Mastering the Basics: A Guide to Reporting Antimicrobial Resistance (AR) Data to NHSN

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NHSN Annual Training
June 2025

Objectives

By the end of this session, you will be able to:

- **Outline the requirements for participation in the NHSN AR Option**
- **Discuss the data elements collected in the AR Option**
- **Explain the steps to submit and delete AR data**

Antimicrobial Resistance (AR) Option provides important benefit

- **Purpose:**
  - Facilitate AR data evaluation using standardized approach and definitions
    - Improve awareness of AR problems to aid in clinical decision making and prioritize transmission prevention efforts
    - Provide facility-specific measures to inform decisions to speed up transmission prevention efforts and slow or stop transmission of emerging or established pathogens
  - Allow regional and national assessment of resistant organisms of public health importance
- **Protocol:** https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf

AR Option reporting is included in the Medicare Promoting Interoperability Program

- **Beginning with the Electronic Health Record (EHR) reporting period in 2024, eligible hospitals and critical access hospitals were required to be in active engagement with NHSN to report data for the AUR Surveillance measure with the Medicare Promoting Interoperability Program**
  - Measure included AR Option and AU Option
- **Hospitals can be in two levels of active engagement:**
  - Option 1 – Pre-production and Validation
  - Option 2 – Validated Data Production
- **Refer to additional training materials for more information on Promoting Interoperability Program requirements**
  - https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html
  - https://www.cdc.gov/nhsn/cms/cms-faq-aur.html

Requirements for participation in AR Option

All hospitals in NHSN Patient Safety Component (PSC) can submit data to AR Option

- **All facility types enrolled in PSC can participate**
  - Includes but not limited to general acute care hospitals, critical access hospitals, long-term acute care hospitals (LTAC), inpatient rehabilitation facilities (IRF), oncology hospitals
- **Facilities must have electronic access to required data elements**
  - Electronic Laboratory Information System (LIS) or Electronic Health Record (EHR)
  - Admission Discharge Transfer (ADT) System
- **Facilities must be able to collect and package data using HL7 standardized format of Clinical Document Architecture (CDA)**
  - https://www.cdc.gov/nhsn/cdaportal/index.html

No manual manipulation of AR data

- **Facilities should use electronic data sources only**
  - If data are not available in discrete fields, do not use manual means of data collection to report to AR Option
  - For example, if susceptibility results are faxed to your facility and scanned into the patient chart, do not hand enter information into the EHR so that it could be sent to NHSN AR Option
- **AR Option data are submitted via CDA files only**
  - There is no manual hand entry of data into NSHN

Report data from all inpatient locations and select outpatient locations

- **All NHSN defined inpatient locations including procedural areas like operating rooms**
- **Three select outpatient locations:**
  - Emergency Department (ED)
  - Pediatric ED
  - 24-hour Observation Area

- **Do not report isolates from:**
  - Outpatient clinics
  - Other hospitals that may send isolates to your hospital's lab for susceptibility testing

Report data monthly

- **AR Event files**
  - Each AR Event file represents 1 isolate and its associated susceptibility testing results
  - Expect facilities to have many AR Events each month

- **AR Summary files**
  - Each file contains summary (aka denominator) data
  - Minimum submission: FacWideIN only
  - Ideal submission: FacWideIN and each individual eligible outpatient location

Knowledge Check #1

True/False: My facility can participate in the AR Option even though our facility receives all antimicrobial susceptibility test results from our external lab via fax.

- True
- False

Knowledge Check #1

True/False: My facility can participate in the AR Option even though our facility receives all antimicrobial susceptibility test results from our external lab via fax.

- True
- **False**

False: Facilities must have electronic access to all required data elements in discrete fields to be able to participate in AR Option reporting.

AR Event Data Elements

AR Event criteria – locations

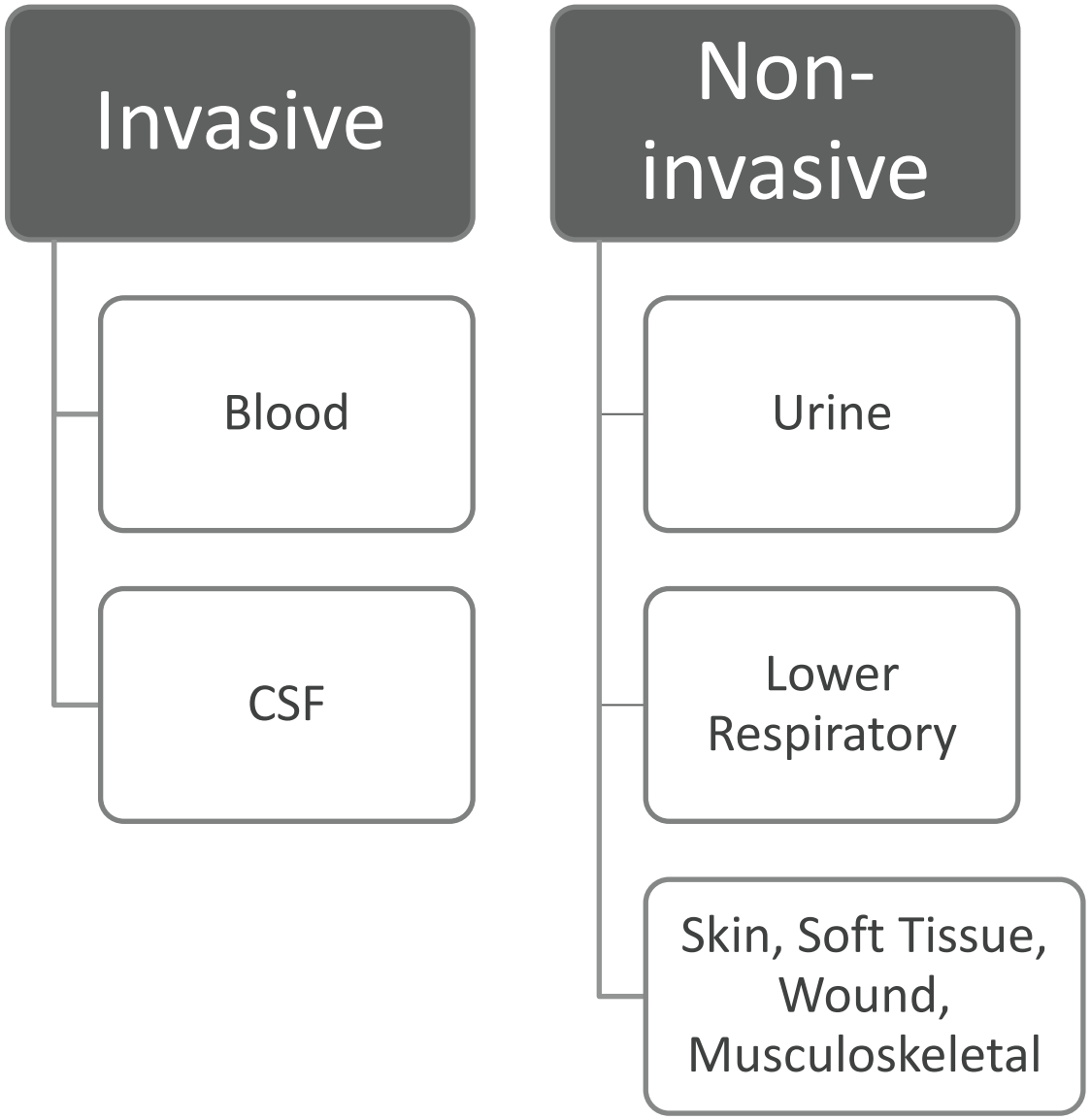
- **AR Event: isolate-level susceptibility results for specific organisms**
- **Four qualifying criteria:**
  1. Collected in an eligible location/unit
     - All inpatient units (including procedural areas)
     - ED, pediatric ED, 24-hour Observation

AR Event criteria – specimen sources

- **AR Event: isolate-level susceptibility results for specific organisms**
- **Four qualifying criteria:**
  1. Collected in an eligible location/unit
  2. Collected from one of five categories eligible specimen sources
     i. Blood
     ii. Cerebrospinal fluid (CSF)
     iii. Urine
     iv. Lower Respiratory
     v. Skin, soft tissue, wound, and musculoskeletal

Specimens grouped into invasive and non-invasive categories

- **Categories will be used for de-duplication logic**



AR Event criteria – organisms

- **AR Event: isolate-level susceptibility results for specific organisms**
- **Four qualifying criteria:**
  1. Collected in an eligible location/unit
  2. Collected from one of five categories eligible specimen sources
  3. Eligible organism identified
     - See list on next slide

Many organisms eligible for reporting

- All *Acinetobacter* species
- All *Candida* species
- *Nakaseomyces glabratus (Candida glabrata)*
- *Pichia kudriavzevii (Candida krusei)*
- All *Citrobacter* species
- All *Enterobacter* species
- All *Enterococcus* species
- *Escherichia coli*
- All *Klebsiella* species
- *Morganella morganii*
- All *Proteus* species
- *Pseudomonas aeruginosa*
- *Serratia marcescens*
- *Staphylococcus aureus*
- *Stenotrophomonas maltophilia*
- *Streptococcus agalactiae*
- *Streptococcus pneumoniae*
- *Streptococcus pyogenes*

AR Event criteria – antimicrobial susceptibility testing

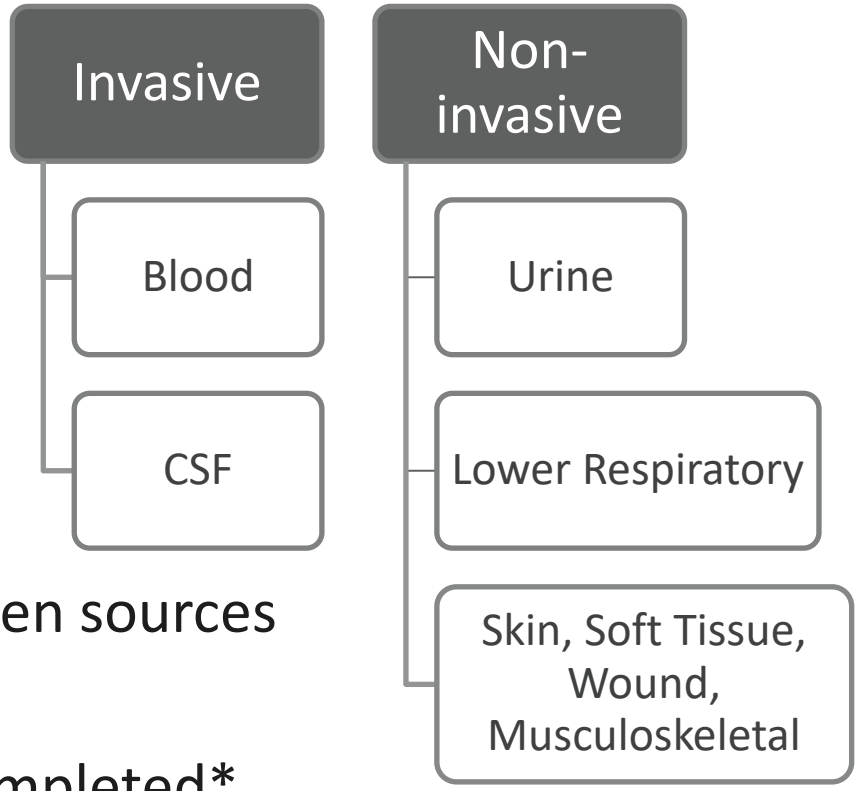
- **AR Event: isolate-level susceptibility results for specific organisms**
- **Four qualifying criteria:**
  1. Collected in an eligible location/unit
  2. Collected from one of five categories eligible specimen sources
  3. Eligible organism identified
  4. Antimicrobial susceptibility testing (AST) must be completed*
     - *Candida isolates can be reported **without** AST
     - Qualifies for submission regardless of susceptibility results
     - Report susceptibility result or “Not Tested” for each required susceptibility test for the given organism

