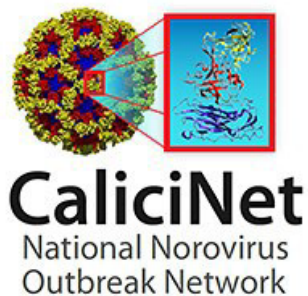# National Outbreak Reporting System (NORS)

User Training Document:

Integrated CDC Lab Systems

National Outbreak Reporting System (NORS)

User Training Document: Integrated CDC Lab Systems

Contents

INTRODUCTION

This training document provides instructions on adding laboratory data into NORS from two integrated CDC laboratory systems:

1) CaliciNet

2) PulseNet

This document assumes you have already read the NORS 3.0 General Training Guide. To enter data in the Etiology and Isolates section of the NORS report, the question "Is there at least one confirmed or suspected outbreak etiology(s)?" must be answered "Yes".

Additional information on specific questions can also be found by clicking the gray button with the question mark near the top of each question box within the NORS interface.

OVERVIEW OF FEATURES

CaliciNet Data Integration:

CaliciNet etiology data are _imported_ into a NORS report, meaning CaliciNet data that are added to the etiology section of a NORS report are a copy of the data in CaliciNet and will be editable by a NORS user.

CaliciNet strain data are _linked_ to the NORS isolate table, meaning CaliciNet strain data that are added to the isolate section of a NORS report are linked directly to the CaliciNet database and will _not_ be editable by a NORS user.

PulseNet Data Integration:

PulseNet isolate data are _linked_ to a NORS report, meaning PulseNet data that are added to a NORS report will have a direct link established with the PulseNet database and will _not_ be editable by a NORS user.

	CaliciNet Integration Features	PulseNet Integration Features
Matching etiology data are automatically available for review and import within a NORS report	✓	**Not applicable**
Matching etiology data are editable once added to NORS report	✓	**Not applicable**
Matching isolate data are automatically available for review and linking within a NORS report	✓	✗
Isolate data must be manually searched for review and linking within a NORS report	✗	✓
Isolate table data are automatically updated when CDC lab system data are updated	✓	✓
Automated nightly pull of new and updated data from CDC lab systems into NORS	✓	✓
NORS Home page notifications of new and updated matched data from CDC lab systems	✓	✗
NORS Reports page search option for status of CDC lab system data	✓	✗
CDC lab system data can be imported using NORSDirect	✓	✓

SECTION I: CALICINET INTEGRATION

The NORS/CaliciNet integration allows users to add or link norovirus strain data from a CaliciNet record to a matching NORS record. CaliciNet reports are automatically matched to NORS records in which all of the following apply:

- NORS Reporting Site matches the CaliciNet Outbreak State,

- NORS State ID or CDC ID matches the CaliciNet NORS Number or State Outbreak Code, and

- First ill date in NORS is within 90 days of the Outbreak Date reported to CaliciNet.

Once linked to a NORS report by a NORS user, norovirus strain data in the Isolates table will be automatically updated on a nightly basis to reflect any changes made to the CaliciNet record.

Etiology data from CaliciNet may also be added to a NORS report, but unlike isolate data, etiology data are not linked and can be edited within the NORS report.
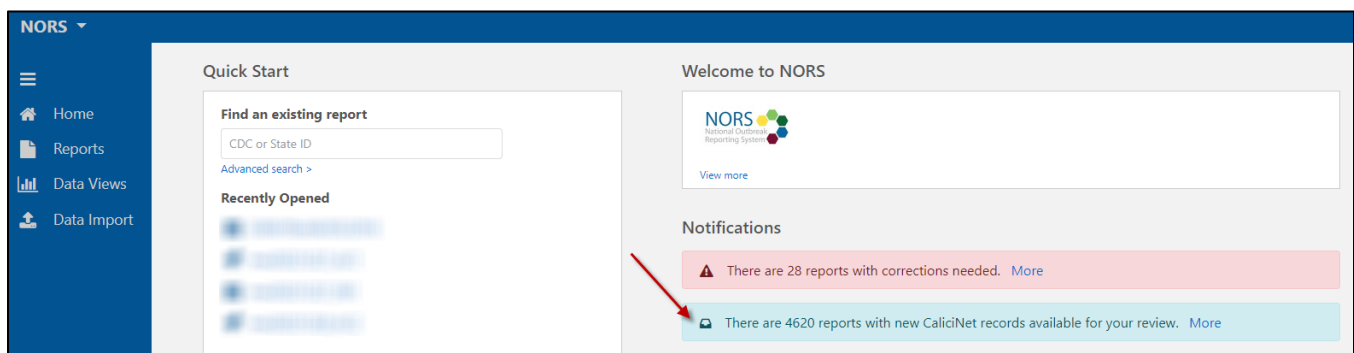
CaliciNet

CaliciNet is a national surveillance network of federal, state, and local public health laboratories that perform norovirus diagnostic testing for outbreaks. CDC launched CaliciNet in 2009 to collect information on norovirus strains associated with gastroenteritis outbreaks in the United States. This network plays an important role in monitoring circulating norovirus strains, identifying newly emerging norovirus strains, and using these data to potentially link norovirus outbreaks to a common source. More information on CaliciNet can be found on the website https://www.cdc.gov/norovirus/reporting/calicinet/index.html.

SEARCHING FOR MATCHED RECORDS

Users can search for matched records in NORS and will have the option to import the etiology and link norovirus strain data from CaliciNet into an existing NORS record.

- The "Notifications" section of the NORS Home page will display the number of NORS records that have newly matched CaliciNet data available. Clicking on the "More" link in this section will open up a list of the NORS reports with new CaliciNet matches, displaying the CDC report ID, State report ID, primary mode, and username of the report owner.

