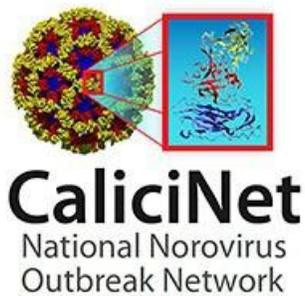


National Outbreak Reporting System (NORS)

User Training Document: Integrated CDC Lab Systems



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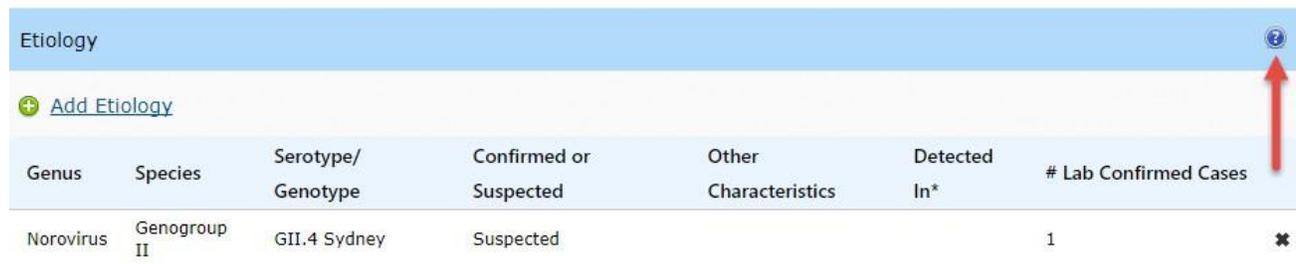
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INTRODUCTION

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

- 1) CaliciNet
- 2) PulseNet

The document assumes you have already read the NORS User Training Document – General Section, Etiology, and Attachments Tabs. Additional information on specific questions can also be found by clicking the blue button with the question mark near the top of each question box within the NORS interface.



Genus	Species	Serotype/ Genotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases
Norovirus	Genogroup II	GI.4 Sydney	Suspected		1	1

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 homepage will display the number of NORS records that have newly matched CaliciNet data available. Clicking on the “View” link in this section will direct users to the Reports page, where new and updated CaliciNet records within the user’s agency will be listed by default.

The screenshot shows the NORS Home dashboard. On the left is a 'Quick Start' sidebar with options like 'Open an existing report' and 'Create a new report'. On the right, there is a 'Message Board' with a recent update from CDC and a 'Notifications' section. The notification states: 'There are 371 new and 0 updated CaliciNet records for your agency. View' with a red arrow pointing to the 'View' link.

- 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 select the checkboxes in the CaliciNet Records section of the “Filter By” navigation bar and click “Search.”
- Filtering by CaliciNet Records will return NORS reports that fall into the following three categories:
 - 1) *New CaliciNet Records*: 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 CaliciNet Records*: 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 CaliciNet Records*: NORS reports with matched CaliciNet data that have already been reviewed, added, or linked to the NORS record.

The screenshot shows the 'Reports' interface. On the left is a 'Filter By' sidebar with various search criteria. The 'CaliciNet Records' section is highlighted with a red box, showing three checked options: 'New', 'Updated', and 'Reviewed'. Below it, the 'Report Status' section is also visible. At the bottom of the sidebar are 'Reset' and 'Search' buttons, with the 'Search' button also highlighted by a red box.

The main area, titled 'View and Select Reports', displays a table of 94 reports. The table has the following columns: CDC ID, State ID, Primary Mode of Transmission, First Ill, Report Status, Agency, Site, Report Author, CaliciNet Records, and PDF. The 'Report Status' column shows '6 Active' for each row. The 'CaliciNet Records' column shows 'New' for each row. The 'PDF' column contains download icons.