Each organism requires specific AST results

- **Required "drug panels" are determined based on Clinical & Laboratory Standards Institute (CLSI) guidelines**
- **Appendix F of AUR Module Protocol includes full list**
- **All susceptibility tests must be included in the AR Event file regardless of whether that test was performed by the lab**
  - Vendor will include "Not Tested" for tests not performed
- **Some organisms require additional AST results for urine specimens**

Organism	Specimen Type	Antimicrobial Agents
Pseudomonas aeruginosa	Blood, CSF, Lower Respiratory, Skin, Soft Tissue, Wound, Musculoskeletal, Urine	Aztreonam Cefepime Cefiderocol Ceftazidime Ceftazidime-avibactam[a] Ceftolozane-tazobactam[a] Ciprofloxacin Colistin Imipenem Imipenem-relebactam[a] Levofloxacin Meropenem Piperacillin-tazobactam[a] Polymyxin B Tobramycin
	Additional Agents for Urine	Amikacin

Summary of AR Event criteria



- **AR Event: isolate-level susceptibility results for specific organisms**
- **Qualifying isolate criteria for an AR Event:**
  1. Collected in an eligible location/unit
  2. Collected from one of five categories eligible specimen sources
  3. Eligible organism identified
  4. Antimicrobial susceptibility testing (AST) must be completed*
     - Qualifies for submission regardless of susceptibility results
     - *Candida isolates can be reported **without** AST
- **Reported for:**
  - All inpatient locations and 3 outpatient location types (ED, pediatric ED, & 24-hour observation area)

Knowledge Check #2

True/False: An isolate must test resistant to at least one drug during AST to be eligible for AR Option reporting.

- True
- False

Knowledge Check #2

True/False: An isolate must test resistant to at least one drug during AST to be eligible for AR Option reporting.

- True
- **False**

False: An isolate is eligible for AR Option reporting regardless of its susceptibility pattern (assuming it meets the other AR Event criteria)

Knowledge Check #3

Multiple choice: Which one response reflects the 2025 AR Option rules for whether the isolate needs AST completed?

A. All isolates must have AST completed to be considered eligible

B. Isolates of all organisms except for *Candida* must have AST completed to be considered eligible

C. No isolates need AST completed to be considered eligible

Knowledge Check #3

Multiple choice: Which one response reflects the 2025 AR Option rules for whether the isolate needs AST completed?

A. All isolates must have AST completed to be considered eligible

B. Isolates of all organisms except for *Candida* must have AST completed to be considered eligible

C. No isolates need AST completed to be considered eligible

B: As of January 2025, *Candida* isolates are no longer required to have AST completed to be eligible for AR Option reporting. All other organisms must have AST completed to be eligible.

Assessing eligibility example: Patient A

- **Patient A was admitted to Hospital ABC on January 1**
  - Patient A has not been seen at Hospital ABC before
- **Patient A was housed in the Medical ICU from January 1-20 and the Medical ward from January 21-February 5 and discharged on February 5**
- **Patient A had four specimens collected**
  - January 1 – blood culture with *S. aureus* identified
  - January 4 – wound culture with *S. aureus* identified
  - January 16 – CSF culture with *S. aureus* identified
  - January 31 – blood culture with *S. aureus* identified
- **AST was performed on all isolates**

Four criteria to assess isolate eligibility

- **Qualifying isolate criteria for an AR Event:**
  1. Collected in an eligible location/unit
  2. Collected from one of five categories eligible specimen sources
  3. Eligible organism identified
  4. Antimicrobial susceptibility testing (AST) must be completed*
     - Qualifies for submission regardless of susceptibility results
     - *Candida isolates can be reported **without** AST

4 Eligible isolates

- **Qualifying isolate criteria for an AR Event:**
  1. Collected in an eligible location/unit
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1

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- Patient A was housed in the Medical ICU from January 1-20 and the Medical ward from January 20-February 5 and discharged on February 5
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  - January 1 – **blood culture** with *S. aureus* identified
  - January 4 – **wound culture** with *S. aureus* identified
  - January 16 – **CSF culture** with *S. aureus* identified
  - January 31 – **blood culture** with *S. aureus* identified

2

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4 Eligible isolates

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- **Patient A had four specimens collected**
  - January 1 – blood culture with ***S. aureus*** **identified**
  - January 4 – wound culture with ***S. aureus*** **identified**
  - January 16 – CSF culture with ***S. aureus*** **identified**
  - January 31 – blood culture with ***S. aureus*** **identified**

3

- **AST was performed on all isolates**

4 Eligible isolates

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- **Patient A had four specimens collected**
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  - January 4 – wound culture with *S. aureus* identified
  - January 16 – CSF culture with *S. aureus* identified
  - January 31 – blood culture with *S. aureus* identified

4

- **AST was performed on all isolates**

Each AR Event includes many required variables – patient information

- **PatientID**
  - Should remain the same across all visits and admissions for all NHSN reporting
- **Date of birth**
- **Sex**
- **Admission status**
  - Whether the patient was admitted to an inpatient location in your hospital during the encounter
- **Admission date**
  - Date the patient physically locates to an inpatient location
  - If patient is not admitted during that encounter, use encounter date (date patient arrived in the first eligible outpatient location)

Each AR Event includes many required variables – specimen information

- **Specimen collection date**
- **Specimen source**
- **Location**
  - Unit/location the patient was in at the time of specimen collection

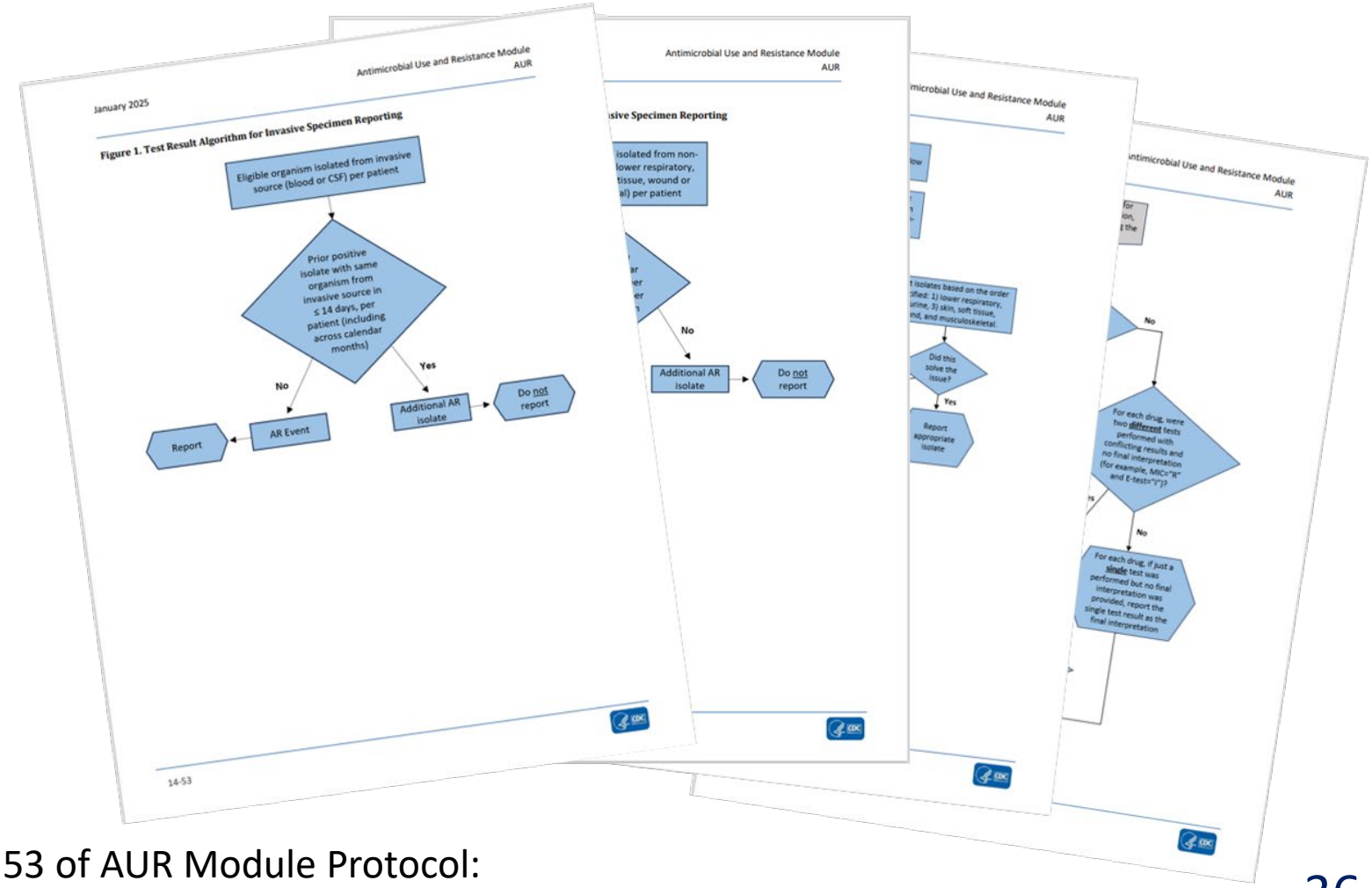
Each AR Event includes many required variables – organism & AST results

- **Isolate identifier**
  - Unique for each isolate within the lab based on the isolate being reported with its own AST results
- **Organism**
  - If *Staph aureus*, report two additional tests:
    - PBP2a agglutination
    - PCR mec-gene
- **Each required antimicrobial susceptibility test**
  - E-test sign, value & interpretation
  - MIC sign, value & interpretation
  - Disk diffusion (KB) sign, value & interpretation
  - Final interpretation result