- If a user navigates directly to the Reports page or by clicking on the "Advanced search" link in the Quick Start menu on the home page, matching CaliciNet records will not be listed by default. Users must click the column chooser button on the top right of the screen, then select the checkbox that says "CaliciNet Records".
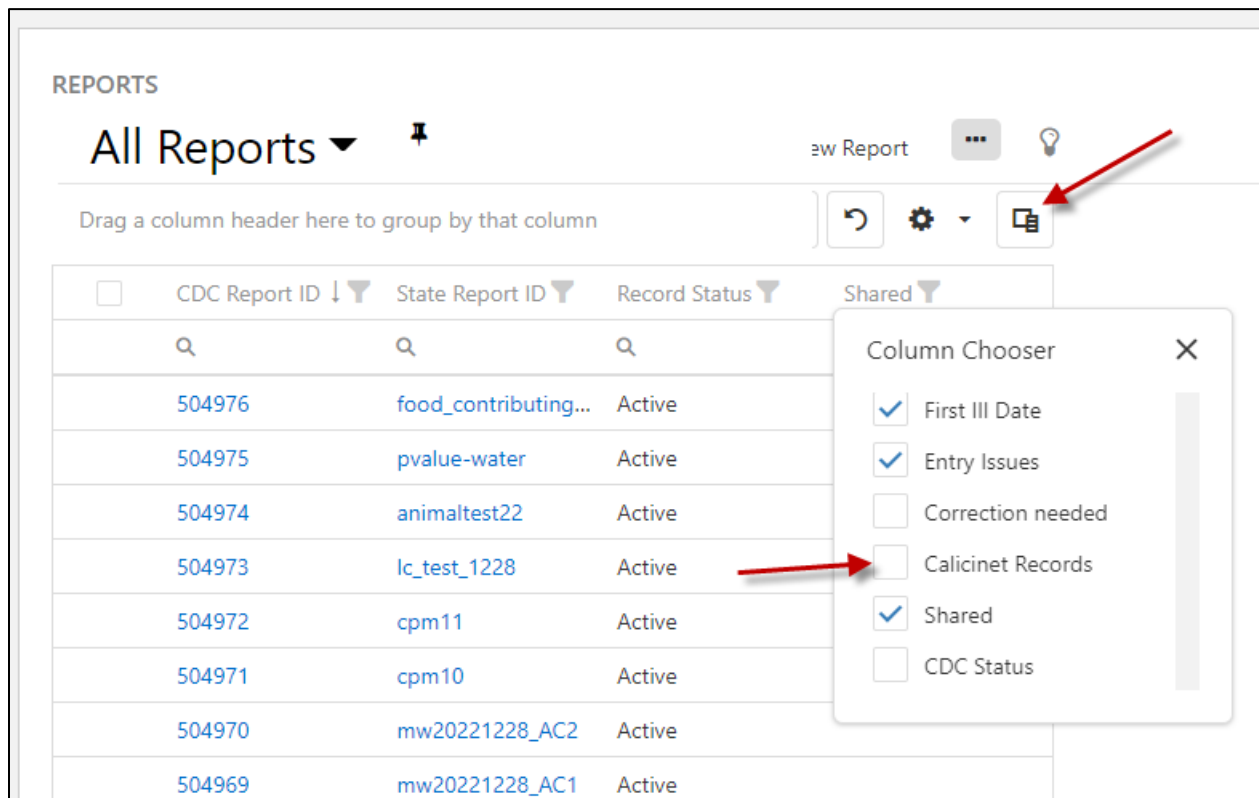

- Users can then filter reports using the following categories in the CaliciNet Records column:

   1) *New*: NORS reports that have been newly matched to a CaliciNet record, for which no action has yet been taken (i.e., the user has not reviewed, added, or linked the CaliciNet data).

   2) *Updated*: NORS reports with matched CaliciNet data, for which updates to the corresponding CaliciNet records have occurred since the data was reviewed, added, or linked (e.g., additional sequences were uploaded to CaliciNet).

   3) *Reviewed*: NORS reports with matched CaliciNet data that have already been reviewed, added, or linked to the NORS record.

   4) *None*: NORS reports with no matched CaliciNet data currently available.

- Users can filter or sort on any of the other columns (e.g., Mode of Transmission, First Ill Date) to further refine their search.
- To open the NORS record to review matched CaliciNet data, click on the CDC Report ID or State Report ID. Once the report is open, users can navigate to the Etiology and Isolates section.