CDC ID	State ID	Primary Mode of Transmission	First Ill	Report Status	Agency	Site	Report Author	CaliciNet Records	PDF
[Redacted]	[Redacted]	Person-to-person	03/25/2019	6 Active	[Redacted]	[Redacted]	[Redacted]	New	[Download Icon]
[Redacted]	[Redacted]	Indeterminate/Unknown	03/24/2019	6 Active	[Redacted]	[Redacted]	[Redacted]	New	[Download Icon]
[Redacted]	[Redacted]	Person-to-person	03/23/2019	6 Active	[Redacted]	[Redacted]	[Redacted]	New	[Download Icon]
[Redacted]	[Redacted]	Person-to-person	03/19/2019	6 Active	[Redacted]	[Redacted]	[Redacted]	New	[Download Icon]
[Redacted]	[Redacted]	Person-to-person	03/17/2019	6 Active	[Redacted]	[Redacted]	[Redacted]	New	[Download Icon]
[Redacted]	[Redacted]	Person-to-person	03/09/2019	6 Active	[Redacted]	[Redacted]	[Redacted]	New	[Download Icon]
[Redacted]	[Redacted]	Person-to-person	03/05/2019	6 Active	[Redacted]	[Redacted]	[Redacted]	New	[Download Icon]

- The search results will display all records that fit the desired search parameters. In the “CaliciNet Records” column, the search results will indicate whether a NORS record has newly matched CaliciNet data for review (New), updated CaliciNet data for review (Updated), or if matched CaliciNet data have already been reviewed, added, or linked (Reviewed). Users can click on any of the column headers in the results box (e.g., Primary Mode of Transmission, First Ill) to sort on that column.

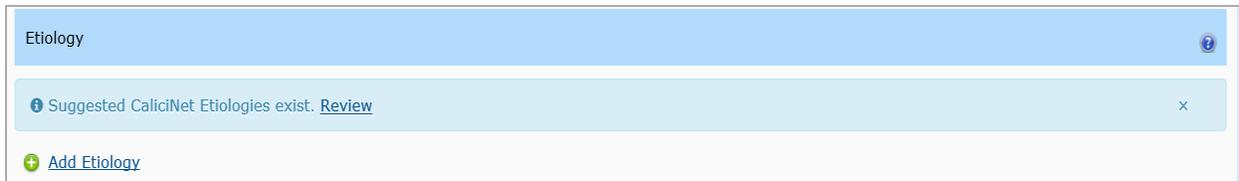
The screenshot shows the 'Reports' interface with a 'Filter By' sidebar on the left and a main table titled 'View and Select Reports'. The sidebar includes filters for 'CDC or State ID', 'First Ill Date' (From: 1/1/2018, To: 4/30/2019), 'Primary Mode Of Transmission' (Food, Water, Animal Contact, Person-to-person, Environmental, Indeterminate/Unknown), 'Author Site/Agency', 'CaliciNet Records' (New, Updated, Reviewed), and 'Report Status'. The main table has 11 columns: CDC ID, State ID, Primary Mode of Transmission, First Ill, Report Status, Agency, Site, Report Author, CaliciNet Records, and PDF. The 'CaliciNet Records' column is highlighted with a red box and contains 'New' links for several reports. The table also shows '94 reports' and '6 Active' status for each row.

CDC ID	State ID	Primary Mode of Transmission	First Ill	Report Status	Agency	Site	Report Author	CaliciNet Records	PDF
		Person-to-person	03/25/2019	6 Active				New	Download
		Indeterminate/Unknown	03/24/2019	6 Active				New	Download
		Person-to-person	03/23/2019	6 Active				New	Download
		Person-to-person	03/19/2019	6 Active				New	Download
		Person-to-person	03/17/2019	6 Active				New	Download
		Person-to-person	03/09/2019	6 Active				New	Download
		Person-to-person	03/05/2019	6 Active				New	Download

- To open the NORS record to review matched CaliciNet data, click on the “New”, “Updated”, or “Reviewed” link in the CaliciNet Records column that corresponds to the NORS report for which the user would like to review the data. This will open the report directly to the Etiology section. Alternatively, users may click on the State ID of the desired report; this will open to the General section of the report, from which users can navigate to the Etiology section.

REVIEWING NORS ETIOLOGY DATA

- If the NORS record has been newly matched to data from CaliciNet, a notification will appear above 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. All etiology data imported from CaliciNet will include “Imported from CaliciNet” under the “Other Characteristics” field by default for foodborne, animal contact, person-to-person, environmental and unknown modes of transmission.