AR Event De-duplication

De-duplication rules determine distinct AR Events

1. **Invasive**
2. **Non-invasive**
3. **Same day**

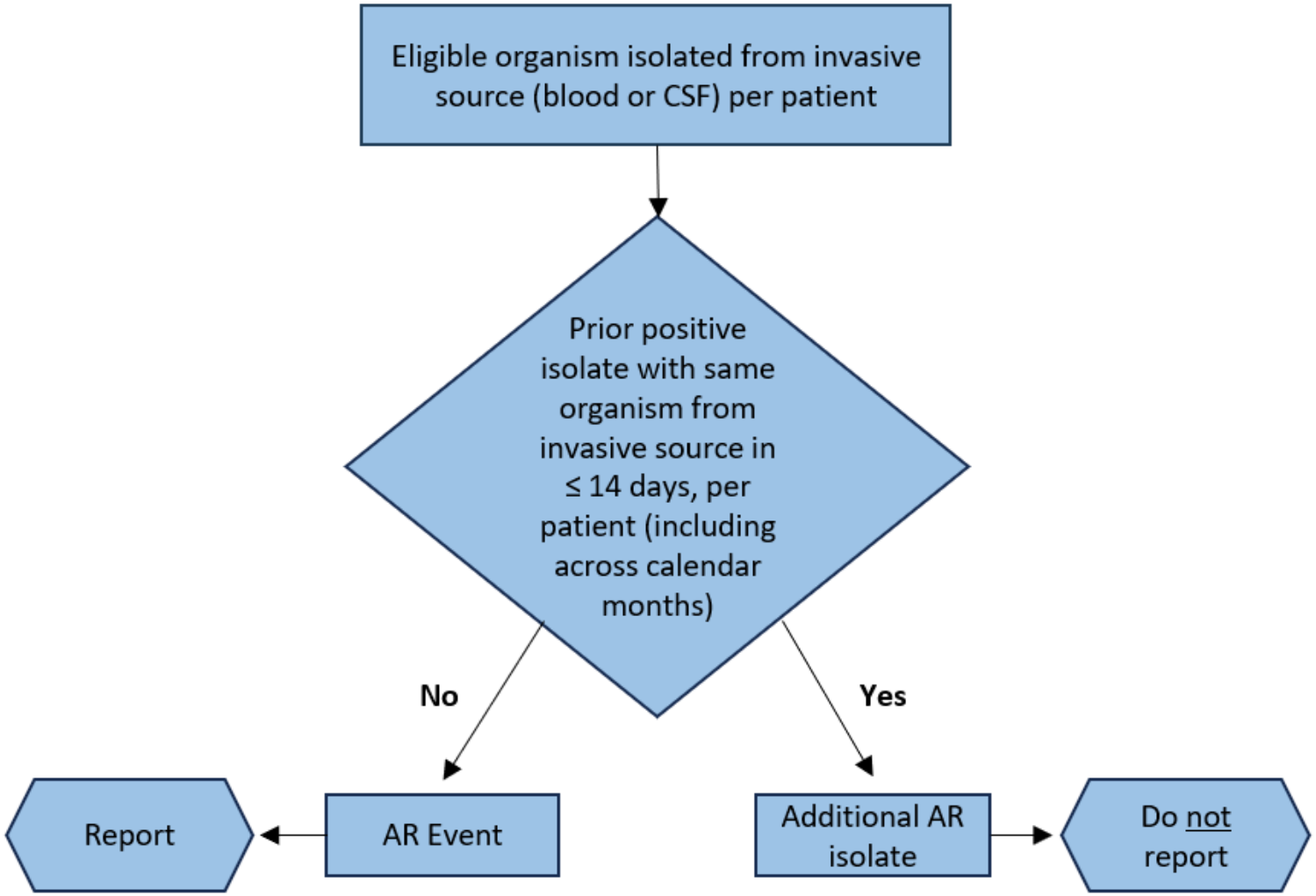


De-duplication flow charts start on page 53 of AUR Module Protocol:
https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf

Invasive specimens follow 14-day rule

- **Report each eligible organism isolated from an invasive source (blood or CSF) per patient, per 14-day period even across calendar months**
  - Must be 14 days with no positive culture result for that patient and specific organism from an invasive source before another invasive source AR Event for that patient and specific organism can be entered
    - 14 days with no isolates of the given organism from an invasive source
    - Regardless of whether previous isolates qualified as an AR Event
  - Day of specimen collection is considered Day 1
  - Based on the 14-day rule, at maximum, a patient would have no more than three invasive isolates per specific organism reported per month

Invasive specimen de-duplication flow chart



Invasive specimen de-duplication example: Patient B

- **Patient B was admitted to Hospital ABC on January 1**
  - Patient B has not been seen at Hospital ABC before
- **Patient B was housed in the Medical ICU from January 1-20 and the Medical ward from January 20-February 5 and discharged on February 5**
- **Patient B had four specimens collected**
  - January 1 – blood culture with *S. aureus* identified
  - January 4 – blood culture with *S. aureus* identified
  - January 16 – CSF culture with *S. aureus* identified
  - January 31 – blood culture with *S. aureus* identified
- **AST was performed on all isolates**

Invasive specimen de-duplication example: Patient B

Date	Lab Result	Reported to NHSN?	Justification
January 1	*S. aureus* isolated from blood culture		
January 4	*S. aureus* isolated from blood culture		
January 16	*S. aureus* isolated from CSF culture		
January 31	*S. aureus* isolated from blood culture		

Invasive specimen de-duplication example: Patient B

Date	Lab Result	Reported to NHSN?	Justification
January 1	*S. aureus* isolated from blood culture	**Yes**	• Patient B's first specimen from invasive source (blood culture) of admission • No previous isolates from previous admissions • *S. aureus* is isolated • **Reportable AR Event**
January 4	*S. aureus* isolated from blood culture		
January 16	*S. aureus* isolated from CSF culture		
January 31	*S. aureus* isolated from blood culture		

Invasive specimen de-duplication example: Patient B

Date	Lab Result	Reported to NHSN?	Justification
January 1	*S. aureus* isolated from blood culture	**Yes**	• Patient B's first specimen from invasive source (blood culture) of admission • No previous isolates from previous admissions • *S. aureus* is isolated • **Reportable AR Event**
January 4	*S. aureus* isolated from blood culture	No	• <14 days since last positive culture from invasive source (Jan 1) of *S. aureus*
January 16	*S. aureus* isolated from CSF culture		
January 31	*S. aureus* isolated from blood culture		

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January 16	*S. aureus* isolated from CSF culture	No	• <14 days since last positive culture from invasive source (Jan 4) of *S. aureus*
January 31	*S. aureus* isolated from blood culture		

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January 1	*S. aureus* isolated from blood culture	**Yes**	• Patient B's first specimen from invasive source (blood culture) of admission • No previous isolates from previous admissions • *S. aureus* is isolated • **Reportable AR Event**
January 4	*S. aureus* isolated from blood culture	No	• <14 days since last positive culture from invasive source (Jan 1) of *S. aureus*
January 16	*S. aureus* isolated from CSF culture	No	• <14 days since last positive culture from invasive source (Jan 4) of *S. aureus*
January 31	*S. aureus* isolated from blood culture	**Yes**	• >14 days since last positive culture (Jan 16) from invasive source of *S. aureus* • **Reportable AR Event**

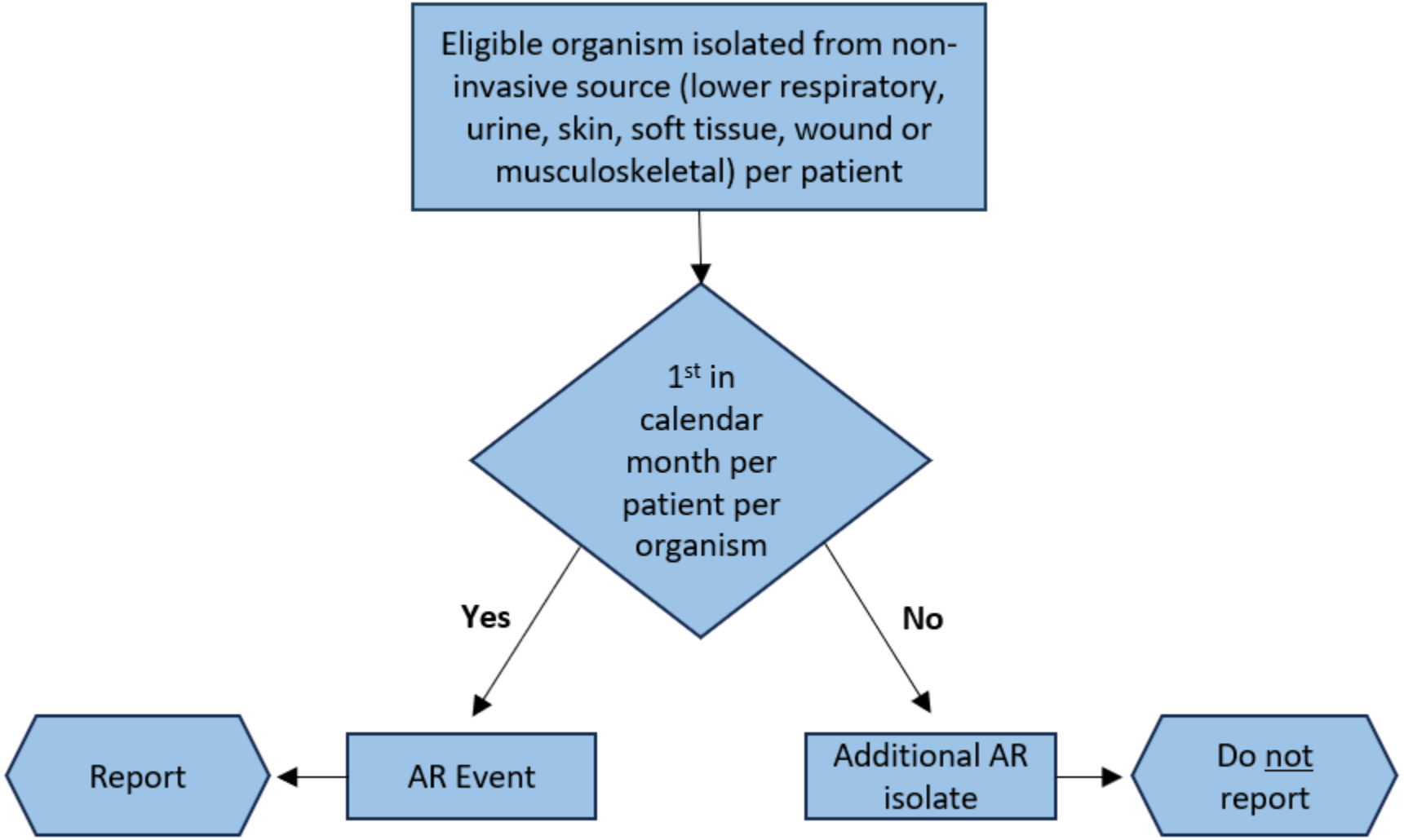
Invasive specimen de-duplication example: Patient B

Date	Lab Result	Reported to NHSN?	Justification
January 1 ❶	*S. aureus* isolated from blood culture	**Yes**	• Patient B's first specimen from invasive source (blood culture) of admission • No previous isolates from previous admissions • *S. aureus* is isolated • **Reportable AR Event**
January 4	*S. aureus* isolated from blood culture	No	• <14 days since last positive culture from invasive source (Jan 1) of *S. aureus*
January 16	*S. aureus* isolated from CSF culture	No	• <14 days since last positive culture from invasive source (Jan 4) of *S. aureus*
January 31 ❷	*S. aureus* isolated from blood culture	**Yes**	• >14 days since last positive culture (Jan 16) from invasive source of *S. aureus* • **Reportable AR Event**

Non-invasive specimens follow the 1 per month rule

- **Report first eligible organism isolated from a non-invasive source (lower respiratory, urine, skin, soft tissue, wound and musculoskeletal) per patient, per calendar month**
  - Only 1 AR Event allowed for the same patient and organism per calendar month

Non-invasive specimen de-duplication flow chart



Non-invasive specimen de-duplication example: Patient C

- **Patient C was admitted to Hospital ABC on January 1**
  - Patient C has not been seen at Hospital ABC before
- **Patient C was housed in the Medical ICU from January 1-20 and the Medical ward from January 20-February 5 and discharged on February 5**
- **Patient C had four specimens collected**
  - January 1 – urine culture with *E. coli* identified
  - January 2 – wound culture with *E. coli* identified
  - January 10 – lower respiratory culture with *E. coli* identified
  - February 3 – urine culture with *E. coli* identified
- **AST was performed on all isolates**

