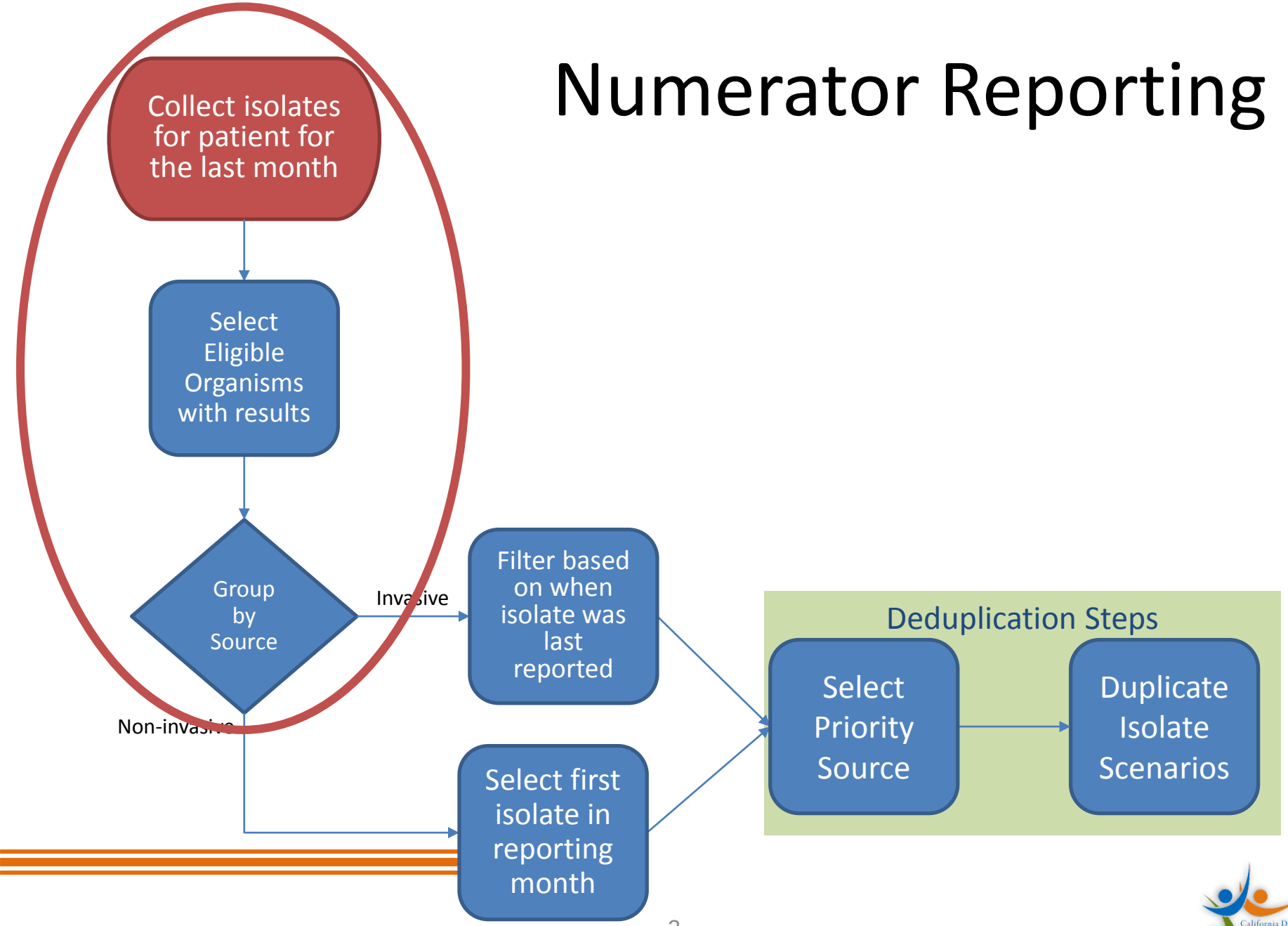
AR Reporting: Rules for an Isolate

CALCULATION WALKTHROUGH

California Department of PublicHealth

Numerator Reporting



California Department of PublicHealth

Eligible Organisms

- Full List: Appendix A, NHSN AUR Guide
- Antimicrobials required for resistance testing

Organism	Specimen Type	Antimicrobial Agents
Acinetobacter (All *Acinetobacter* 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 Doxcycline Gentamicin Imipenem with Cilastatin Levofloxacin Meropenem Minocycline Piperacillin Piperacillin-tazobactam Tetracycline Ticarcillin-clavulanate Tobramycin Trimethoprim-sulfamethoxazole
	Additional Agents for Urine	None