REVIEWING NORS ETIOLOGY DATA

- If the NORS record has been newly matched to data from CaliciNet, a notification will appear below the "Add Etiology" button indicating that suggested CaliciNet etiologies exist. To view the suggested CaliciNet etiologies, click the "review" link.
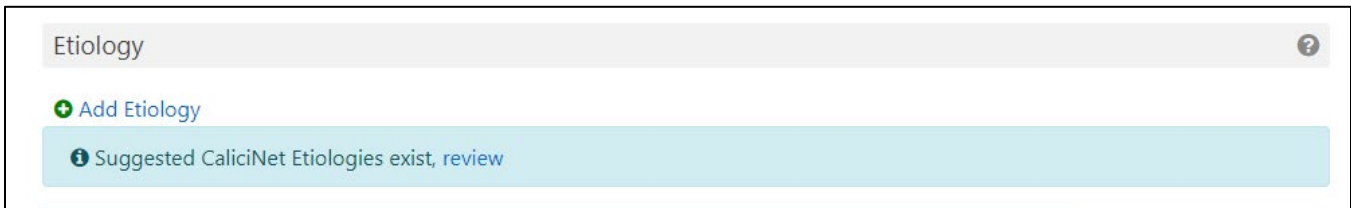
- The Add Etiology pop-up will open, showing the suggested CaliciNet etiologies that have been formatted to match the NORS Etiology table.
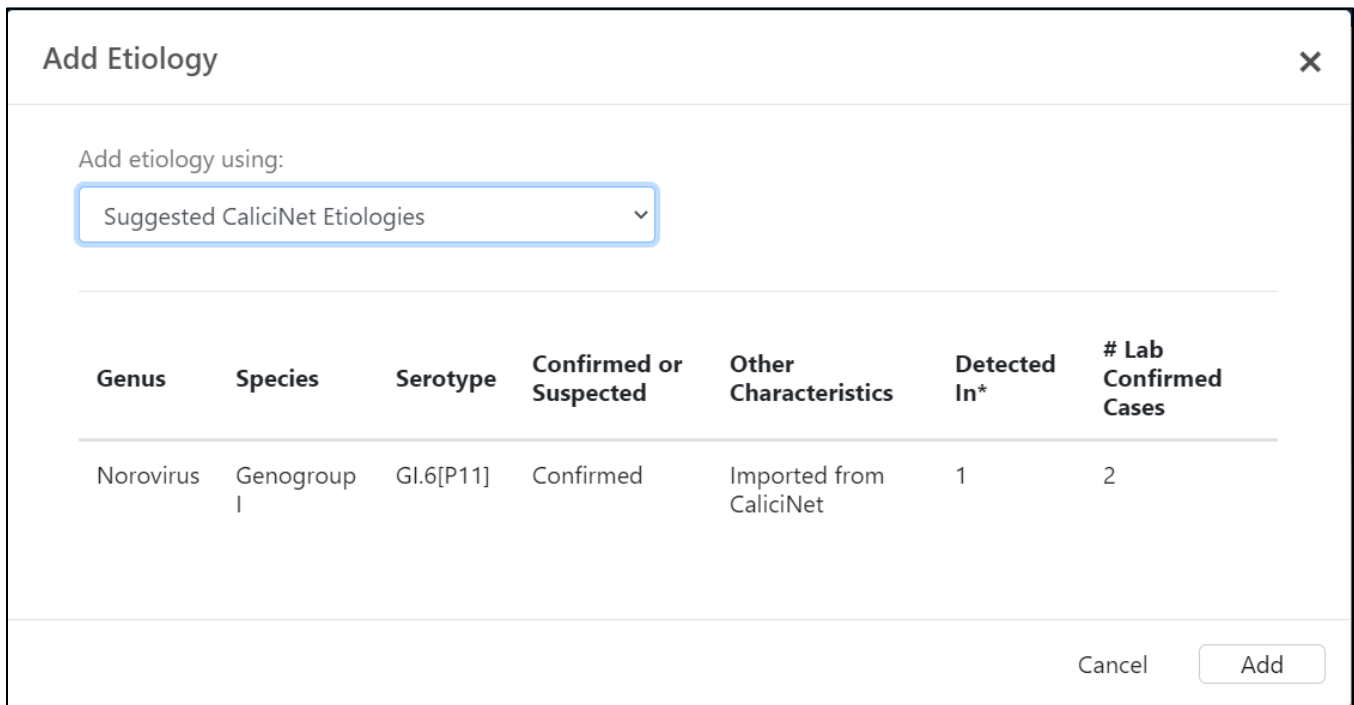
- The suggested CaliciNet etiologies will list each genotype as confirmed or suspected based on the number of positive stool specimens in CaliciNet that match the listed norovirus genotype. In the example below, there are three lab-confirmed cases for the first suggested CaliciNet etiology (GII.6[P7]), so it is listed as "Confirmed." If the number of lab-confirmed cases reported CaliciNet is less than two, the genotype will be listed as "Suspected." If food, water, or environmental samples were genotyped and submitted to CaliciNet, these specimens will be reflected in the "Detected In" field for the appropriate etiology row and will not be included in the number of lab-confirmed cases.

Etiology		
⊕ Add Etiology		
Etiology		
Norovirus Genogroup II Capsid: GII.6 Polymerase: GII.P7	Positive primary cases: 3 CIDT-positive only: 3	• Confirmed • Detected In: patient specimen • Imported from CaliciNet	⊖
Norovirus Genogroup II Capsid: unknown	Positive primary cases: 1 CIDT-positive only: 1	• Suspected • Detected In: patient specimen • Imported from CaliciNet	⊖

- If the number of real-time positive specimens entered into CaliciNet is greater than the number of sequenced specimens, the suggested CaliciNet etiologies will display an additional row containing information on positive but not sequenced specimens. These specimens will include the Genus (Norovirus) and the Species (e.g., Genogroup II) and will list the genotype as "unknown." In the example below, 5 total specimens were obtained, tested positive by RT-PCR for norovirus GII, and were entered into CaliciNet. Four of the specimens were sequenced as GII.4 Sydney[P4 New Orleans]. The remaining specimen was positive for norovirus GII but could not be sequenced, so is listed in a separate row as Norovirus Genogroup II unknown.

- The data shown in the suggested CaliciNet etiologies cannot be edited or deleted before being added to the NORS record. If there is an error in the CaliciNet data, please contact NORSAdmin@cdc.gov.

- Once CaliciNet data have been reviewed, users can choose to either add or ignore the CaliciNet etiologies.

ADD CALICINET ETIOLOGIES

- Selecting the option to "Add" in the Add Etiology pop up will append the suggested CaliciNet etiologies to the NORS Etiology table without affecting the existing data in the NORS Etiology table.

- The CaliciNet data will appear as a new row in the NORS Etiology table. The imported CaliciNet etiology data can be edited by clicking on the genus name, as one would with any other NORS etiology data.

- Once CaliciNet data is added as a new row in the NORS Etiology table, "Imported from CaliciNet" will appear in the "Other Characteristics" field.