Non-invasive specimen de-duplication example: Patient C

Date	Lab Result	Reported to NHSN?	Justification
January 1	*E. coli* isolated from urine culture	**Yes**	• Patient B's first specimen from non-invasive source (urine culture) of admission • *E. coli* is isolated • **Reportable AR Event**
January 2	*E. coli* isolated from wound culture		
January 10	*E. coli* isolated from lower respiratory culture		
February 3	*E. coli* isolated from urine culture		

Non-invasive specimen de-duplication example: Patient C

Date	Lab Result	Reported to NHSN?	Justification
January 1	*E. coli* isolated from urine culture	**Yes**	• Patient B's first specimen from non-invasive source (urine culture) of admission • *E. coli* is isolated • **Reportable AR Event**
January 2	*E. coli* isolated from wound culture	No	• Only 1 AR Event from non-invasive source per organism per month reportable
January 10	*E. coli* isolated from lower respiratory culture		
February 3	*E. coli* isolated from urine culture		

Non-invasive specimen de-duplication example: Patient C

Date	Lab Result	Reported to NHSN?	Justification
January 1	*E. coli* isolated from urine culture	**Yes**	• Patient B's first specimen from non-invasive source (urine culture) of admission • *E. coli* is isolated • **Reportable AR Event**
January 2	*E. coli* isolated from wound culture	No	• Only 1 AR Event from non-invasive source per organism per month reportable
January 10	*E. coli* isolated from lower respiratory culture	No	• Only 1 AR Event from non-invasive source per organism per month reportable
February 3	*E. coli* isolated from urine culture		

Non-invasive specimen de-duplication example: Patient C

Date	Lab Result	Reported to NHSN?	Justification
January 1	*E. coli* isolated from urine culture	**Yes**	• Patient B's first specimen from non-invasive source (urine culture) of admission • *E. coli* is isolated • **Reportable AR Event**
January 2	*E. coli* isolated from wound culture	No	• Only 1 AR Event from non-invasive source per organism per month reportable
January 10	*E. coli* isolated from lower respiratory culture	No	• Only 1 AR Event from non-invasive source per organism per month reportable
February 3	*E. coli* isolated from urine culture	**Yes**	• Patient B's first specimen from non-invasive source (urine culture) of calendar month • **Reportable AR Event**

Non-invasive specimen de-duplication example: Patient C

Date	Lab Result	Reported to NHSN?	Justification
January 1 ❶	*E. coli* isolated from urine culture	**Yes**	• Patient B's first specimen from non-invasive source (urine culture) of admission • *E. coli* is isolated • **Reportable AR Event**
January 2	*E. coli* isolated from wound culture	No	• Only 1 AR Event from non-invasive source per organism per month reportable
January 10	*E. coli* isolated from lower respiratory culture	No	• Only 1 AR Event from non-invasive source per organism per month reportable
February 3 ❷	*E. coli* isolated from urine culture	**Yes**	• Patient B's first specimen from non-invasive source (urine culture) of calendar month • **Reportable AR Event**

Knowledge Check #4

Multiple choice: Which one statement is incorrect?

A. Blood specimens are in the invasive category and follow the 14-day de-duplication rule

B. Lower respiratory specimens are in the non-invasive category and follow the 1 per month de-duplication rule

C. Wound specimens are in the invasive category and follow the 14-day de-duplication rule

D. Musculoskeletal specimens are in the non-invasive category and follow the 1 per month de-duplication rule

Knowledge Check #4

Multiple choice: Which one statement is incorrect?

A. Blood specimens are in the invasive category and follow the 14-day de-duplication rule

B. Lower respiratory specimens are in the non-invasive category and follow the 1 per month de-duplication rule

C. Wound specimens are in the invasive category and follow the 14-day de-duplication rule

D. Musculoskeletal specimens are in the non-invasive category and follow the 1 per month de-duplication rule

C: Wound specimens are in the non-invasive category and follow the 1 per month de-duplication rule

Same day de-duplication is needed

- **In some cases, multiple isolates of the same organism from the same specimen source type may produce conflicting results**
- **Duplicate = same species or genus, when identification to the species level is not provided, isolated from the same source type (invasive or non-invasive) from the same patient on the same calendar day**
  - Use the same organism terms in NHSN pathogen value set (Snomed codes in Vendor IDM in the AR CDA Toolkit: https://www.cdc.gov/nhsn/cdaportal/toolkits.html)
- **Facilities should report one isolate to NHSN**
- **De-duplication rules apply**

Same day duplicate rules

- **Eliminate isolates without susceptibility testing results**
  - Only report isolates with complete/final laboratory testing
- **If two invasive isolates, select CSF over blood**
- **If two non-invasive isolates, select isolate based on the order specified: 1) lower respiratory, 2) urine, 3) skin, soft tissue, wound, and musculoskeletal**
- **Report the isolate with the higher amount of antimicrobial resistance**
  - If the lab did not provide a final summary interpretation, report the isolate with the higher amount of drug resistance based on the number of antimicrobials testing first “NS”, if equal amount of “NS” then move to the amount of “R”, then “I”, then “S-DD” then “S”

Same day specimen de-duplication example: Patient D

- **Patient D was admitted to Hospital ABC on January 1**
  - Patient D has not been seen at Hospital ABC before
- **Patient D was housed in the Medical ICU from January 1-20 and the Medical ward from January 20-February 5 and discharged on February 5**
- **Patient D had four specimens collected**
  - January 1 – blood culture with *K. pneumoniae* identified
  - January 1 – wound culture with *K. pneumoniae* identified
  - January 16 – blood culture with *K. pneumoniae* identified
  - January 16 – CSF culture with *K. pneumoniae* identified
- **AST was performed on all isolates**

Same day specimen de-duplication example: Patient D

Date	Lab Result	Reported to NHSN?	Justification
January 1	*K. pneumoniae* isolated from blood culture	**Yes**	• Patient C's first specimen from invasive source (blood culture) of admission • *K. pneumoniae* is isolated • **Reportable AR Event**
January 1	*K. pneumoniae* isolated from wound culture	**Yes**	• Patient C's first specimen from non-invasive source (wound culture) of admission • *K. pneumoniae* is isolated • **Reportable AR Event**
January 16	*K. pneumoniae* isolated from blood culture		
January 16	*K. pneumoniae* isolated from CSF culture		

Same day specimen de-duplication example: Patient D

Date	Lab Result	Reported to NHSN?	Justification
January 1	*K. pneumoniae* isolated from blood culture	**Yes**	• Patient C's first specimen from invasive source (blood culture) of admission • *K. pneumoniae* is isolated • **Reportable AR Event**
January 1	*K. pneumoniae* isolated from wound culture	**Yes**	• Patient C's first specimen from non-invasive source (wound culture) of admission • *K. pneumoniae* is isolated • **Reportable AR Event**
January 16	*K. pneumoniae* isolated from blood culture	No	• Another invasive isolate (CSF) of *K. pneumoniae* on this same day. CSF reported over blood.
January 16	*K. pneumoniae* isolated from CSF culture	**Yes**	• CSF reported over blood. • >14 days since last positive culture (Jan 1) from invasive source of *K. pneumoniae* • **Reportable AR Event**

Same day specimen de-duplication example: Patient D

Date	Lab Result	Reported to NHSN?	Justification
January 1 ❶	*K. pneumoniae* isolated from blood culture	**Yes**	• Patient C's first specimen from invasive source (blood culture) of admission • *K. pneumoniae* is isolated • **Reportable AR Event**
January 1 ❷	*K. pneumoniae* isolated from wound culture	**Yes**	• Patient C's first specimen from non-invasive source (wound culture) of admission • *K. pneumoniae* is isolated • **Reportable AR Event**
January 16	*K. pneumoniae* isolated from blood culture	No	• Another invasive isolate (CSF) of *K. pneumoniae* on this same day. CSF reported over blood.
January 16 ❸	*K. pneumoniae* isolated from CSF culture	**Yes**	• CSF reported over blood. • >14 days since last positive culture (Jan 1) from invasive source of *K. pneumoniae* • **Reportable AR Event**

Knowledge Check #5

Background: Two specimens, CSF (invasive) and soft tissue (non-invasive), isolated *A. baumannii* collected from the patient on the same calendar day.

True/False: These isolates are considered duplicates and only 1 should be reported to NHSN.

- True
- False

Knowledge Check #5

Background: Two specimens, CSF (invasive) and soft tissue (non-invasive), isolated *A. baumannii* collected from the patient on the same calendar day.

True/False: These isolates are considered duplicates and only 1 should be reported to NHSN.

- True
- **False**

- **False: If two specimens are from alternate specimen categories (invasive and non-invasive) they are considered unique events and can be reported to NHSN.**

AR Summary (aka AR Denominator)

Two AR Summary file types

- **Facility-wide inpatient (aka FacWideIN)**
  - 1 file submitted per facility per month
  - Patient days and admissions for all inpatient units combined
- **Outpatient locations**
  - 1 file submitted for each eligible outpatient location (specifically, ED, pediatric ED, 24hr observation)
  - Outpatient encounters for the given unit/location

Denominators reported for FacWideIN

- **Patient days: number of patients present in the inpatient locations of the facility at the same time on each day of the month, summed across all days of the month**
- **Admissions: number of patients admitted to an inpatient location in the facility each month**
  - Patient counts when the arrive in an inpatient location regardless of patient status (for example, inpatient, observation)
  - Patient counted as an admission even if they were discharged that same day
  - Note: AR Option admissions definition is different than the definition used in the NHSN MDRO/CDI Module

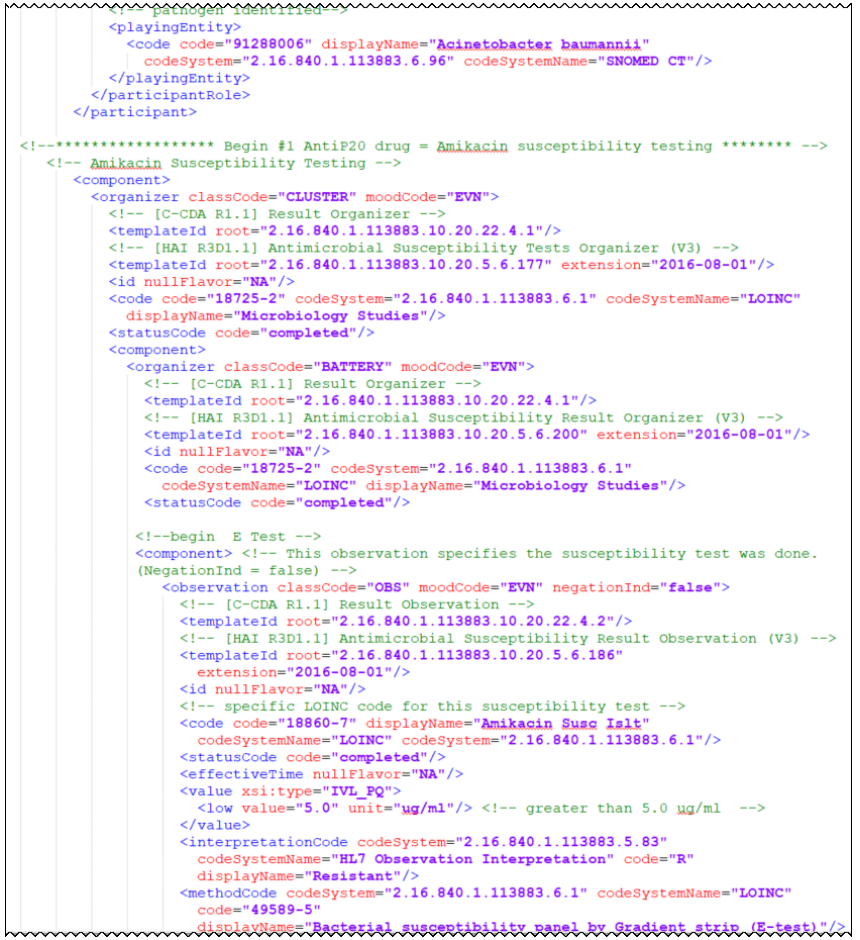
Denominator reported for outpatient locations