Eligible Isolates

- Report all required data each month for each eligible isolate-based report
- Inpatient or specific outpatient locations (i.e., ED, pediatric ED, and 24-hour observation)
- Regardless of antimicrobial resistance
  - susceptible to all required antimicrobials

Lab Reporting Guidelines

- Interpretation of test results (i.e., E-test, MIC test, Disk diffusion [KB] test):
  - S = Susceptible
  - S-DD = Susceptible-Dose Dependent
  - I = Intermediate
  - R = Resistant
  - NS = Non-Susceptible
  - N = Not Tested
- Specific to Gentamicin and Streptomycin results for Enterococcus testing:
  - S = Susceptible/Synergistic
  - R = Resistant/Not Synergistic
- Facilities should only report final or corrected susceptibility testing.

Electronic Calculation Requirement

- Facilities should not employ manual data collection to report AR.
- Facilities that cannot electronically obtain the results of the individual laboratory tests should:
  - Use ‘Unknown’ or ‘Not Tested’
  - Provide the final interpretation result

Specimen Types

- Two distinct sources are reported:
  - Invasive Specimen: Blood or cerebrospinal fluid
  - Non-Invasive Specimen: Lower respiratory or urine
- Different sources, different “AR Events”

Reporting Rules for Specimen Sources

- Invasive Sources

  Each eligible organism isolated from an invasive source (i.e., blood or CSF) per patient, per 14-day period, across calendar months

- Non-Invasive Sources

  First eligible organism isolated from an eligible non-invasive culture source (i.e., lower respiratory or urine), per patient, per month

Reporting for Non-Required Drugs

- Isolate is eligible for reporting if:
  - All of the *NHSN required* antimicrobials were not tested
  - At least one non-required drug is eligible
- Example:
  - Oritavancin is not a required antimicrobial for the *Staphlococcus aureus* isolate
  - None of the 23 required antimicrobials were tested
  - Isolate is still considered eligible for reporting

Reporting for Non-Required Drugs

- For such an isolate, the facility will:
  - Report the specimen.
  - Report “Not Tested” for all required drugs.
  - Exclude the susceptibility information for Oritavancin because it not in the drug panel for that organism.