Add Etiology

Add etiology using

Genus	Species	Serotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases
Norovirus	Genogroup II	GII.4 Sydney[P16]	Confirmed	Imported from CaliciNet	1	2

Cancel

- 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 four lab confirmed cases for the first suggested CaliciNet etiology (GII.4 Sydney[P4 New Orleans]), 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.

Add Etiology

Add etiology using Suggested CaliciNet Etiologies ▾

Genus	Species	Serotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases
Norovirus	Genogroup II	GII.4 Sydney[P4 New Orleans]	Confirmed	Imported from CaliciNet	1	4
Norovirus	Genogroup II	unknown	Suspected	Imported from CaliciNet		1

Cancel
Add

- 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.

Add Etiology

Add etiology using
Suggested CaliciNet Etiologies ▾

Genus	Species	Serotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases
Norovirus	Genogroup II	GII.4 Sydney[P4 New Orleans]	Confirmed	Imported from CaliciNet	1	4
Norovirus	Genogroup II	unknown	Suspected	Imported from CaliciNet		1

Cancel
Add

- 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, and an import symbol will appear in front of the etiology row. Hovering over the import symbol will display a pop up that says, “Imported from CaliciNet.” While the “Other Characteristics” field and other fields in an imported etiology row can be manually updated, the import symbol cannot be deleted, indicating the original source of the data.

Etiology								
+ Add Etiology								
Imported from CaliciNet	Species	Serotype/ Genotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases		
✚	Norovirus	Genogroup II	GII.4 Sydney[P16]	Confirmed	Imported from CaliciNet	1	2	✖
*Detected in: 1 - patient specimen; 2 - food specimen; 3 - environment specimen; 4 - food worker specimen; 5 - water sample; 6 - animal specimen								

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 three specimens, the user should delete the previously entered etiology information in order to avoid duplication. However, if three specimens were genotyped as GII.4 Sydney[P16].and three additional specimens were RT-PCR positive for Genogroup II but not sequenced, the user should keep both entries.

Etiology								
+ Add Etiology								
Genus	Species	Serotype/ Genotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases		
Norovirus	Genogroup II		Confirmed			1	3	✖
✚ Norovirus	Genogroup II	GII.4 Sydney[P16]	Confirmed	Imported from CaliciNet		1	3	✖
*Detected in: 1 - patient specimen; 2 - food specimen; 3 - environment specimen; 4 - food worker specimen; 5 - water sample; 6 - animal specimen								

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.

Add Etiology

Add etiology using Suggested CaliciNet Etiologies

Genus	Species	Serotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases
Norovirus	Genogroup II	GII.4 Sydney[P16]	Confirmed	Imported from CaliciNet	1	2

Cancel
Add

2. The CaliciNet record will be marked as “Reviewed” and 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.

Etiology

+ [Add Etiology](#)

There is 1 suggested CaliciNet etiology available to add.

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.

Add Etiology

Add etiology using Manual Entry
Suggested CaliciNet Etiologies

Genus	Species	Serotype	Confirmed or Suspected	Other Characteristics	Detected In*	# Lab Confirmed Cases
Norovirus	Genogroup II	GII.4 Sydney[P16]	Confirmed	Imported from CaliciNet	1	3

Cancel
Add

- 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.

<input type="checkbox"/>	CDC ID	State ID	Primary Mode of Transmission	First Ill	Report Status	Agency	Site	Report Author	CaliciNet Records	PDF
<input type="checkbox"/>	287163	TEST_2019	Food	04/06/2019	4 Active	Ohio Department of Health	Ohio	mwiksw_oh	Reviewed	

- If additional specimens tested positive for norovirus by RT-PCR 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 laboratory results. This can be done by clicking on “Add Etiology” and selecting “Manual Entry” from the dropdown, then entering any additional etiology data.

Add Etiology

Add etiology using Manual Entry

Genus

Species

Serotype/Serogroup/ Serovar

Confirmed or Suspected Suspected

Other Characteristics

characters left: 200

Detected In

- Patient Specimen
- Food Specimen
- Environment Specimen
- Food Worker Specimen
- Water Sample
- Animal Specimen

Lab-confirmed cases

Cancel
Add

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. If the NORS record has been matched to data from CaliciNet, a message will appear indicating that suggested CaliciNet matches exist.