- **Encounters: a visit to an eligible outpatient location counts as a single encounter**
  - Patient can contribute an encounter as soon as they've had initial interaction with a medical professional (for example, beginning of triage)
  - Patient can contribute an encounter regardless of whether they are placed in a bed
  - If the patient is transferred from one eligible outpatient location to another within the same facility, the patient is counted as 1 encounter for the first outpatient location and 0 encounters for the receiving outpatient location
  - If the patient is discharged, or leaves, then returns on the same calendar day, the patient should be counted as 2 encounters

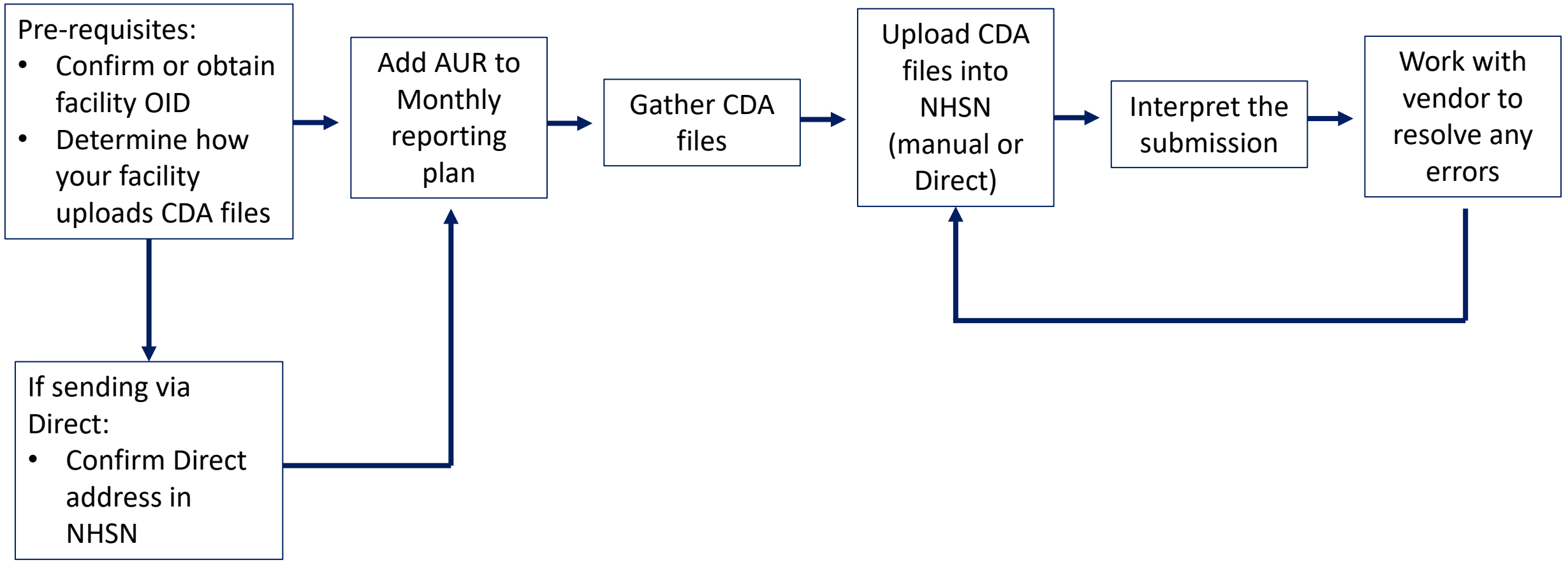
How to report AR Option data to NHSN

AR Option data must be submitted using CDA files

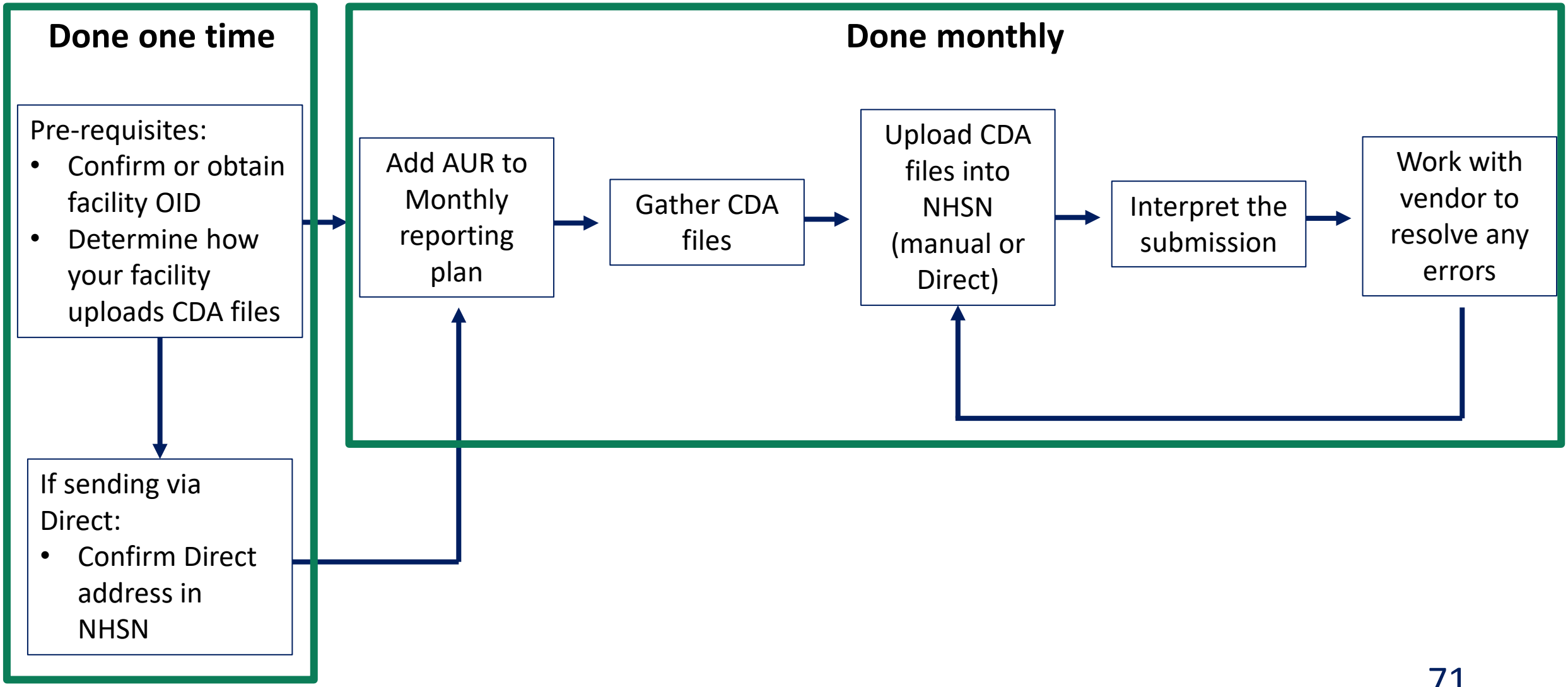
- **AR Option data cannot be manually hand typed into NHSN**
- **CDA ≠ CSV (Excel)**
- **Most facilities use commercial software vendors**
  - Hospitals participating in the Medicare Promoting Interoperability Program must use certified electronic health record technology to meet Assistant Secretary for Technology Policy (ASTP) requirements: https://chpl.healthit.gov
  - All hospitals must use software that has met NHSN validation standards: https://www.cdc.gov/nhsn/cdaportal/sds/ar-vendor-list.html



Steps for reporting AR data

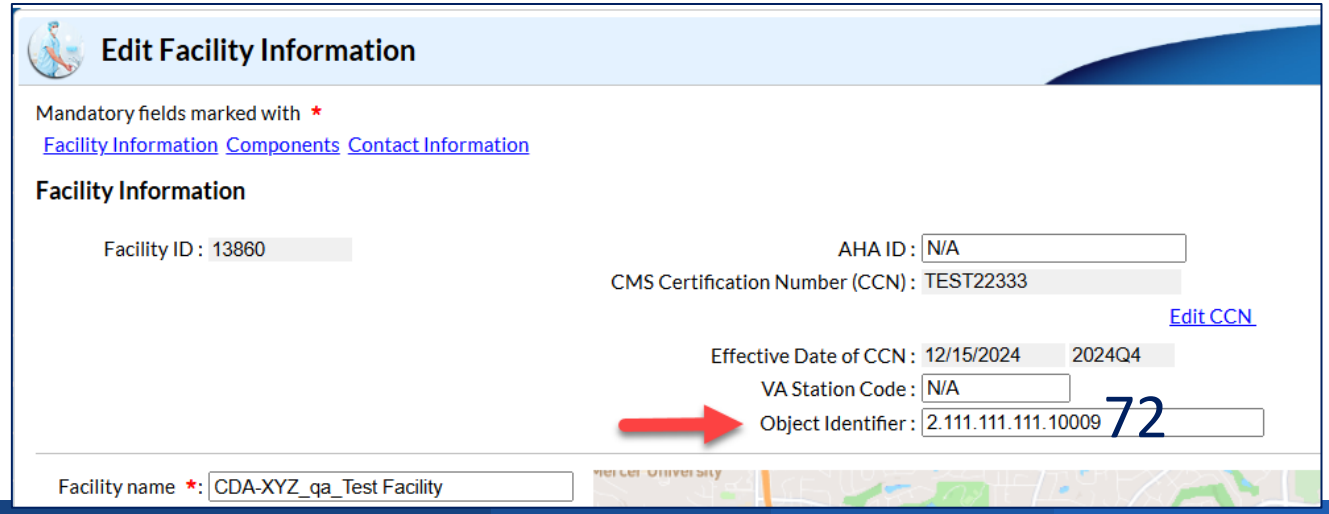


Steps for reporting AR data



Prerequisite 1: Confirm facility OID

- **Each NHSN facility should have its own unique facility object identifier (OID)**
  - Different than the five digit NHSN orgID
- **If your facility uploads CDA files for other NHSN reporting, you already have an OID**
- **Check in NHSN (may need NHSN Facility Administrator to help)**
  - Click Facility then Facility Info
  - Look to see if OID field is populated



