of the following: imipenem, meropenem, doripenem, or ertapenem

OR any Proteus mirabilis, Proteus penneri, Proteus vulgaris, and Morganella morganii that has tested Resistant ('R') to at least 1 of the following: meropenem, doripenem, or ertapenem.

*Data for example only

AR Organism Percentages

- In August 2018: 84 E.coli, Klebsiella, and Enterobacter AR Events

National Healthcare Safety Network
Rate Table - Antimicrobial Resistance Percentages
 As of: March 5, 2019 at 10:28 PM
 Date Range: ANTIBIOGRAM_RATESAR specDateYr 2018 to 2018

Facility Org ID=13860 Phenotype Description=Carbapenem-resistant Enterobacteriaceae (E. coli, Klebsiella, or Enterobacter)

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
13860	CREall_AR	2018M01	16	16	8	.	
13860	CREall_AR	2018M08	84	81	73	90.1	82.1,95.3

1. CREall includes any Escherichia coli, Klebsiella oxytoca, Klebsiella pneumoniae, or Enterobacter spp. that has tested Resistant ('R') to at least 1 of the following: imipenem, meropenem, doripenem, or ertapenem
 OR any Proteus mirabilis, Proteus penneri, Proteus vulgaris, and Morganella morganii that has tested Resistant ('R') to at least 1 of the following: meropenem, doripenem, or ertapenem.

*Data for example only

AR Organism Percentages

- In August 2018: 84 E.coli, Klebsiella, and Enterobacter AR Events
- 81 of those events were tested (and 73 were resistant) for one or more of the drugs in the definition

National Healthcare Safety Network
Rate Table - Antimicrobial Resistance Percentages
 As of: March 5, 2019 at 10:28 PM
 Date Range: ANTIBIOGRAM_RATESAR specDateYr 2018 to 2018

Facility Org ID=13860 Phenotype Description=Carbapenem-resistant Enterobacteriaceae (E. coli, Klebsiella, or Enterobacter)

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
13860	CREall_AR	2018M01	16	16	8	.	
13860	CREall_AR	2018M08	84	81	73	90.1	82.1,95.3

1. CREall includes any *Escherichia coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, or *Enterobacter* spp. that has tested Resistant ('R') to at least 1 of the following: imipenem, meropenem, doripenem, or ertapenem
 OR any *Proteus mirabilis*, *Proteus penneri*, *Proteus vulgaris*, and *Morganella morganii* that has tested Resistant ('R') to at least 1 of the following: meropenem, doripenem, or ertapenem.

*Data for example only

AR Organism Percentages

- In August 2018: 84 E.coli, Klebsiella, and Enterobacter AR Events
- 81 of those events were tested (and 73 were resistant) for one or more of the drugs in the definition
- 90.1% (73 resistant/81 tested) of the E.coli, Klebsiella, and Enterobacter events reported meet the definition for CRE

National Healthcare Safety Network
Rate Table - Antimicrobial Resistance Percentages
 As of: March 5, 2019 at 10:28 PM
 Date Range: ANTILOGRAM_RATESAR specDateYr 2018 to 2018
 Facility Org ID=13860 Phenotype Description=Carbapenem-resistant Enterobacteriaceae (E. coli, Klebsiella, or Enterobacter)

Facility Org ID	Resistant Organism	Spec Collected Yr/Mon	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
13860	CREall_AR	2018M01	16	16	8	.	
13860	CREall_AR	2018M08	84	81	73	90.1	82.1,95.3

1. CREall includes any Escherichia coli, Klebsiella oxytoca, Klebsiella pneumoniae, or Enterobacter spp. that has tested Resistant ('R') to at least 1 of the following: imipenem, meropenem, doripenem, or ertapenem
 OR any Proteus mirabilis, Proteus penneri, Proteus vulgaris, and Morganella morganii that has tested Resistant ('R') to at least 1 of the following: meropenem, doripenem, or ertapenem.

*Data for example only

Knowledge check: Why is the resistance percentage not displayed for 2016 or 2017?