NOTE:

When adding CaliciNet data to a NORS record, care should be taken to avoid data duplication. In the example shown below, the user previously entered Norovirus Genogroup II as an etiology in NORS. The appended CaliciNet data provide further detail, showing that the genotype was GII.4 Sydney[P16].

If these results refer to the same two specimens, the user should delete the previously entered etiology information in order to avoid duplication. However, if two specimens were genotyped as GI.6[P11] and two additional specimens were RT-PCR positive for Genogroup I but not sequenced, the user should keep both entries**.**

IGNORE CALICINET ETIOLOGIES

1. After reviewing the matched CaliciNet data, a user may decide not to include the information in the NORS report. In this case, clicking on the "Cancel" button will close the Add Etiology pop-up, and the NORS Etiology table will remain unchanged.

2. The message "There is/are # suggested CaliciNet etiologies available to add" will appear under the etiology section, indicating the number of suggested CaliciNet etiologies that are still available to add to the report.

3. To view the suggested CaliciNet etiologies again, click on the "Add Etiology" button and select "Suggested CaliciNet Etiologies" from the "Add etiology using" drop down menu. The user may again elect to add or cancel the CaliciNet data shown.

4. Once a user has clicked one of the above options, the Add Etiology pop-up will close. The NORS Etiology table will include the CaliciNet data as part of the NORS report; these data can be edited as well as downloaded as part of the NORS record. The CaliciNet record will be marked as "Reviewed" in the NORS Reports page.

	State ID	Record Status	Mode of Trans...	First Ill Date	Calicinet Recor...
	🔍	🔍	🔍	🔍 📅	🔍
	NYtest2	Active	Person-to-person	1/13/2016	Reviewed
	TEST_2019	Active	Food	4/6/2019	Reviewed

5. If additional specimens tested positive for other pathogens or norovirus but the information was not submitted to CaliciNet, the user may wish to manually add additional rows to the NORS Etiology table to indicate the additional detected. This can be done by clicking on "Add Etiology" and selecting "Manual Entry" from the dropdown, then entering any additional etiology data.

REVIEWING NORS ISOLATES DATA

- The Isolates table in the General Etiology section of a NORS report can also be linked to matching CaliciNet strain data. Similar to the Etiology data described above, if the NORS record has been matched to strain data from CaliciNet, a message will appear in the Isolates table indicating that suggested CaliciNet matches exist.

- To view the matched strain data from CaliciNet, click the "Review" button to open the Add Isolate pop-up.

- Select "CaliciNet" under the dropdown list for CDC system, then select "Suggested Matches" under the dropdown list for "Find isolates using."

- Users may also search for matching strain data using the CaliciNet outbreak number, which requires an exact match. Users may also select "State Lab Specimen ID" and enter an exact or partial match to the specimen identification number used by the user's state laboratory or the CaliciNet key.

- Only CaliciNet data that are associated with the user's reporting site and with a CaliciNet outbreak date within 90 days of the NORS first ill date will be able to be selected from the search results.

Note: Data in the Add Isolates pop-up cannot be edited or deleted. If there is an error in the CaliciNet data, please contact NORSAdmin@cdc.gov and Calicinet1@cdc.gov.

- Users can add or ignore the CaliciNet strain data shown in the Add Isolate pop-up:
  o *Add* – Clicking this option will add the selected CaliciNet strain data to the NORS Isolates table. Users can select individual rows to add using the checkboxes for each row or all rows by selecting the top checkbox.

  o *Cancel* – Clicking this option will close the Add Isolate pop-up without adding any information to the NORS Isolates table.

- Once the user has clicked one of the above options, the Add Isolate pop-up will close, and the linked strain data will appear in the NORS Isolates table. CaliciNet strain data cannot be manually entered into the NORS Isolates table nor can they be edited after being added to the NORS record. All changes made in the CaliciNet record are automatically updated in the NORS record. This link is indicated by the link symbol in the NORS Isolates table.

- If there are remaining matched CaliciNet strains that have not been linked to the NORS record, a message will appear underneath the Isolates table with the number of rows that are still available to add. These records can be viewed by clicking the "Add Isolate" button and selecting "CaliciNet" as the CDC system.

SECTION II: PULSENET INTEGRATION

The NORS/PulseNet integration allows users to link isolate information to their NORS report directly from the PulseNet national databases. Additionally, resistance data from CDC's National Antimicrobial Resistance Monitoring System (NARMS) will be linked to a NORS report if that isolate matches based on the PulseNet Key. Once linked to a NORS report, isolate information will be automatically updated on a nightly basis if any changes are made to that isolate by either PulseNet or NARMS. Resistance data displayed will include the predicted resistance pattern and any antimicrobial susceptibility testing (AST) results if the isolate was found to be intermediate or resistant to a particular antibiotic.

PulseNet

PulseNet is a network of local, state, and federal public health labs that began in 1996. PulseNet detects cases of related illnesses through whole genome sequencing (WGS) to rapidly identify potential foodborne, animal contact, and some waterborne outbreaks. More information on PulseNet can be found on their website: https://www.cdc.gov/pulsenet/

NARMS

NARMS is a collaboration among state and local public health departments, CDC, the U.S. Food and Drug Administration (FDA), and the U.S. Department of Agriculture (USDA) that was established in 1996. NARMS tracks changes in the antimicrobial susceptibility of certain enteric bacteria found in ill people (CDC), retail meats (FDA), and food animals (USDA) in the United States. More information on NARMS can be found on their website: https://www.cdc.gov/narms/