Prerequisite 1.5: Obtain a facility OID

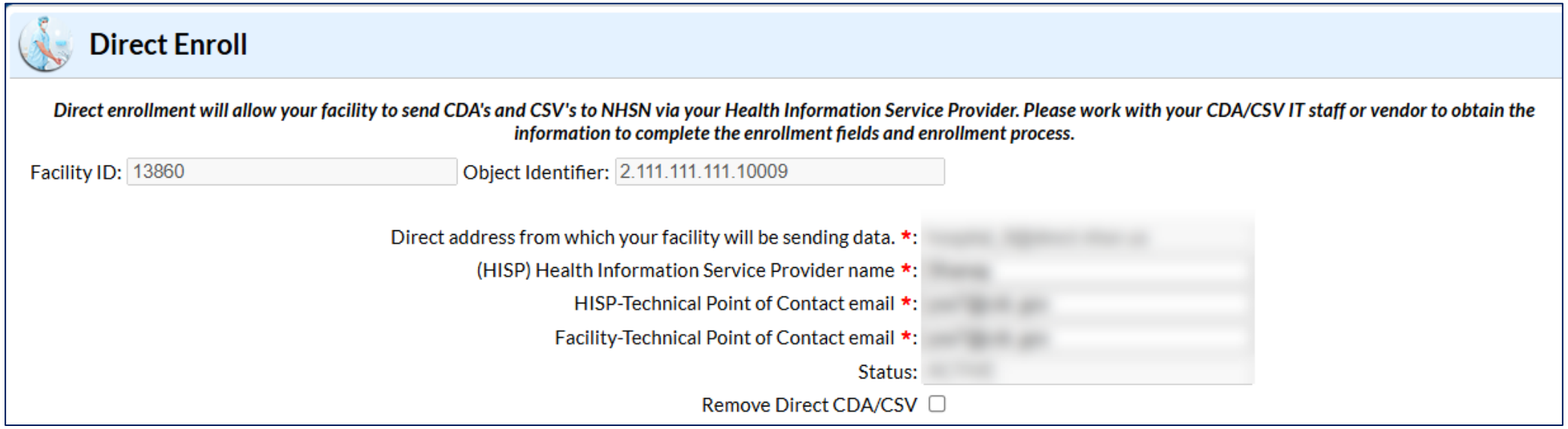
1. **Email phintech@cdc.gov with the following subject line and text:**
   - Subject Line: OID Request
   - Body of email: Please provide a facility OID for < Facility Name>.
     - Facility name:
     - Facility address, city, state and zip
2. **In response to your email, you will receive an email that will include the OID assigned to your facility**
3. **To enter the OID into the NHSN application, log into NHSN**
   - Select “Facility” from the left navigation page.
   - Select “Facility Info” from the menu.
   - Enter the OID into the object identifier field
   - Scroll down to the bottom of the screen and click Update
4. **Provide OID to vendor and/or enter into vendor software**

Prerequisite 2: Determine how you upload your files

- **Manual upload into NHSN**
  - Logging into NHSN then uploading the AR CDA files
- **Send via Direct CDA Automation**
  - Many vendors offer “Direct Send”
  - Vendor system establishes a connection with NHSN via Health Information Service Provider (HISP)
  - Pushing a button(s) in vendor system sends CDA files to NHSN via the HISP connection
  - No need to log into NHSN to perform the upload

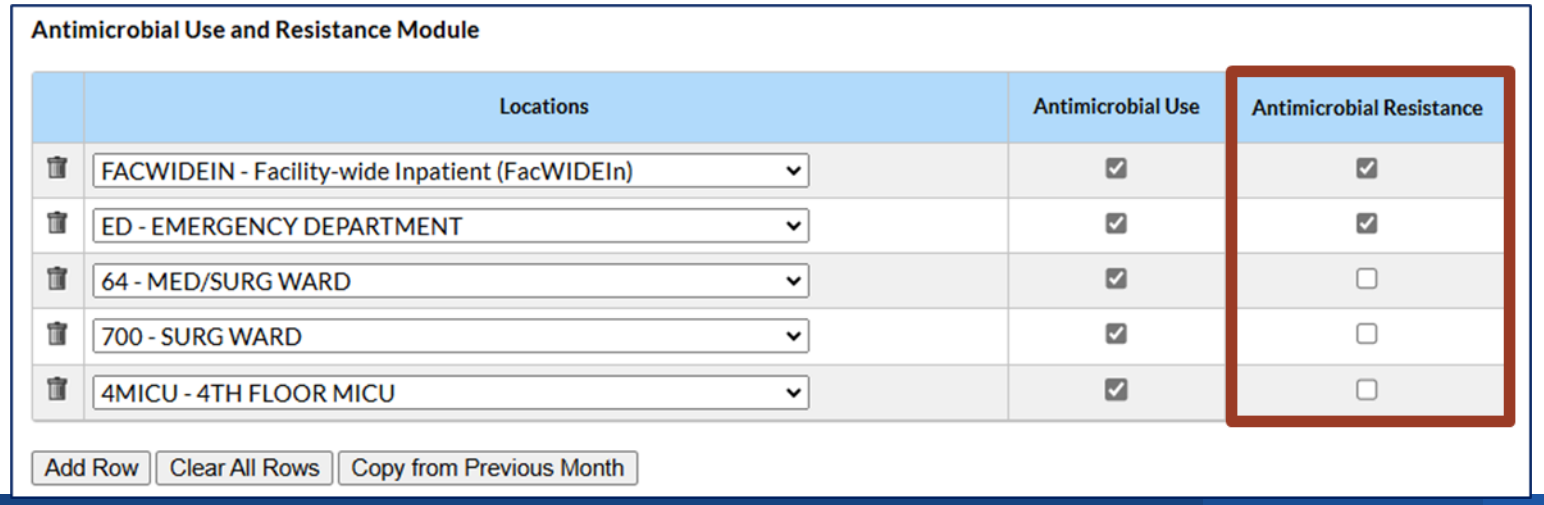
Prerequisite 2.5: Confirm your Direct address is in NHSN

- After logging into NHSN click Facility then Direct Enroll
- Confirm information is present and correct
- If Direct information is missing and your vendor supports submission of CDAs in that way, reach out to them to obtain the information needed



Step 1: Add AUR to Monthly Reporting Plan

- **AUR Module section is included with the HAI sections to make up the Patient Safety Component monthly reporting plan**
- **Add locations to NHSN 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

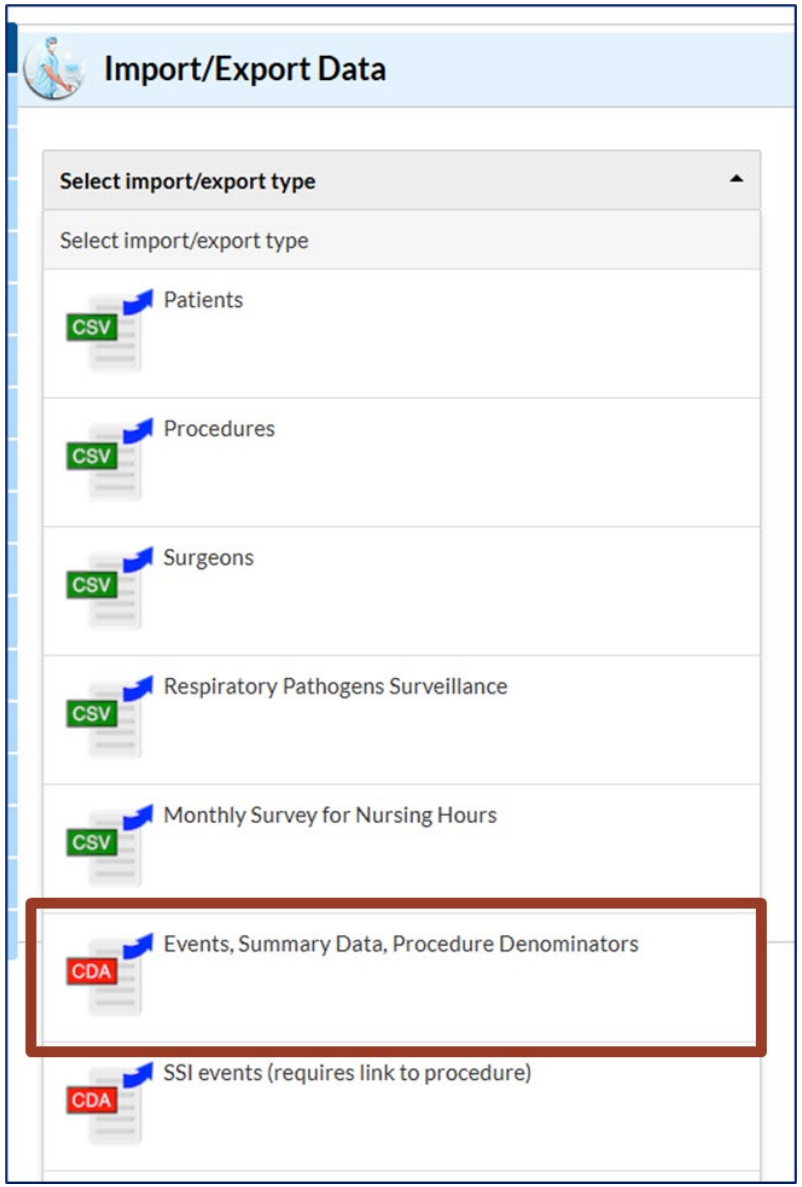


Step 2: Gather the CDA files

- **Locate the AR Option CDA files within your vendor software**
  - AR Events
    - Each AR Event is a single CDA file
    - Likely have many AR Events to report each month
  - AR Summary records for FacWideIN and any eligible outpatient location
    - Likely have between 1-4 AR Summary records each month depending on how many eligible outpatient locations you have
- **Upload the files as packaged by your vendor system**
  - Events and summaries together or in separate zip files
  - Maximum: 1000 CDA files or file size of 2 MB per file (whichever comes first)

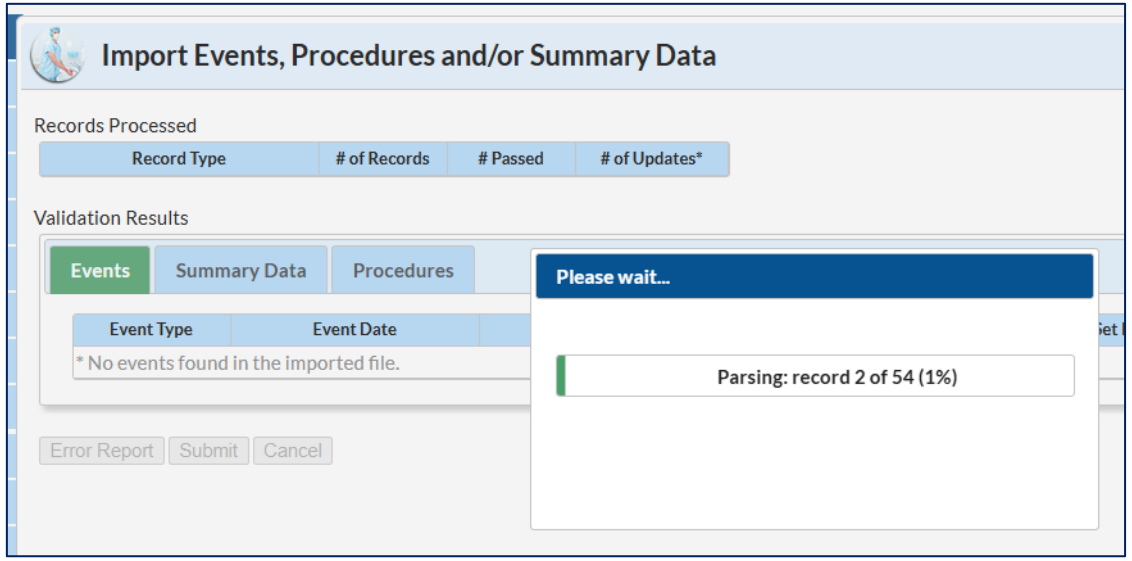
Step 3a: Upload CDA files into NHSN

- **Manual Upload**
  - After exporting the required AR files from the vendor software, log into your NHSN facility
  - **Click** Import/Export then click either:
    - Events, Summary Data, Procedure Denominators
    - or
    - AR Events, AU and AR Summary data
  - **Click** Choose File
    - Select 1 zip file per upload from where you saved the files exported from the vendor system
    - Click Open to attach the specified zip file
  - **Click** Submit