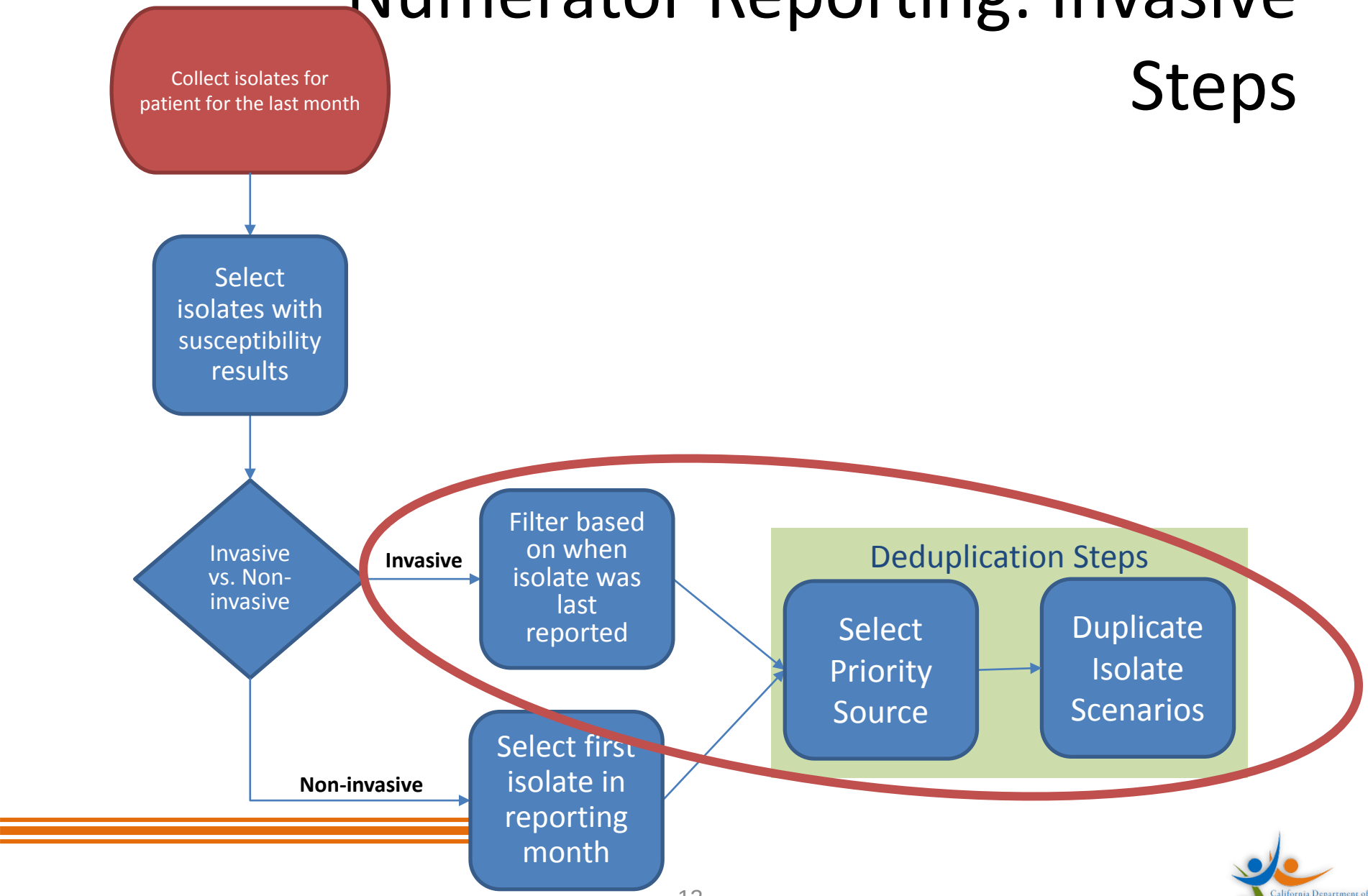
Thank You

- Invasive Steps
- Non-Invasive Steps
- Deduplication
- Full Overview

AR Reporting: Rules for reporting an Isolate from an invasive source

CALCULATION WALKTHROUGH

Numerator Reporting: Invasive Steps



California Department of PublicHealth

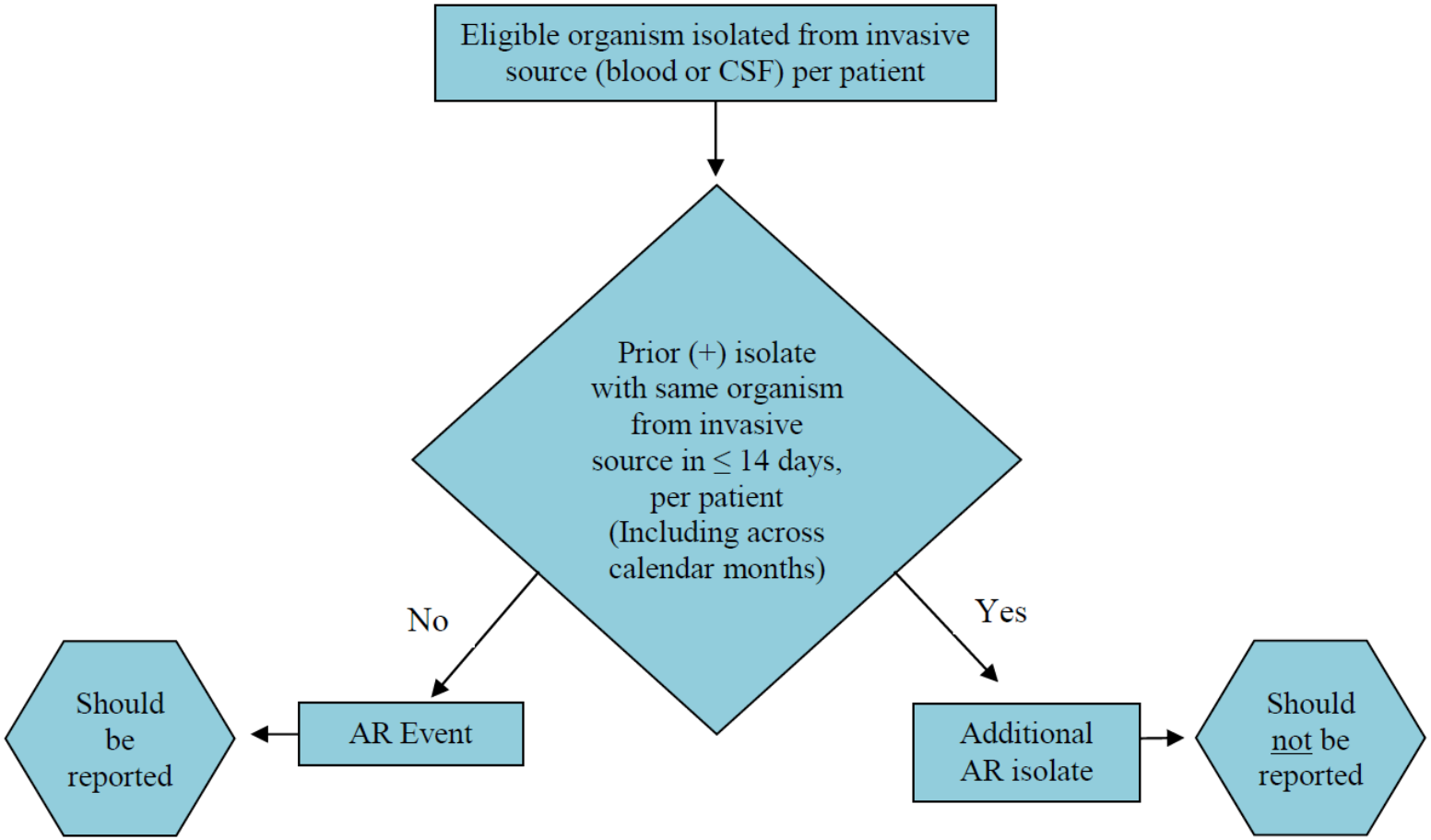
Invasive Specimen Reporting

- Record an AR Event for:
  - Each eligible organism isolated from an invasive source (i.e., blood or CSF)
  - Per patient
  - Per 14-day period
  - Across Calendar Months
- The 14-day Rule for Invasive Specimens:
  - Record an AR Event after 14 days with no positive culture result from the laboratory if the patient and specific organism pass.

14 Day Rule

- Additional Guidance for the 14 day Rule:
  - Count starts on the day of specimen collection
  - Only applies to those specimens from an inpatient location or select outpatient location (i.e., ED, pediatric ED, or 24-hour observation area)
  - Exclude cultures from other healthcare facilities
- At a maximum, there will be no more than three invasive isolates per specific organism per patient per month.

Algorithm for Invasive Specimen



Walkthrough: 14 Day Rule

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffu			Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum concentra			Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Inte			**Final Interpretation**	**Susceptible**
2018-02-24	CSF	Chloramphenicol	E-test	Susceptible	vofloxacin	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Susceptible**
2018-03-16	Blood	Minocycline	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml Resistant
			Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Resistant**

Apply 14 day rule when sources are invasive

Walkthrough: 14 Day Rule

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test		eftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diff			Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum concentration (MIC)			Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Resistant**		**Final Interpretation**	**Susceptible**
2018-02-24	CSF	Chloramphenicol	E-test	Less than 0.1 ug/ml Susceptible	Levofloxacin	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Susceptible**
2018-03-16	Blood	Minocycline	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml Resistant
			Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Resistant**

Report to NHSN

This is the first blood culture collected for this patient

Walkthrough: 14 Day Rule

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Susceptible**
2018-02-24	CSF	Chloramphenicol	E-test		evofloxacin	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)			Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)			Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Susceptible**
2018-03-16	Blood	Minocycline	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml Resistant
			Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Resistant**

Do not report to NHSN

It has been less than 14 days since the last positive culture (Feb/20)

Walkthrough: 14 Day Rule

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum inhibitory concentration (MIC	N/A		Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Resistant**		**Final Interpretation**	**Susceptible**
2018-02-24	CSF	Chloramphenicol	E-test	Less than 0.1 ug/ml Susceptible	Levofloxacin	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Int			**Final Interpretation**	**Susceptible**
2018-03-16	Blood	Minocycline	E-test		Ceftazidime	E-test	Greater than 5.0 ug/ml Resistant
			Disk Diff			Disk Diffusion (KB)	N/A
			Mini mu concentration (MIC)	0.1 ug/ml Susceptible		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Resistant**

Report to NHSN

It has been more than 14 days since the last positive culture (Feb/24)

Walkthrough: 14 Day Rule Data Reported

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum inhibitory concentration (MIC	N/A		Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Resistant**		**Final Interpretation**	**Susceptible**
~~2018-02-24~~	~~CSF~~	~~Chloramphenicol~~	~~E-test~~	~~Less than 0.1 ug/ml Susceptible~~	~~Levofloxacin~~	~~E-test~~	~~Less than 0.1 ug/ml Susceptible~~
			~~Disk Diffusion (KB)~~	~~N/A~~		~~Disk Diffusion (KB)~~	~~N/A~~
			~~Minimum inhibitory concentration (MIC)~~	~~N/A~~		~~Minimum inhibitory concentration (MIC)~~	~~N/A~~
			~~**Final Interpretation**~~	~~**Susceptible**~~		~~**Final Interpretation**~~	~~**Susceptible**~~
2018-03-16	Blood	Minocycline	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml Resistant
			Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Resistant**