Isolates

i Suggested CaliciNet Isolates exist. [Review](#)

+ [Add Isolate](#)

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

Add Isolate

CDC System

Find isolates using:

2 isolates found that are available to add

<input type="checkbox"/>	CaliciNet Key	Outbreak	Genotype	Sample Type	State Lab: Sample ID
<input type="checkbox"/>	OH___2019-SP-0103	2019-OB-262	GII.4 Sydney[P16]	Stool	2019001889
<input type="checkbox"/>	OH___2019-SP-0104	2019-OB-262	GII.4 Sydney[P16]	Stool	2019001891

Contact calicinet1@cdc.gov if isolate information is incorrect

- Suggested matched norovirus strains from CaliciNet will appear by default. To add the suggested rows to the NORS Isolates table, select the rows and click “Add”

Add Isolate

CDC System CaliciNet

Find isolates using:
Suggested Matches

3 isolates found that are available to add

<input type="checkbox"/>	CaliciNet Key	Outbreak	Genotype	Sample Type	State Lab: Sample ID
<input checked="" type="checkbox"/>	WI__2019-SP-0394	2019-OB-226	GII.4 Sydney[P16]	Stool	19VR006276
<input checked="" type="checkbox"/>	WI__2019-SP-0395	2019-OB-226	GII.4 Sydney[P16]	Stool	19VR006277
<input checked="" type="checkbox"/>	WI__2019-SP-0396	2019-OB-226	GII.4 Sydney[P16]	Stool	19VR006278

Cancel Add

- Users may also search for matching strain data using the CaliciNet outbreak number or, if it has been entered into CaliciNet, by the specimen identification number used by the user’s state laboratory (state lab specimen ID). To search using these identification numbers, select “CaliciNet Outbreak Number “or “State Lab Specimen ID“ under the “Find isolates using” drop down menu.

Add Isolate

CDC System CaliciNet

Find isolates using:
Suggested Matches
CaliciNet Outbreak Number
State Lab Specimen ID

- Users can then type in the CaliciNet outbreak number or the state lab specimen ID, depending on the option selected, and click “Search”. 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 appear in the search results.

Option 1: Search and add isolates by State Lab Specimen ID

Find isolates using:

State Lab Specimen ID

2 isolates found that are available to add

<input type="checkbox"/>	CaliciNet Key	Outbreak	Genotype	Sample Type	State Lab: Sample ID
<input type="checkbox"/>	OH__2019-SP-0088	2019-OB-249	GII.4 Sydney[P16]	Stool	2019001755
<input type="checkbox"/>	OH__2019-SP-0090	2019-OB-249	GII.4 Sydney[P16]	Stool	2019001787

Option 2: Search and add isolates by CaliciNet Outbreak Number

Find isolates using:

CaliciNet Outbreak Number

3 isolates found that are available to add

<input type="checkbox"/>	CaliciNet Key	Genotype	Sample Type	State Lab: Sample ID
<input type="checkbox"/>	OH__2019-OB-036			
<input type="checkbox"/>	OH__2019-SP-0103	GII.4 Sydney[P16]	Stool	2019001889
<input type="checkbox"/>	OH__2019-SP-0104	GII.4 Sydney[P16]	Stool	2019001891

- The suggested matches will contain norovirus strain data from CaliciNet that have been formatted to match the NORS Isolates table, including the fields for sample type and state lab sample ID.

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.

- Users can add or ignore the CaliciNet strain data shown in the Add Isolate pop-up:
 - *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.
 - *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 nightly in the NORS record. This link is indicated by the link symbol in the NORS Isolates table.

Isolates										
+ Add Isolate										
CDC System	State lab ID/CaliciNet key/PulseNet key	PulseNet Outbreak Code or CaliciNet Outbreak Number	CDC PulseNet Pattern Designation for Enzyme 1	CDC PulseNet Pattern Designation for Enzyme 2	CaliciNet Sequenced Region/Whole Genome Sequencing ID	CaliciNet Genotype/Other Molecular Designation	Predicted Resistance Pattern	Non-Susceptible Pattern	Sample Type	State Lab: Sample ID
<input type="checkbox"/>	CaliciNet	OH__2019-SP-0104	2019-OB-262			GII.4 Sydney [P16]			Stool	2019001891
There is 1 suggested CaliciNet isolate available to add.										