Step 3a: Upload CDA files into NHSN (continued)

- **After clicking the Submit button, NHSN checks that the files do not contain errors**
  - Records will be grouped into passing and failing
  - Records are not yet submitted into NHSN
- **If at least one file passed validation, click the Submit button again to upload the file(s) into NHSN**
- **If no files pass validation, click the Error Report button to open a PDF with error messages associated with your files**

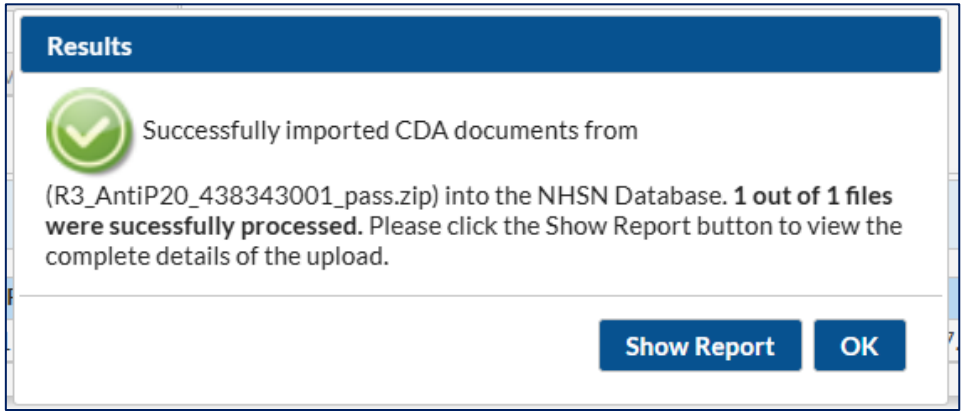


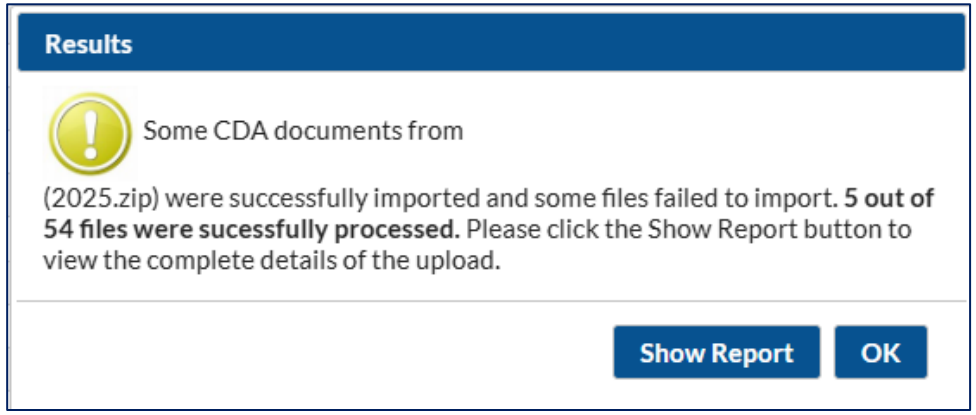
3b: Direct upload of files into NHSN

- **Click the button(s) to send the AR CDA files as outlined by your vendor**
- **Note: Direct submission is not an instant submission**
  - Files sent via direct enter a queue for processing
  - Higher volume of CDA files to process around CMS HAI reporting deadlines
  - Allow up to 48 hours for the files to process into NHSN
- **If connection between vendor software & NHSN is established, NHSN will return results of upload back to the vendor system**
  - **Work with your vendor to determine where you can see the results of your submission**

Step 4: Interpreting the submission

- **NHSN provides feedback on the file submission**
- **ALWAYS click Show Report to generate the PDF submission report (when manually uploading)**
  - Save this PDF as proof of your upload
  - Review this PDF to ensure all files were uploaded successfully
  - Send this PDF to NHSN for troubleshooting if needed





Knowledge Check #6

Multiple Choice: Which are important points to remember when uploading CDA files?

A. Have patience
B. Be sure to upload AR Events AND AR Summary records
C. Open and save the PDF report
D. Read the PDF report to see which files successfully uploaded and which failed to upload
E. All of the above

Knowledge Check #6

Multiple Choice: Which are important points to remember when uploading CDA files?

A. Have patience
B. Be sure to upload AR Events AND AR Summary records
C. Open and save the PDF report
D. Read the PDF report to see which files successfully uploaded and which failed to upload
E. All of the above

E. All the above are important points to remember when uploading files

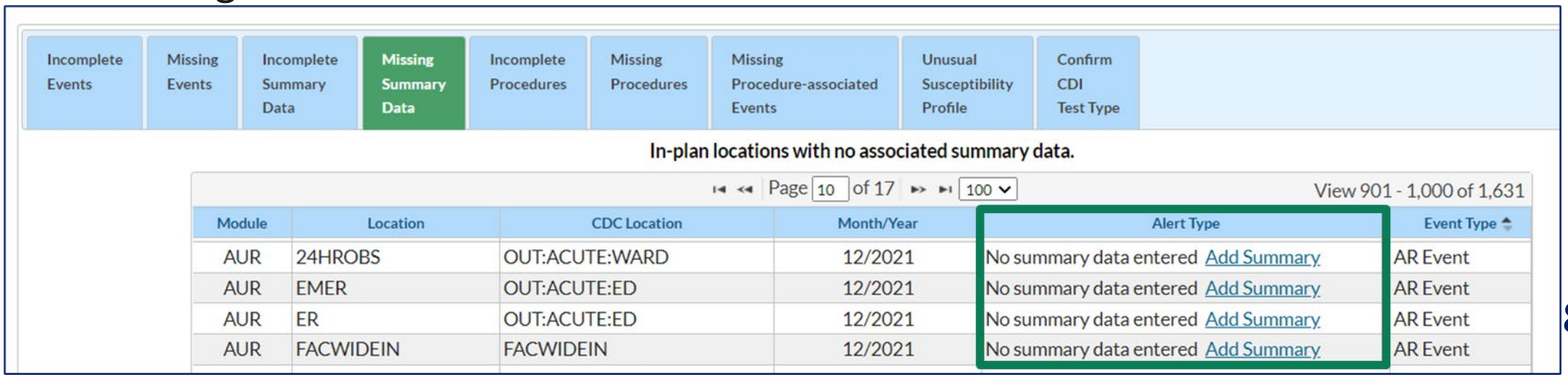
Uploading resources

- **How to upload CDA files: https://www.youtube.com/watch?v=T4DLtimpB5M**
- **Common Data Import Issues & Questions**
  - Recording: https://www.youtube.com/watch?v=65UjfmLRlMI
  - Slides: https://www.cdc.gov/nhsn/pdfs/training/D2_AUR-Module-Common-Data-Import-Issues-and-Questions_2024_508c.pdf

NHSN Alerts

Monthly Reporting Plan and alerts

- **Facilities add AR to their NHSN Monthly Reporting Plans**
- **Then upload AR data**
  - All locations listed in the Monthly Reporting Plan included in the upload?
    - Yes: no missing summary data alerts are generated
    - No: missing summary data alerts and/or missing event alerts are generated

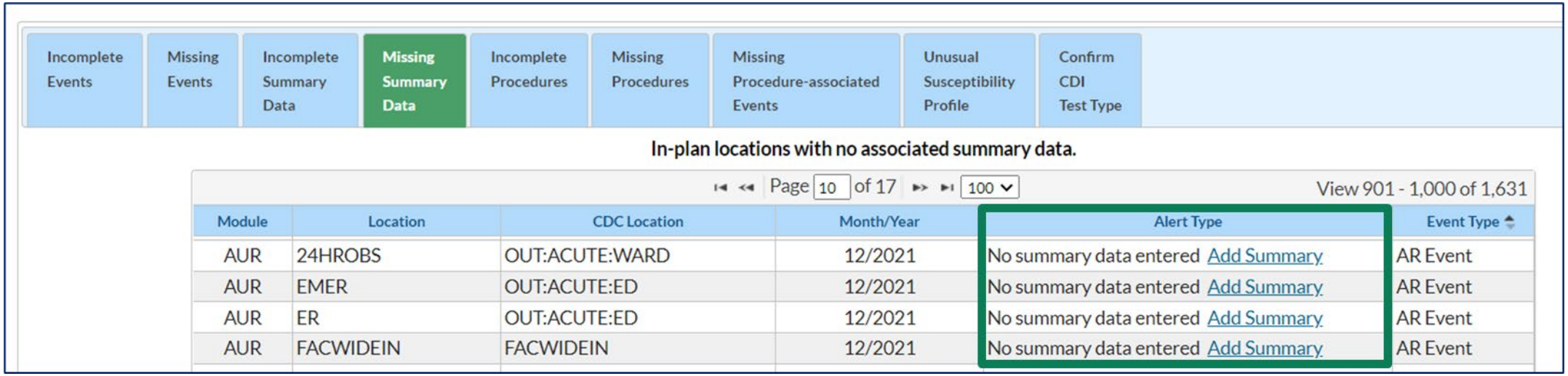


Clear alerts by uploading data

- **Why do I have missing data?**
  - Zip file may not have included all location types or data types
  - Individual files may have failed and you didn’t notice during upload
- **Try the upload again**
  - Pay attention to the number of files in the .zip and whether any fail
- **Work with your vendor representative**
  - Find missing files
  - Resolve errors in files
- **Try the upload again**
- **Goal is to have zero missing data alerts**

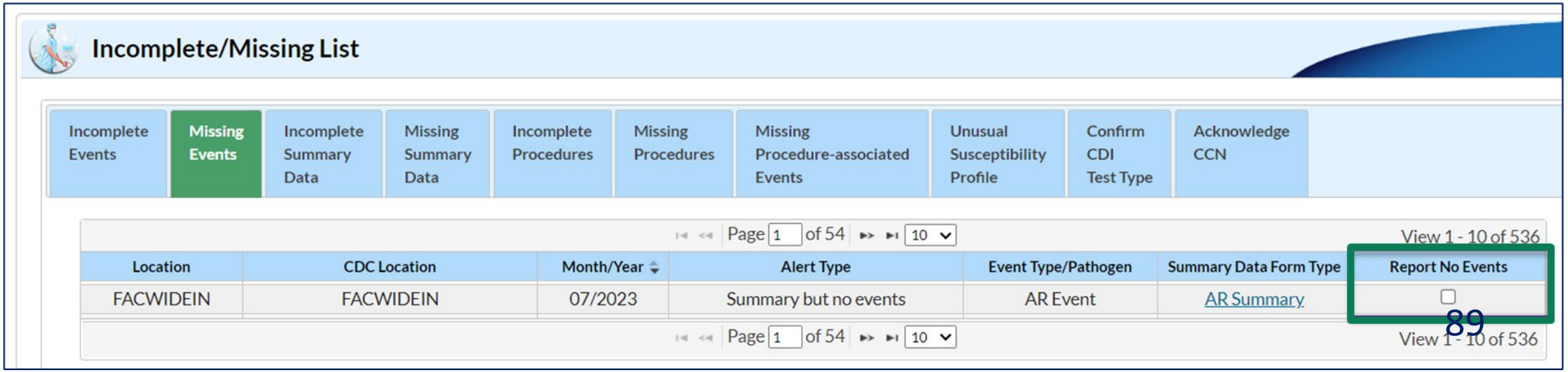
Alerts for missing AR Summary data

- **Each facility should have at least 1 AR Summary record per month for FacWideIN**
  - May have additional files for eligible outpatient locations
- **Locate the file(s) within your vendor system and try the upload again**