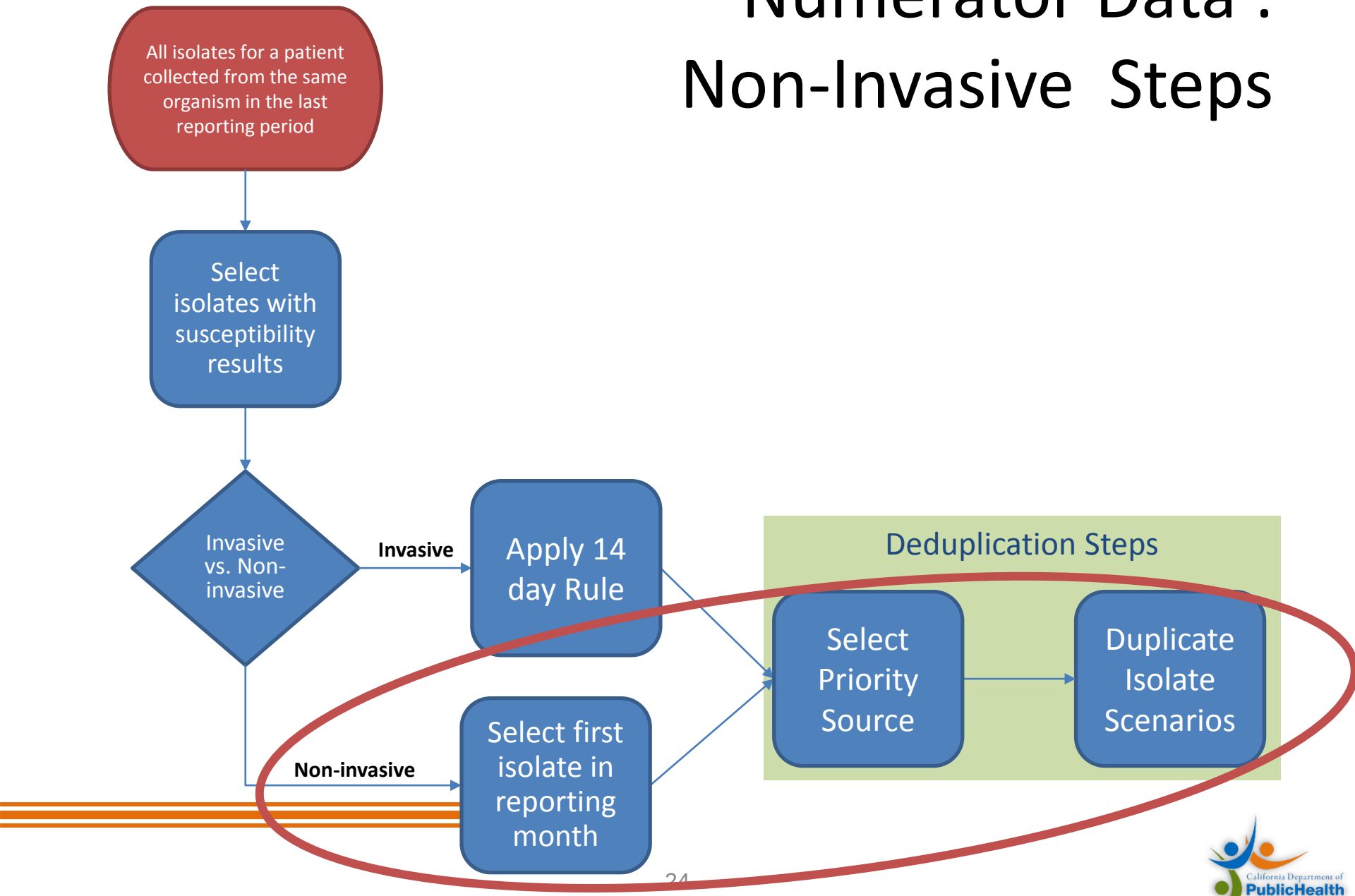
Thank You

- Selecting Isolates
- Non-Invasive Steps
- Deduplication
- Full Overview

AR Reporting: Rules for reporting an Isolate from a non-invasive source

CALCULATION WALKTHROUGH

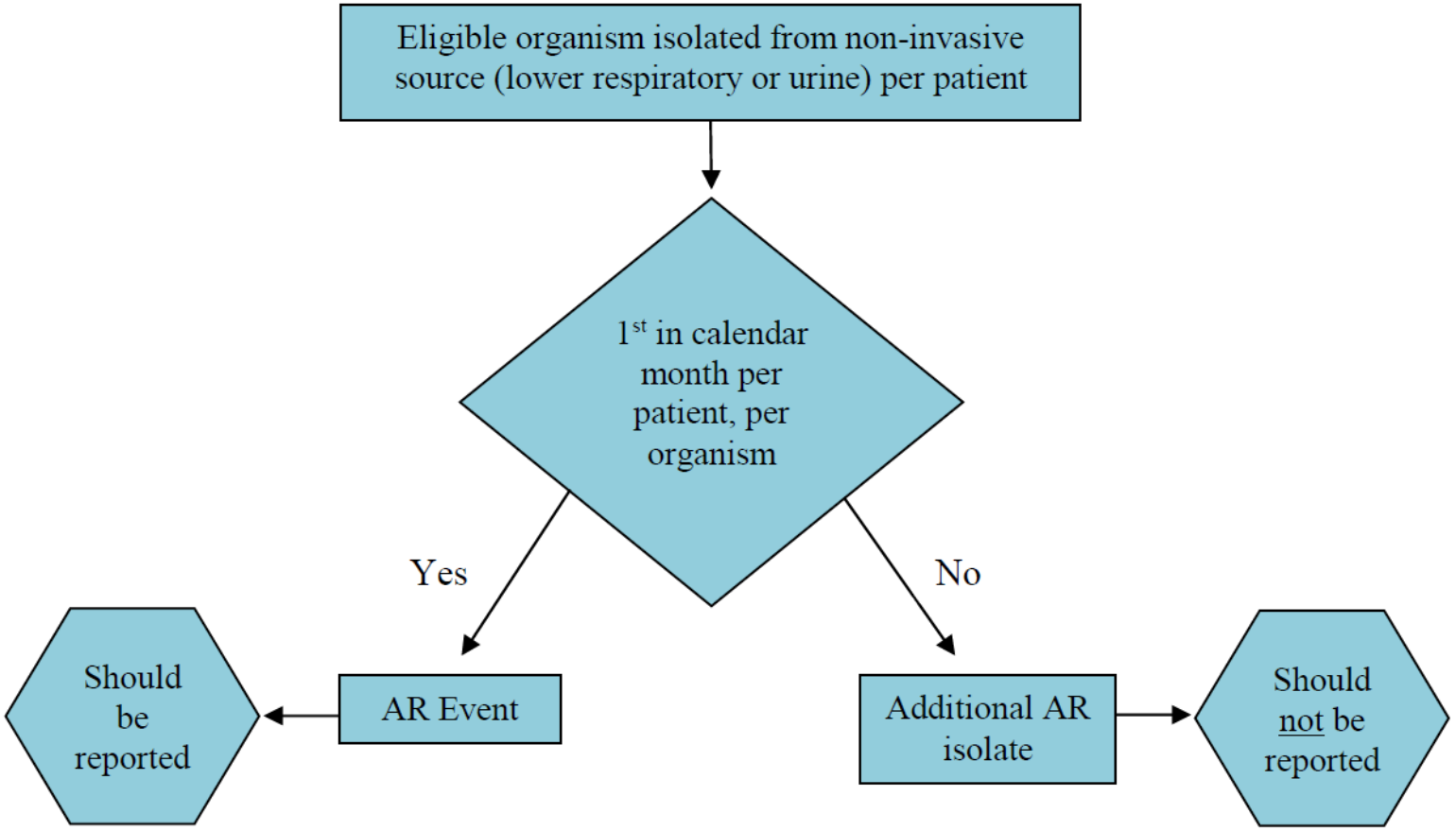
Numerator Data : Non-Invasive Steps



Non-Invasive Specimen Reporting

- Record an AR Event for:
  - First eligible organism isolated from an eligible non-invasive culture
  - Each patient
  - Each month
- NHSN only allows one AR event for lower respiratory or urine specimens per month per patient, per organism.