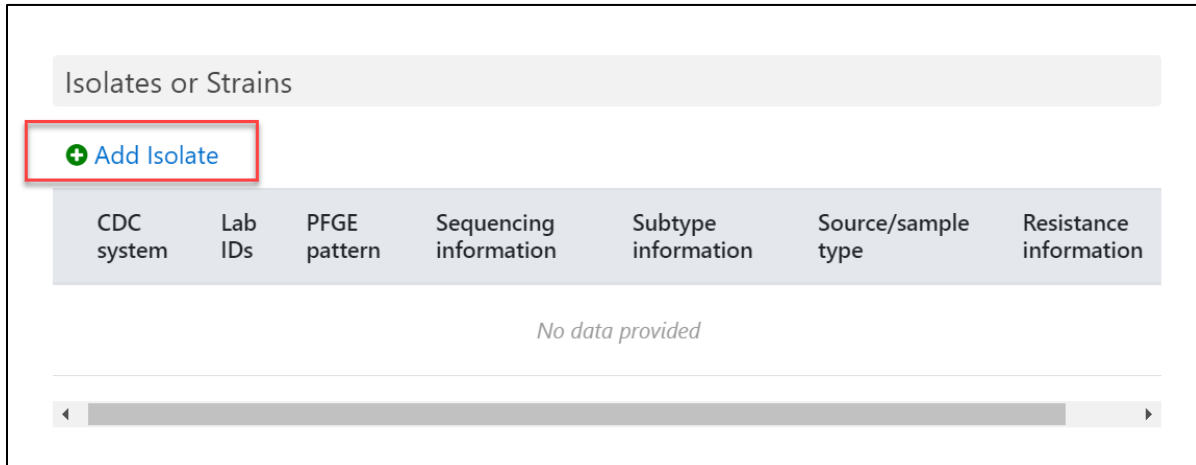**LINKING PULSENET ISOLATE DATA TO NORS**

NORS users can search for isolates within the PulseNet database in real-time based on:

   I.   **PulseNet Key**
         OR
  II.   **PulseNet Outbreak Code**

ADDING AN ISOLATE

Users can find the Isolates table within the Etiology and Isolates section (52.14 form) of their NORS report.
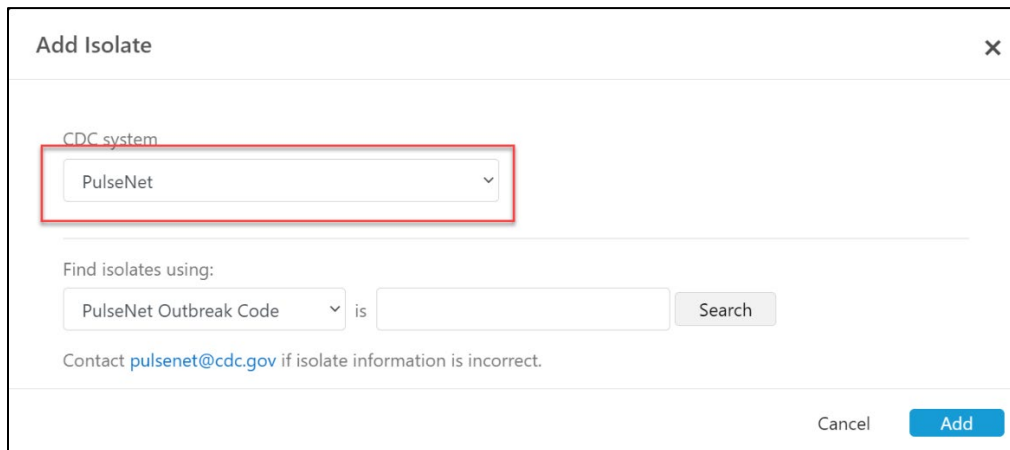
Step 1: **Click to add isolate** to NORS report

Step 2: Choose **PulseNet** as your CDC System

OPTION I — SEARCH AND ADD ISOLATES BY <u>PULSENET KEY</u>

<u>Step 3A:</u> Search isolates by **PulseNet Key** where the PulseNet Key is an **exact match**

<u>Step 3B:</u> OR Search isolates by **PulseNet Key** where the PulseNet Key is a **partial match**