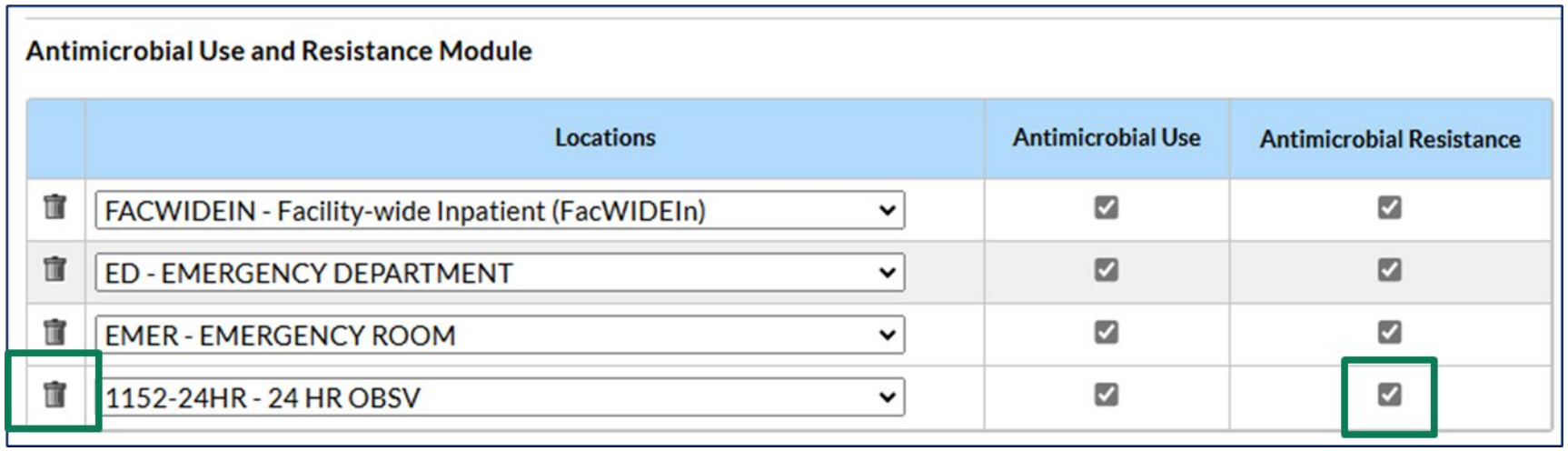
Alerts for missing AR Event data

- **Do you have isolates that qualify as AR Events?**
  - Yes: find & upload them
  - No: click the “Report No Events” box
    - https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/AR-QRG-NoEvents-508.pdf



Clear alerts by updating reporting plan

- **In some circumstances, you may not be able to report data for a location in your reporting plan**
  - E.g., cannot accurately capture numerator or denominator data
- **Remove that location from the reporting plan**
  - Click the garbage can icon to remove a whole row
  - Uncheck the box to remove AR reporting for a location



Knowledge Check #7

Multiple Choice: What steps can I take to clear Missing AR Event alerts?

A. Re-upload that month of AR data, perhaps something went wrong with the submission
B. Click the “Report No Events” box in the rare case where no isolates met NHSN AR Event criteria
C. Review the saved PDF report for that month’s submission to determine what errors were in my files. Then work with my vendor to fix those issues and re-submit.
D. All of the above

Knowledge Check #7

Multiple Choice: What steps can I take to clear Missing AR Event alerts?

A. Re-upload that month of AR data, perhaps something went wrong with the submission

B. Click the “Report No Events” box in the rare case where no isolates met NHSN AR Event criteria

C. Review the saved PDF report for that month’s submission to determine what errors were in my files. Then work with my vendor to fix those issues and re-submit.

D. All of the above

D. All the above steps could be taken to clear Missing AR Event alerts.

Finding & Deleting AR Data from NHSN

After successful uploads, review data

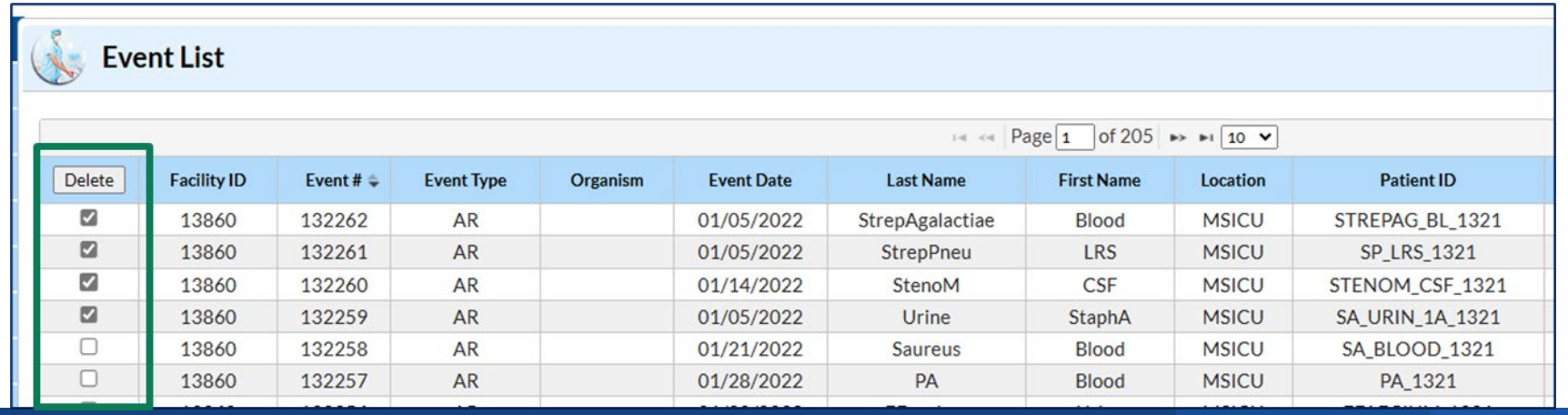
- **All AR Event and AR Summary information can be found in the Analysis section of NHSN**
  - Click Analysis then click Generate Data Sets
  - Always generate new data sets to ensure the most recently uploaded data is included in the analysis reports
  - See Analysis trainings for more information: https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html
- **Some AR Event information can be found on Event screen**
  - Click Event then Find
  - On the Find Event page, select AR – Antimicrobial Resistance as the Event Type and click Find to see the list

You may need to delete AR data

- **Many reasons you may need to delete AR event and/or summary data from NHSN**
  - Data were determined to be incorrect/incomplete during facility validation
  - Erroneous events were uploaded incorrectly
  - Data need to be updated
  - Issues in the data were identified by NHSN AUR Team
  - Issues with software were identified by vendor
- **Re-uploading a corrected file or zip can replace existing records and potentially add new records**
  - Will not delete records that should not have been uploaded originally
  - May need to manually delete entire month if too time consuming to determine which erroneous event(s) need to be deleted

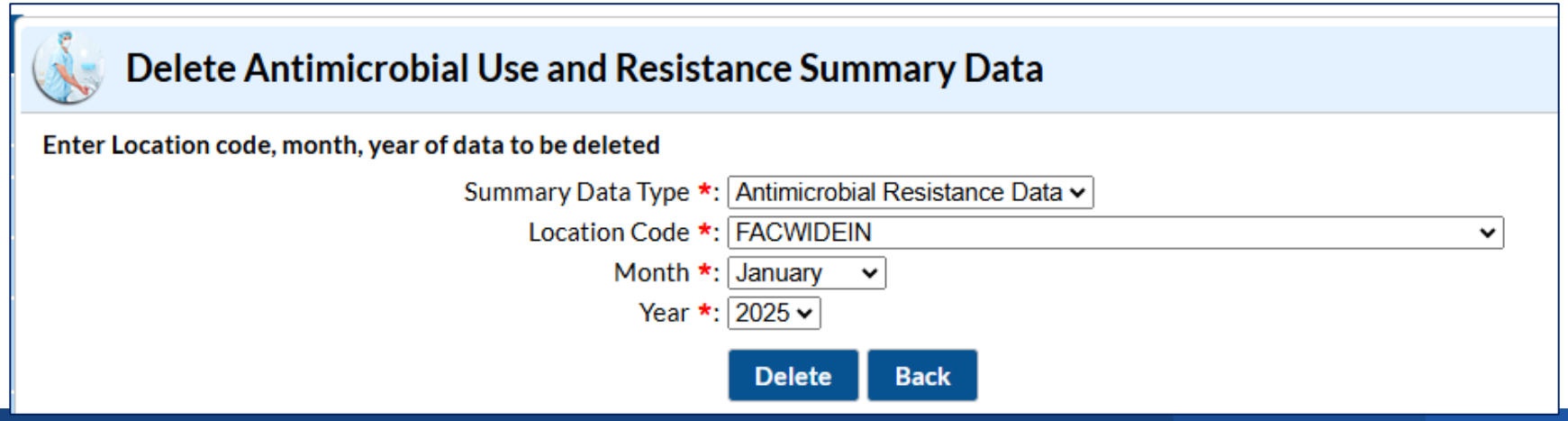
Delete AR Event data from the Event screen

- **Click Event then Find**
- **On the Find Event page, select AR – Antimicrobial Resistance as the Event Type and click Find to see the list**
  - May be helpful to limit your list by including date range or patientID
- **Locate the event(s) you need to delete on the list**
- **Click the check box in the Delete column next to each event you'd like to delete**
- **Click the Delete button and click OK on the pop up asking for confirmation**



Delete AR Summary data from the Summary Data screen

- **Click Summary Data then click Delete AUR Data**
- **Select Antimicrobial Resistance Data as the Summary Data Type**
- **FacWideIN will default as the Location Code**
  - Update to an outpatient location as needed
- **Select the month and year to delete**
- **Click Delete and click OK on the pop up asking for confirmation**



Remember to re-upload corrected AR files

- **After original records have been deleted, remember to upload the corrected event and/or summary files for complete reporting**
  - If you delete a whole month's worth of data and do not reupload, the Missing Data Alerts will be generated again

Resources and Questions

AUR Module webpage

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

AR Option trainings

- **Many more AR Option trainings available:**
  https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html
  - Basic AR analysis
  - Antibiogram
  - AR Option Standardized Resistant Infection Ratio (SRIR) and Pathogen-specific Standardized Infection Ratio (pSIR)
  - Incidence & Prevalence Reports
  - AUR Module Data Quality Validation
  - AUR Module Value Set Resources
  - NHSN Group Function for Antimicrobial Use and Resistance

Reminders

- **Email NHSN@cdc.gov or open a ServiceNow ticket**
- **If emailing about an AR file that's failing to upload, please include the PDF or, at minimum, a screenshot of the error message(s)**

- **Reminder: if asked to send your AR CDA files, please be sure to send any AR Events via secure email to NHSNCDA@cdc.gov**
  - If your facility doesn't have the ability to send secure emails, please reach out to NHSNCDA@cdc.gov and we can provide alternate instructions

For NHSN questions or concerns related to the Annual Training

Post questions in the Annual Training Community

After June 10th, please submit questions to the NHSN Help Desk.

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

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