Non Invasive Specimen Algorithm



Walkthrough: Selecting Non-Invasive

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Urine	Sulfamethoxazole with Trimethoprim	E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum inhibitory concentration (MIC	N/A		Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Resistant**		**Final Interpretation**	**Susceptible**
2018-02-21	Lower Respiratory	Chloramphenicol	E-test	Less than 0.1 ug/ml Susceptible	Levofloxacin	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Susceptible**
2018-03-01	Lower Respiratory	Minocycline	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml Resistant
			Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Resistant**

Thank You

- Selecting Isolates
- Invasive Steps
- Deduplication
- High Level Overview

AR Reporting: Deduplication

CALCULATION WALKTHROUGH

Duplicate Isolates

- Duplicate Isolates
  - Defined as same species or same genus from same patient on same day
  - Isolates must have the same source type (i.e., invasive or non-invasive)
- Handling multiple isolates of the same organism
  - Isolates may produce conflicting results
  - Facilities should only report one isolate to NHSN
  - NHSN has rules for removing duplicates

Duplicate Isolate Removal Rules

- General rules:
  - Do not merge test results across multiple isolates
  - Don't summarize results across different isolates tested on same day
  - Eliminate isolates on same day without susceptibility test results
  - For Invasive Specimens:
    - CSF isolates > blood isolates
  - For Non-Invasive Specimens:
    - lower respiratory isolates > urine isolates

Duplicate Isolate Scenarios: Conflicting Results

1. Same isolate tested using the same test, with conflicting results
2. Same isolate tested using different tests, with conflicting results
3. Two isolates collected on the same day return conflicting results from a panel of antimicrobial tests

Duplicate Isolate Removal Rules

- Same isolate, same specific test, conflicting results:
  - If available, report the final interpretation
  - Without a final interpretation, report the most resistant interpretation (i.e., NS > R > I > S-DD > S > NT)
- Example:
  - Interpretation of E-test 1 = Intermediate
  - Interpretation of E-test 2 = Susceptible
  - Report E-test 1/ Intermediate as final interpretation

Duplicate Isolate Removal Rules

- Same isolate, different specific tests, conflicting results:
  - If available, report the final interpretation
  - If no final interpretation is provided, report the most resistant interpretation (i.e., NS > R > I > S-DD > S > NT).
- Example:
  - Interpretation of MIC test = Resistant
  - Interpretation of E-Test = Intermediate
  - No final interpretation was provided
  - Report “Resistant” as the final interpretation

Duplicate Isolate Removal Rules

- Different isolates, specific tests, conflicting results:
  - If available, report isolate with the most resistant final interpretation.
  - If no final interpretation, report the isolate with the higher amount of drug resistance based on the number antimicrobials testing “NS” or “R”.
  - If all else fails, report first isolate entered into LIS
- Example: *Candida albicans,* isolated from two blood specimens, same patient, same calendar day, no final interpretation
  - First isolate tested “R” to 3 of 8 antimicrobials
  - Second isolate tested “R” to 4 of 8 antimicrobials
  - The facility reports the second isolate to NHSN because it showed greater resistance

Walkthrough: Deduplication

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum inhibitory concentration (MIC	N/A		Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Resistant**		**Final Interpretation**	**Susceptible**
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml= Non-susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Non-Susceptible**

Scenario:
Two isolates from same day, conflicting results to panel of antimicrobials

California Department of PublicHealth

Walkthrough: Deduplication

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim		) ug/ml	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
						Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
						Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Resistant**		**Final Interpretation**	**Susceptible**
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml= Non-susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Non-Susceptible**

Collected on the same day

Verification Walkthrough: Deduplication

Conflicting Results

			Test	Results	Antimicrobial agent	Test	Results
			E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum inhibitory concentration (MIC	N/A		Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Resistant**		**Final Interpretation**	**Susceptible**
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml= Non-susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Non-Susceptible**

Verification Walkthrough: Deduplication

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Greater than 5.0 ug/ml Resistant	Ceftazidime	E-test	Less than 0.1 ug/ml Susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	Exactly equal to 2.5 mm Intermediate
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	Less than or equal to 0.1 ug/ml Susceptible
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Susceptible**
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test		Ceftazidime	E-test	Greater than 5.0 ug/ml= Non-susceptible
			Disk Diffusion (KB)			Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Non-Susceptible**

Report most resistant result

Verification Walkthrough: Deduplication Data Reported

Date	Source	Antimicrobial Agent	Test	Results	Antimicrobial agent	Test	Results
~~2018-02-20~~	~~Blood~~	~~Sulfamethoxazole with Trimethoprim~~	~~E-test~~	~~Greater than 5.0 ug/ml Resistant~~	~~Ceftazidime~~	~~E-test~~	~~Less than 0.1 ug/ml Susceptible~~
			~~Disk Diffusion (KB)~~	~~N/A~~		~~Disk Diffusion (KB)~~	~~Exactly equal to 2.5 mm Intermediate~~
			~~Minimum inhibitory concentration (MIC~~	~~N/A~~		~~Minimum inhibitory concentration (MIC)~~	~~Less than or equal to 0.1 ug/ml Susceptible~~
			~~**Final Interpretation**~~	~~**Resistant**~~		~~**Final Interpretation**~~	~~**Susceptible**~~
2018-02-20	Blood	Sulfamethoxazole with Trimethoprim	E-test	Less than 0.1 ug/ml Susceptible	Ceftazidime	E-test	Greater than 5.0 ug/ml= Non-susceptible
			Disk Diffusion (KB)	N/A		Disk Diffusion (KB)	N/A
			Minimum inhibitory concentration (MIC)	N/A		Minimum inhibitory concentration (MIC)	N/A
			Final Interpretation	**Susceptible**		**Final Interpretation**	**Non-Susceptible**