Step 4: Add **selected** isolate(s) to NORS report

Step 5: Selected isolate(s) will appear in the Isolates table

OPTION II — SEARCH AND ADD ISOLATES BY <u>PULSENET OUTBREAK CODE</u>

<u>Step 3:</u> Search isolates by **PulseNet Outbreak Code**

<u>Step 4:</u> Add **selected** isolate(s) to NORS report

Step 5: Selected isolate(s) will appear in the Isolates table

FEATURES TO NOTE

1)   The number of isolates found matching the search criteria are displayed at the top of the search.
2)   Users can select multiple isolates from an outbreak code if desired by selecting multiple check boxes. The ability to select multiple isolates at once by selecting the top checkbox, as well as column sorting by clicking on headers, should be available for users in the future.
3)   All information displayed reflects the most current data stored in PulseNet. If information is incorrect, please contact PulseNet directly at pulsenet@cdc.gov to have isolate information updated.
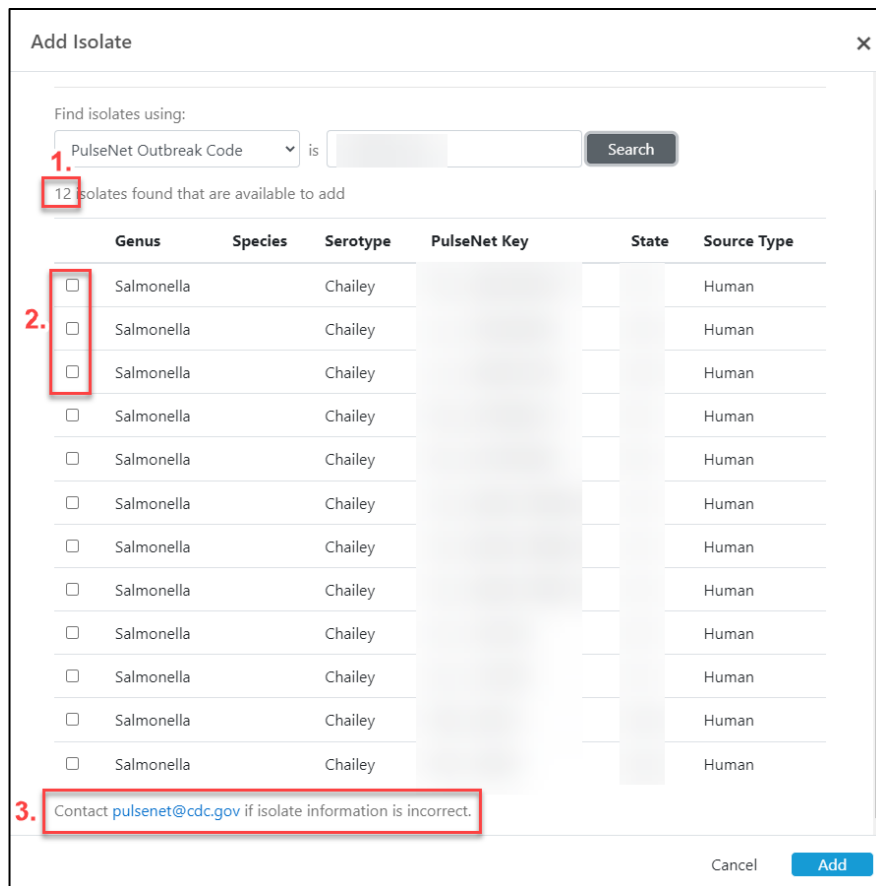
4) The link symbol indicates the isolate information in that row is linked to the PulseNet database and therefore cannot be edited.
5) Any NARMS data linked by PulseNet Key to added isolates is displayed in the Isolates table.
6) Users have the ability to remove isolates from their NORS report by clicking the "minus" sign on the right side.
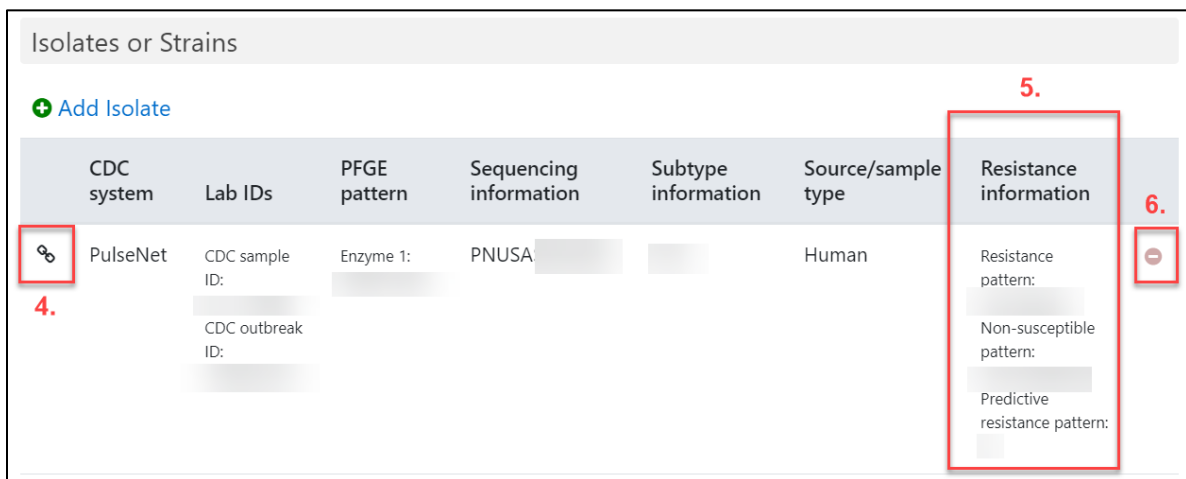
DATA VALIDATION CHECKS
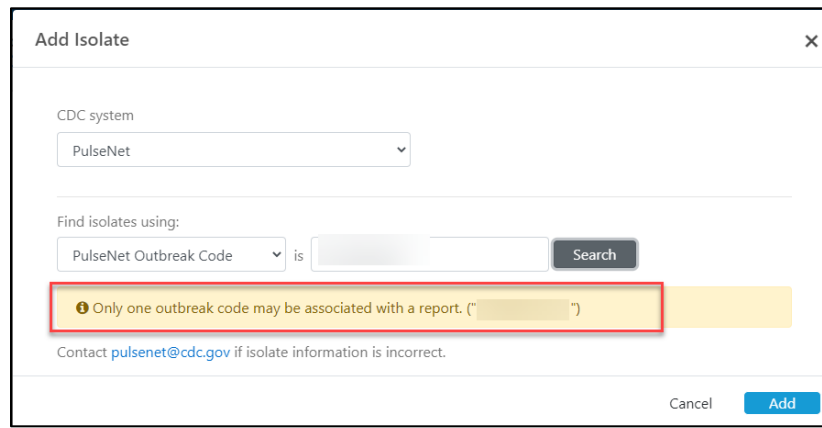
NORS/PulseNet integration has three types of built-in data validation checks to ensure data consistency across CDC systems, and data accuracy with state level data.