- A. There were less than 30 isolates resistant
- B. There were less than 30 isolates tested
- C. NHSN is broken

National Healthcare Safety Network

Rate Table - Antimicrobial Resistance Percentages

As of: March 5, 2019 at 10:34 PM

Date Range: All ANTIBIOGRAM_RA TESAR

Facility Org ID=13860 Phenotype Description=Carbapenem-resistant Enterobacteriaceae (E. coli, Klebsiella, or Enterobacter)

Facility Org ID	Resistant Organism	Spec Collected Year	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
13860	CREall_AR	2016	6	6	0	.	
13860	CREall_AR	2017	11	11	0	.	
13860	CREall_AR	2018	100	97	81	83.5	75.1,89.9

1. CREall includes any Escherichia coli, Klebsiella oxytoca, Klebsiella pneumoniae, or Enterobacter spp. that has tested Resistant ('R') to at least 1 of the following: imipenem, meropenem, doripenem, or ertapenem

OR any Proteus mirabilis, Proteus penneri, Proteus vulgaris, and Morganella morganii that has tested Resistant ('R') to at least 1 of the following: meropenem, doripenem, or ertapenem.

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 March 1, 2019 at 2:12 PM.

Why is the resistance percentage not displayed for 2016 or 2017?

There were less than 30 isolates resistant

There were less than 30 isolates tested

NHSN is broken

Knowledge Check

B. There were less than 30 isolates tested

National Healthcare Safety Network

Rate Table - Antimicrobial Resistance Percentages

As of: March 5, 2019 at 10:34 PM

Date Range: All ANTI BIOGRAM_RA TESAR

Facility Org ID=13860 Phenotype Description=Carbapenem-resistant Enterobacteriaceae (E. coli, Klebsiella, or Enterobacter)

Facility Org ID	Resistant Organism	Spec Collected Year	Number Isolated	Number Tested	Number Resistant	Percent Resistant	95% confidence interval
13860	CREall_AR	2016	6	6	0	.	
13860	CREall_AR	2017	11	11	0	.	
13860	CREall_AR	2018	100	97	81	83.5	75.1,89.9

1. CREall includes any Escherichia coli, Klebsiella oxytoca, Klebsiella pneumoniae, or Enterobacter spp. that has tested Resistant ('R') to at least 1 of the following: imipenem, meropenem, doripenem, or ertapenem

OR any Proteus mirabilis, Proteus penneri, Proteus vulgaris, and Morganella morganii that has tested Resistant ('R') to at least 1 of the following: meropenem, doripenem, or ertapenem.

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 March 1, 2019 at 2:12 PM.