- 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 drug.

PulseNet

PulseNet is a network of local, state, and federal public health labs that began in 1996. PulseNet detects cases of related illnesses through pulsed-field gel electrophoresis (PFGE) and 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**

It is important to note that PulseNet isolates that only undergo whole-genome sequencing (WGS), without pulsed-field gel electrophoresis (PFGE) run, are not yet accessible to link to a NORS report using this feature. If this is the case for your isolates, please add your isolates normally, citing "Other" as your CDC System.

ADDING AN ISOLATE

Users can find the Isolates table within the Etiology section (52.13 form) or Etiology & Lab section (52.12 form) of their NORS report.

Step 1: Click to add isolate to NORS report

The screenshot shows the top navigation bar with the following information: Status: Active, Primary Mode: Food, State ID: test_RSfood, CDC ID: 90235, Created: Monday, 06/04/2018, and Author: RSilver. Below this is a breadcrumb trail: General Section > Etiology > Food > Attachments > Finalize. The main content area has a header 'Isolates' and a blue button with a plus icon and the text 'Add Isolate' highlighted with a red rectangular box.

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

The screenshot shows the 'Add Isolate' dialog box overlaid on the 'General Etiology' section. The dialog has a title bar 'Add Isolate' and a 'CDC System' dropdown menu highlighted with a red box. The dropdown menu is open, showing options: CaliciNet, CaliciNet, CryptoNet, NARMS, PulseNet (highlighted in blue), Other, Unknown, and None. Below the dropdown are several text input fields: 'State lab ID/Accession ID/CaliciNet key/PulseNet ID', 'PulseNet Outbreak or CaliciNet Outbreak Number', 'CDC PulseNet Pattern Designation for Enzyme 1', 'CDC PulseNet Pattern Designation for Enzyme 2', 'CaliciNet Sequenced Region/Whole Genome Sequencing ID', and 'CaliciNet Genotype/Other Molecular Designation'. At the bottom of the dialog are 'Cancel' and 'Add' buttons. The background shows the 'General Etiology' section with a 'Previous' and 'Next' button.

OPTION I — SEARCH AND ADD ISOLATES BY PULSENET KEY

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

Add Isolate

CDC System

Find isolates where:

contains

1 isolate found that is available to add

<input type="checkbox"/>	Genus	Species	Serotype	PulseNet Key	State	Outbreak	Source Type
<input type="checkbox"/>	Campylobacter	jejuni		<input type="text" value="NORS___12345"/>	NORS	2018-ABCD	Human

Contact pulsenet@cdc.gov if isolate information is incorrect

Step 3B: OR Search isolates by PulseNet Key where the PulseNet Key is a partial match

Add Isolate

CDC System PulseNet

Find isolates where:

PulseNet Key contains 12345 Search

36 isolates found that are available to add

<input type="checkbox"/>	Genus	Species	Serotype	PulseNet Key	State	Outbreak	Source Type
<input type="checkbox"/>	Campylobacter	jejuni		NORS__123456	NORS	2018-ABCD	Human
<input type="checkbox"/>	Campylobacter	jejuni		NORS__12345	NORS	2018-ABCD	Human
<input type="checkbox"/>	Ecoli		O157:H7	NORS__012345	NORS		Human
<input type="checkbox"/>	Listeria	monocytogenes		NORS__1234567	NORS		Human
<input type="checkbox"/>	Ecoli 57		O153:H25	NORS__812345	NORS		Human
<input type="checkbox"/>	Ecoli		O26:Undetermined	NORS__9123459	NORS		Human
<input type="checkbox"/>	Ecoli			NORS__1234500	NORS		Human

Contact pulsenet@cdc.gov if isolate information is incorrect

Cancel Add

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

Add Isolate

CDC System PulseNet

Find isolates where:

PulseNet Key contains 12345 Search

36 isolates found that are available to add

<input type="checkbox"/>	Genus	Species	Serotype	PulseNet Key	State	Outbreak	Source Type
<input checked="" type="checkbox"/>	Campylobacter	jejuni		NORS__123456	NORS	2018-ABCD	Human
<input checked="" type="checkbox"/>	Campylobacter	jejuni		NORS__12345	NORS	2018-ABCD	Human
<input type="checkbox"/>	Ecoli		O157:H7	NORS__012345	NORS		Human
<input type="checkbox"/>	Listeria	monocytogenes		NORS__1234567	NORS		Human
<input type="checkbox"/>			O153:H25	NORS__812345	NORS		Human
<input type="checkbox"/>	Ecoli		O26:Undetermined	NORS__9123459	NORS		Human
<input type="checkbox"/>	Ecoli			NORS__1234500	NORS		Human

Contact pulsenet@cdc.gov if isolate information is incorrect

Cancel Add

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

CDC System	State lab ID/Accession ID/CaliciNet key/PulseNet key	PulseNet Outbreak Code or CaliciNet Outbreak Number	CDC PulseNet Pattern Designation for Enzyme 1	CDC PulseNet Pattern Designation for Enzyme 2	CaliciNet Sequenced Region/Whole Genome Sequencing ID	CaliciNet Genotype/Other Molecular Designation	Predicted Resistance Pattern	Non-Susceptible Pattern
%	PulseNet NORS__123456	2018-ABCD	DBRS16.0170	Unrestricted	PNUSAC0001		ATCipNalGenEryAzmTelCli	TCipNalGenEryAzmTelCli *
%	PulseNet NORS__12345	2018-ABCD	DBRS16.0170	Unrestricted	PNUSAC0002		ATCipNalEryAzmTelCli	TCipNalEryAzmTelFfnCli *

OPTION II — SEARCH AND ADD ISOLATES BY PULSENET OUTBREAK CODE

Step 3: Search isolates by **PulseNet Outbreak Code**

Add Isolate

CDC System PulseNet

Find isolates where:

PulseNet Outbreak Code is 2018-ABCD Search

49 isolates found that are available to add

<input type="checkbox"/>	<u>Genus</u>	<u>Species</u>	<u>Serotype</u>	<u>PulseNet Key</u>	<u>State</u>	<u>Source Type</u>
<input type="checkbox"/>	Campylobacter	jejuni		NORS__123456	NORS	Human
<input type="checkbox"/>	Campylobacter	jejuni		CDC__54321	CDC	Human
<input type="checkbox"/>	Campylobacter	jejuni		NORS__12345	NORS	Human
<input type="checkbox"/>	Campylobacter	jejuni		CDC__67589	CDC	Human
<input type="checkbox"/>	Campylobacter	jejuni		RSA__24680	RSA	Human
<input type="checkbox"/>	Campylobacter	jejuni		RSA__111555	RSA	Human
<input type="checkbox"/>	Campylobacter	jejuni		NORS__1234567	NORS	Human

Contact pulsenet@cdc.gov if isolate information is incorrect

Cancel Add

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

Add Isolate

CDC System PulseNet ▼

Find isolates where:

PulseNet Outbreak Code is 2018-ABCD Search

49 isolates found that are available to add

<input type="checkbox"/>	Genus	Species	Serotype	PulseNet Key	State	Source Type
<input checked="" type="checkbox"/>	Campylobacter	jejuni		NORS__123456	NORS	Human
<input checked="" type="checkbox"/>	Campylobacter	jejuni		CDC__54321	CDC	Human
<input checked="" type="checkbox"/>	Campylobacter	jejuni		NORS__12345	NORS	Human
<input checked="" type="checkbox"/>	Campylobacter	jejuni		CDC__67589	CDC	Human
<input type="checkbox"/>	Campylobacter	jejuni		RSA__24680	RSA	Human
<input type="checkbox"/>	Campylobacter	jejuni		RSA__111555	RSA	Human
<input type="checkbox"/>	Campylobacter	jejuni		NORS__1234567	NORS	Human