1) *NORS users cannot edit an isolate linked from PulseNet once added to a NORS report.*

   This is to ensure data consistency. If there is a discrepancy between the PulseNet isolate information displayed and state lab data, please contact PulseNet directly at pulsenet@cdc.gov.
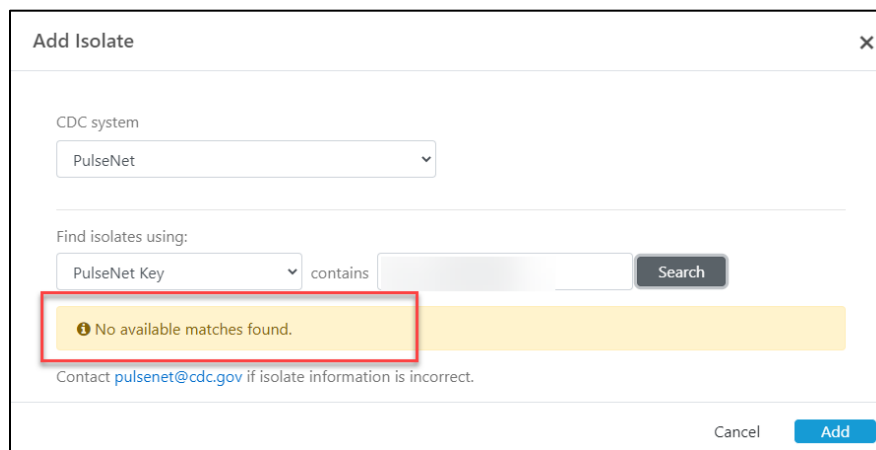
2) *NORS users cannot add isolates from more than one PulseNet outbreak code to a NORS report.*

   a) If a user tries to add two isolates with different PulseNet outbreak codes at once, they will receive the following message:

   b) If a user tries to add an isolate by PulseNet Key with an outbreak code that differs from the outbreak code of any isolates already added to the NORS report, the user will not be able to select and add those isolates. No available matches will populate unless they match the outbreak code of the isolates already added. Please note that this includes missing outbreak codes. For example, a user will not be able to add an isolate where the outbreak code is blank to a report with PulseNet isolates where an outbreak code exists.

3) *NORS reports with altered isolate data resulting in differing outbreak codes must be addressed.*

If PulseNet isolates that have been added to a NORS report have their outbreak code information updated in the PulseNet database, and the update results in those isolates differing by outbreak code, users are asked to remove the isolate(s) that no longer belong(s) before adding any additional isolates.

If changes made to isolates in the PulseNet database are incorrect, please contact PulseNet directly.

NORSDIRECT USERS

This section assumes you have already read the NORSDirect Training Document or reviewed the NORSDirect help page. NORSDirect users should note that any isolates added to the NORS Isolates table using the CaliciNet or PulseNet integration tools must also be added to respective state databases. Any changes that are made using the CaliciNet or PulseNet integration tools will be overwritten by any subsequent NORSDirect uploads that do not include the imported CaliciNet or linked PulseNet data. This similarly applies to any changes made to the NORS Etiology table using CaliciNet integration.

NORSDirect users will have full capabilities to add CaliciNet and PulseNet isolates using NORSDirect but will only be able to do so by providing an exact match to an existing CaliciNet or PulseNet Key in the NORSDirect fields CDCSampleID1–CDCSampleID99. NORS users may also import CaliciNet strain data by entering the specimen identification number used by the user's state laboratory in the fields StateSampleID1–StateSampleID99, as long as that specimen ID was also entered in CaliciNet. Users will not be able to add a CaliciNet or PulseNet isolate based on a partial match to a CaliciNet or PulseNet Key or sample ID or by only providing a CaliciNet or PulseNet Outbreak Code. All checks described in the "Data Validation Checks" section above apply to reports uploaded through NORSDirect. Users will also not be able to add CaliciNet or PulseNet Keys with different outbreak codes to one NORS report.

All isolate data imported using NORSDirect with a selection of "PulseNet" in the variables CDCSystem1–CDCSystem99 must match an existing key in PulseNet. Similarly, all strain data imported using NORSDirect with a selection of "CaliciNet" in the variables CDCSystem1– CDCSystem99 must match an existing key or specimen ID in CaliciNet. If the CaliciNet or PulseNet Key submitted using NORSDirect does not match an existing key in the CaliciNet or PulseNet, respectively, an error will indicate that no match can be found. The user should verify the CaliciNet or PulseNet Key information or enter the isolate information using a different selection for the CDC System variable.

If isolate/strain data is imported using NORSDirect but an appropriate match to CaliciNet or PulseNet data cannot be made or another error occurs, NORSDirect will skip importing the data for that isolate/strain only. The rest of the NORS record will import as normal.

NORSDirect Isolate Table Variables:

CaliciNet Integration

NORSDirect Import Field Name	Field Description: Isolates	Variable Requirements	Data Validation Checks
CDCSystem1–CDCSystem99	CaliciNet	Required	
CDCSampleID1–CDCSampleID99	CaliciNet Key	Required*	Exact match required
StateSampleID1–StateSampleID99	State lab specimen ID	Required*	Exact match required
CDCLabOutbreakID1–CDCLabOutbreak99	CaliciNet outbreak number	Optional†	1 outbreak code permitted per NORS report
SubtypeInfo1–SubtypeInfo99	Genotype	Optional†	
SourceType1–SourceType99	Specimen type	Optional†	

Either the CDCSampleID or the StateSampleID is required in order to import matching CaliciNet data.

†Variables listed as "Optional" in the Variable Requirements column will automatically populate with CaliciNet data once the NORS report is uploaded if the isolate is able to be linked to the CaliciNet system.

PulseNet Integration

NORSDirect Import Field Name	Field Description: Isolates	Variable Requirements	Data Validation Checks
CDCSystem1–CDCSystem99	PulseNet	Required	
CDCSampleID1–CDCSampleID99	PulseNet Key	Required	Exact match required
StateSampleID1–StateSampleID99	State lab specimen ID	Optional†	
CDCLabOutbreakID1–CDCLabOutbreak99	PulseNet outbreak code	Optional†	1 outbreak code permitted per NORS report
Enzyme1_1–Enzyme1_99	Enzyme 1	Optional†	
Enzyme2_1–Enzyme2_99	Enzyme 2	Optional†	
SequenceInfo1–SequenceInfo99	Whole Genome Sequencing ID	Optional†	
SubtypeInfo1–SubtypeInfo99	Other Molecular Designation (e.g., serotype)	Optional†	
SourceType1–SourceType99	Specimen type	Optional†	

†Variables listed as "Optional" in the Variable Requirements column will automatically populate with PulseNet data once the NORS report is uploaded, if the isolate is able to be linked to PulseNet.