AR Option Reporting Resources

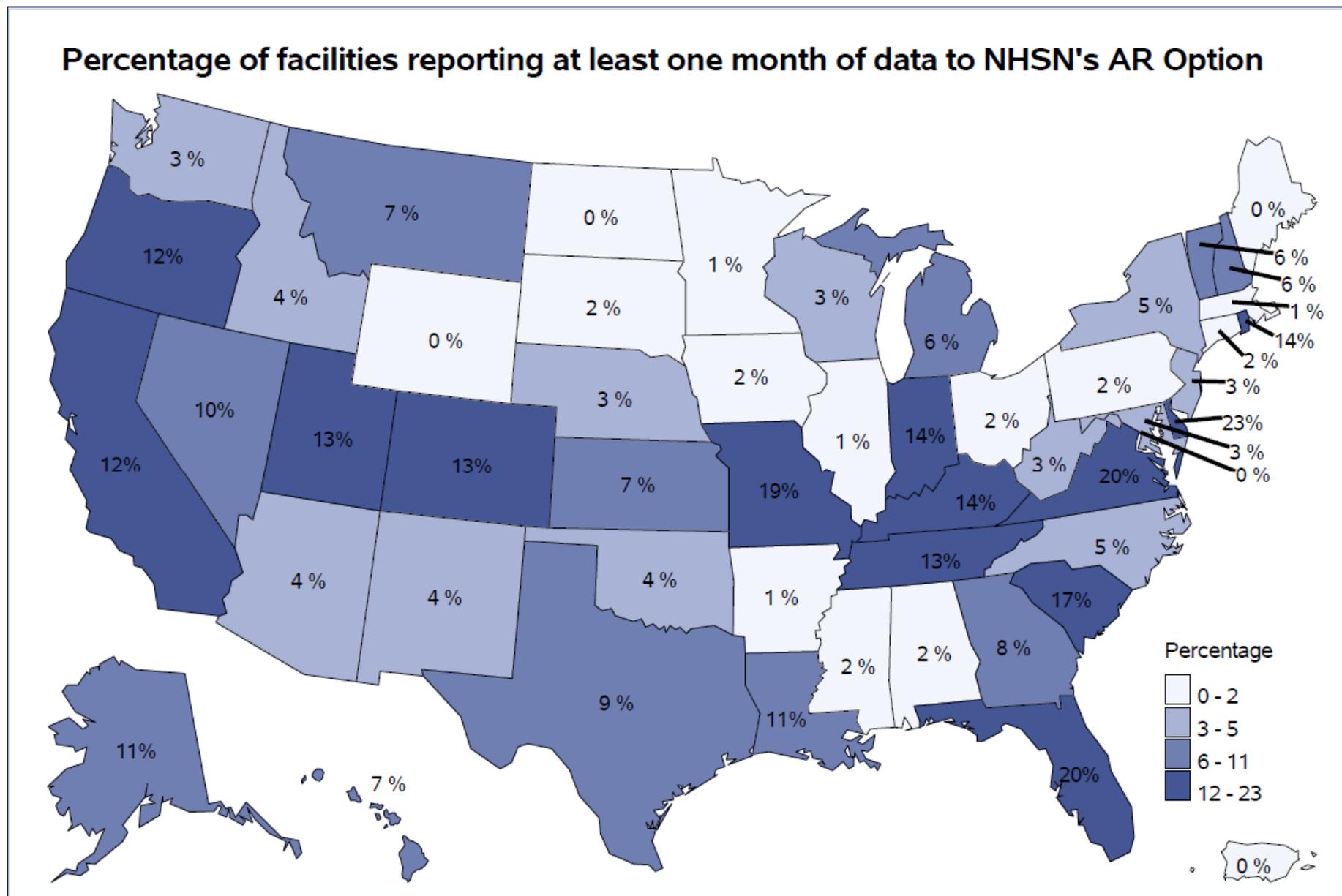
Steps for Facility Participation in the AR Option

- Prerequisite: Electronic LIS or electronic access to lab data
- Identify facility lead(s)/champion(s) for AR Option
- Gain support!
- Gather information on current CDA submission capabilities
 - Activate, obtain, or develop system for aggregating and packaging data into CDA files
- Validation
- Monthly submission

Reporting Metrics

- 522 facilities submitted at least one month of data
 - From 47 states
 - Bed size
 - Average = 215
 - Median = 178
 - Min/Max = 6, 1266
 - Teaching status
 - Teaching: 66%
 - 49% (170 of 346) Major teaching

Hospital participation in AR Option



*As of
March 1,
2019

AR Option Resources

- NHSN AUR Module webpage: <http://www.cdc.gov/nhsn/acute-care-hospital/aur/index.html>

Surveillance for Antimicrobial Use and Antimicrobial Resistance Options

Resources for NHSN Users Already Enrolled

Training	+
Protocols	+
Frequently Asked Questions	+
Data Validation	+
Data Collection Forms	+
<u>Supporting Material</u>	+
Analysis Resources	+

New Users - Start Enrollment Here



Step 1: Enroll into NHSN

Step 2: Set up NHSN

Step 3: Report

AR Option Resources

- NHSN AUR Protocol:
 - <http://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf>
- NHSN Analysis Quick Reference Guides:
 - <http://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html>
- NHSN CDA Submission Support Portal
 - <https://www.cdc.gov/nhsn/cdaportal/index.html>
- NHSN Helpdesk (protocol & submission questions):
 - NHSN@cdc.gov
- NHSN CDA Helpdesk (technical CDA related questions):
 - NHSNCDA@cdc.gov

Thank you!

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