Contact pulsenet@cdc.gov if isolate information is incorrect

Cancel Add

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

Isolates								
+ Add Isolate								
CDC System	State lab ID/Accession ID/CaliciNet key/PulseNet key	PulseNet Outbreak Code or CaliciNet Outbreak Number	CDC PulseNet Pattern Designation for Enzyme 1	CDC PulseNet Pattern Designation for Enzyme 2	CaliciNet Sequenced Region/Whole Genome Sequencing ID	CaliciNet Genotype/Other Molecular Designation	Predicted Resistance Pattern	Non-Susceptible Pattern
PulseNet	NORS__123456	2018-ABCD	DBRS16.1390	Unrestricted	PNUSAC0001			
PulseNet	CDC__54321	2018-ABCD	DBRS16.0170		PNUSAC3004		Not analyzed	TCipNalGenEryAzmTelFnCli
PulseNet	NORS__12345	2018-ABCD	DBRS16.0164	Unrestricted	PNUSAC0002			
PulseNet	CDC__67589	2018-ABCD	DBRS16.0170		PNUSAC1005		Not analyzed	TCipNalGenEryAzmTelCli

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 all isolates from an outbreak code if desired by selecting the top check box.
- 3) Users can sort all columns by clicking on the headers.
- 4) 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.

Add Isolate

CDC System PulseNet

Find isolates where:

PulseNet Key contains Search

1 36 isolates found that are available to add

<input checked="" type="checkbox"/>	2 Genus	Species	Serotype	PulseNet Key	State	Outbreak	Source Type
<input checked="" type="checkbox"/>	Campylobacter	jejuni		NORS__123456	NORS	2018-ABCD	Human
<input checked="" type="checkbox"/>	Campylobacter	jejuni		NORS__12345	NORS	2018-ABCD	Human
<input checked="" type="checkbox"/>	Ecoli		O157:H7	NORS__012345	NORS		Human
<input checked="" type="checkbox"/>	Listeria	monocytogenes	not typed	NORS__1234567	NORS		Human
<input checked="" type="checkbox"/>	Ecoli		O153:H25	NORS__812345	NORS		Human
<input checked="" type="checkbox"/>	Ecoli		O26:Undetermined	NORS__912345	NORS		Human
<input checked="" type="checkbox"/>	Ecoli			NORS__1234500	NORS		Human

3

4 Contact pulsenet@cdc.gov if isolate information is incorrect

Cancel Add

- 5) The link symbol indicates the isolate information in that row is linked to the PulseNet database and therefore cannot be edited.
- 6) Any NARMS data linked by PulseNet Key to added isolates is displayed in the Isolates table.
- 7) Users have the ability to remove isolates from their NORS report by clicking the “x” on the right side.

Isolates										
+ Add Isolate										
	CDC System	State lab ID/Accession ID/CaliciNet key/PulseNet key	PulseNet Outbreak Code or CaliciNet Outbreak Number	CDC PulseNet Pattern Designation for Enzyme 1	CDC PulseNet Pattern Designation for Enzyme 2	CaliciNet Sequenced Region/Whole Genome Sequencing ID	CaliciNet Genotype/Other Molecular Designation	6		
								Predicted Resistance Pattern	Non-Susceptible Pattern	
5 <input checked="" type="checkbox"/>	PulseNet	NORS__123456	2018-ABCD	DBRS16.0170	Unrestricted	PNUSAC0001		ATCipNalGenEryAzmTelCli	TCipNalGenEryAzmTelCli	7 <input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	PulseNet	NORS__12345	2018-ABCD	DBRS16.0170	Unrestricted	PNUSAC0002		ATCipNalEryAzmTelCli	TCipNalEryAzmTelFfnCli	<input checked="" type="checkbox"/>

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 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:

Only one outbreak code may be associated with a report

- b) If a user tries to add an isolate 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. 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.

Add Isolate

CDC System PulseNet

Find isolates where:

PulseNet Key contains Search

0 isolates found that are available to add

<input type="checkbox"/>	Genus	Species	Serotype	PulseNet Key	State	Outbreak	Source Type
<input checked="" type="checkbox"/>	Campylobacter			NORS___20180101	NORS		Human

- 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.

Isolates								
<p>⚠ This report contains multiple PulseNet outbreak codes. Please remove PulseNet isolates that do not belong to this report, or contact pulsenet@cdc.gov if information is incorrect.</p>								
CDC System	State lab ID/Accession ID/CaliciNet key/PulseNet key	PulseNet Outbreak Code or CaliciNet Outbreak Number	CDC PulseNet Pattern Designation for Enzyme 1	CDC PulseNet Pattern Designation for Enzyme 2	CaliciNet Sequenced Region/Whole Genome Sequencing ID	CaliciNet Genotype/Other Molecular Designation	Predicted Resistance Pattern	Non-Susceptible Pattern

NORSDIRECT USERS

This section assumes you have already read the NORSDirect Training Document (<https://wwwn.cdc.gov/NorsDirect/Resources/NORSDirect%20Training%20Document.pdf>) or reviewed the NORSDirect help page (<https://wwwn.cdc.gov/NorsDirect/UserPages/Instructions.aspx>). 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 StateLabID1–StateLabID99. Users will not be able to add a CaliciNet or PulseNet isolate based on a partial match to a CaliciNet or PulseNet Key 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.