Error Messaging Guide:

CaliciNet Integration

Scenario	Error Message
CDC System is *CaliciNet* but StateSampleID and CDCSampleID are blank.	"Unable to match calicinet isolate on StateSampleID# or CDCSampleID#. Isolate has been skipped."
No CaliciNet match is found for the entered StateSampleID or CDCSampleID.	"Unable to match calicinet isolate on StateSampleID# or CDCSampleID#. Isolate has been skipped."
Multiple CaliciNet isolates are being imported with different outbreak codes for one NORS report.	Correction needed: "Only one CaliciNet Lab Outbreak ID can be linked per report."
Identical CaliciNet Keys added to the same NORS report.	Correction needed: "The CaliciNet CDC Lab Sample ID must be unique, you have a duplicate in the report."

PulseNet Integration

Scenario	Error Message
CDC System is *PulseNet* but CDCSampleID is blank.	"Unable to match PulseNet isolate on State Lab ID. Isolate has been skipped."
No PulseNet match is found for the entered CDCSampleID.	"Unable to match PulseNet isolate on State Lab ID. Isolate has been skipped."
Multiple PulseNet isolates are being imported with different outbreak codes for one NORS report.	Correction Needed: "Only one PulseNet CDC Lab Outbreak ID can be linked per report."
Identical PulseNet Keys added to the same NORS report.	Correction Needed: "Duplicate Lab Sample ID – The PulseNet CDC Lab Sample ID must be unique, you have a duplicate in the report."

ADDITIONAL INFORMATION

If you need assistance in completing other sections of NORS, please refer to the online technical and guidance documents located at http://www.cdc.gov/nors/forms.html.

For further assistance or for questions or comments, please email us at NORSAdmin@cdc.gov.

APPENDIX: NARMS METHODS & PATTERN ABBREVIATION KEY

Predicted Resistance Pattern: CDC NARMS predicted resistance pattern based on resistance determinants

CDC NARMS screens sequenced isolates, using ResFinder, for the presence of resistance determinants (which include acquired resistance genes and mutations). This listing of genes and mutations is then used to determine a predicted resistance pattern. If no determinants were found, the Predicted Resistance Pattern field in NORS will read "No determinants detected". If whole genome sequencing was not performed on the isolate, the Predicted Resistance Pattern field in NORS will read "Not sequenced". If whole genome sequencing was performed on the isolate, but it has not yet been analyzed for the presence of resistance determinants, the Predicted Resistance Pattern field in NORS will read "Not analyzed".

Non-Susceptible Pattern: CDC NARMS antimicrobial susceptibility testing (AST) results

Antibiotics that had either an intermediate or resistant (i.e. not susceptible) interpretation for the isolate based on results of phenotypic AST are listed. Otherwise, the Non-Susceptible Pattern field in NORS will read "No non-susceptibility detected". If there are no breakpoints for the isolate, the Non-Susceptible Pattern field in NORS will read "N/A". If the isolate was not tested phenotypically by NARMS or results have not been approved, the Non-Susceptible Pattern field in NORS will be blank.

CDC NARMS phenotypic testing is performed via broth microdilution to obtain a minimum inhibitory concentration (in micrograms per milliliter). That value is then used to determine if an isolate is susceptible, intermediate, or resistant to that particular antibiotic, based on current breakpoints provided by the Clinical and Laboratory Standards Institute (CLSI), epidemiological cutoff values established by the European Committee on Antimicrobial Susceptibility Testing (EUCAST), or MIC distribution data collected by NARMS. Please see https://www.cdc.gov/narms/antibiotics-tested.html for more information.

Disclaimer - These test results are provided for epidemiological study purposes only and must not be returned to clinicians, referral laboratories, or other medical practitioners. The test method and antimicrobial agents tested are for epidemiologic research and cannot be used for patient assessment or treatment.

NARMS Pattern Abbreviation Key:

Pattern Abbreviation	Antibiotic Name
Ami	Amikacin
Au	Amoxicillin-Clavulanic Acid
A	Ampicillin
Azm	Azithromycin
Car	Carbomycin
Fox	Cefoxitin
Tio	Ceftiofur
Cx	Ceftriaxone
Cep	Cephalothin
C	Chloramphenicol
Cip	Ciprofloxacin (abbreviation used in the Non-Susceptible Pattern field)
Cip(I/R)	Ciprofloxacin (abbreviation used in the Predicted Resistance Pattern field to indicate when the genetic determinants can only predict decreased susceptibility to ciprofloxacin (intermediate or resistant MIC).)
Cli	Clindamycin

Pattern Abbreviation	Antibiotic Name
Col	Colistin
Ery	Erythromycin
Ffn	Florfenicol
Fos	Fosfomycin
Fus	Fuscidic acid
Gen	Gentamicin
Hyg	Hygromycin
Imd	Imidazole
Kan	Kanamycin
Lin	Lincomycin
Lzd	Linezolid
Mer	Meropenem
Nal	Nalidixic Acid
Ole	Oleandomycin
Pen	Penicillin
Rif	Rifampin
Spe	Spectinomycin
Spi	Spiramycin
S	Streptomycin
Su	Sulfamethoxazole/Sulfisoxazole
Tel	Telithromycin
T	Tetracycline
Tia	Tiamulin
Tmp	Trimethoprim
Cot	Trimethoprim-Sulfamethoxazole
Tyl	Tylosin
Van	Vancomycin
Vir	Virginiamycin