Thank You

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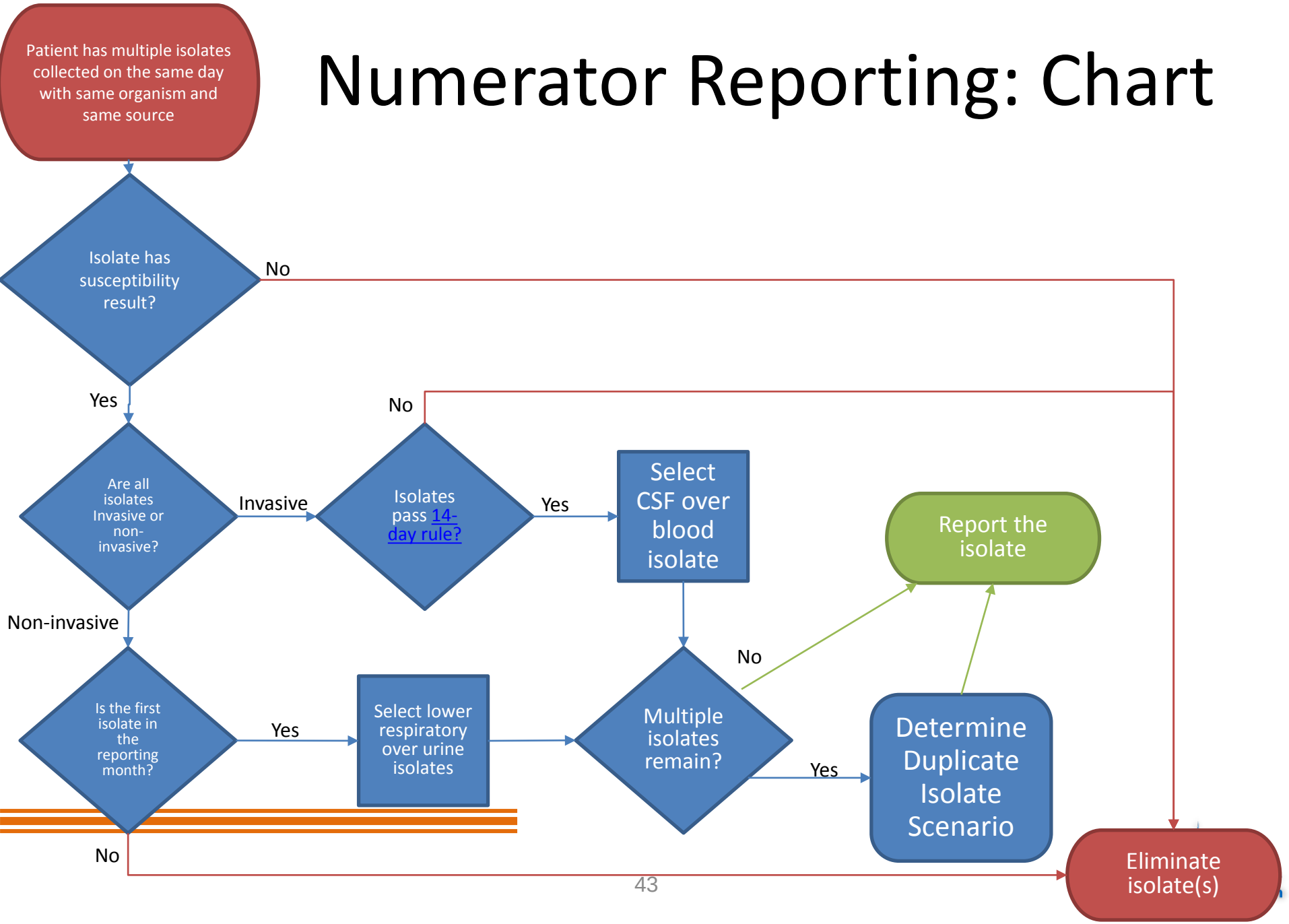
AR Reporting

NUMERATOR REPORTING: AN OVERVIEW

Numerator Reporting: Chart



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