NORS users may also import CaliciNet strain data by entering the state lab specimen ID in the CaliciNet key field, as long as that ID was also entered in CaliciNet. If an exact match is found in CaliciNet, the CaliciNet data will be reformatted to match the NORS interface format, with the CaliciNet key in the CaliciNet key field and the state lab specimen ID moved to the State Lab: Sample ID field.

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 isolate 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.

NORSDirect Isolate Table Variables:

CaliciNet Integration

NORSDirect Import Field Name	Field Description: Isolates	Variable Requirements	Data Validation Checks
CDCSys1em1–CDCSys1em99	CaliciNet	Required	
StateLabID1–StateLabID99	CaliciNet Key	Required	Exact CaliciNet Key(s) or State lab specimen ID(s) required
CDCLabOutbreakID1–CDCLabOutbreak99	CaliciNet outbreak number	Optional*	1 outbreak number permitted per NORS report
OtherMolecularDesignation1–OtherMolecularDesignation99	CaliciNet Genotype	Optional*	

**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
CDCSys1em1–CDCSys1em99	PulseNet	Required	
StateLabID1–StateLabID99	PulseNet Key	Required	Exact PulseNet Key(s) required
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*	
SequenceID1–SequenceID99	Whole Genome Sequencing ID	Optional*	
OtherMolecularDesignation1–OtherMolecularDesignation99	Other Molecular Designation	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	Field Highlighted in NORSDirect
CDC System is <i>CaliciNet</i> but CaliciNet Key is blank.	"A state lab ID is required when other related fields (cdcsystem1, statelabid1) are populated."	StateLabID
No CaliciNet match is found for CaliciNet Key or State lab specimen ID entered.	"The CaliciNet State Lab ID provided was not found or did not match the report."	StateLabID
Multiple CaliciNet isolates are being imported with different outbreak codes for one NORS report.	"Cannot save isolates from more than one outbreak code to a report. CaliciNet Keys must be changed to match a single outbreak code. Contact calicinet1@cdc.gov if outbreak code information is incorrect."	All StateLabIDs
Identical CaliciNet Keys added to the same NORS report.	"Cannot save isolates with identical State lab IDs. Duplicate IDs must be revised."	Duplicate StateLabIDs

PulseNet Integration

Scenario	Error Message	Field Highlighted in NORSDirect
CDC System is <i>PulseNet</i> but PulseNet Key is blank.	"A state lab ID is required when other related fields (cdcsystem1, statelabid1) are populated."	StateLabID
No PulseNet match is found for PulseNet Key entered.	"PulseNet Key provided was not found in PulseNet database and is unable to be linked. The PulseNet Key provided must be edited, or a different CDC System must be specified."	StateLabID
Multiple PulseNet isolates are being imported with different outbreak codes for one NORS report.	"Cannot save isolates from more than one outbreak code to a report. PulseNet Keys must be revised to match a single outbreak code. Contact pulsenet@cdc.gov if outbreak code information is incorrect."	All StateLabIDs
Identical PulseNet Keys added to the same NORS report.	"Cannot save isolates with identical PulseNet Keys. Duplicate PulseNet Keys must be revised."	Duplicate StateLabIDs

NORSDirect files with errors will *not* be uploaded to NORS until errors are addressed.

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 & DRUG 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 genes. This listing of genes 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 genes, 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 susceptibility testing 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".

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 drug, 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.

NARMS Pattern Abbreviation Key:

Pattern Abbreviation	Agent 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
Col	Colistin
Ery	Erythromycin
Ffn	Florfenicol
Fos	Fosfomycin
Fus	Fuscidic acid

Pattern Abbreviation	Agent Name
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