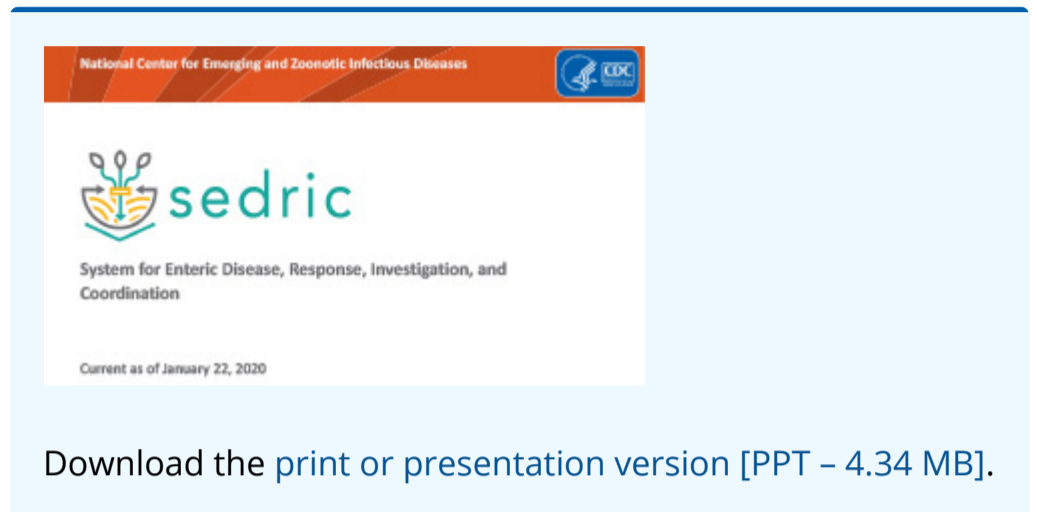


SEDRIC Overview

What is SEDRIC?

- The System for Enteric Disease Response, Investigation, and Coordination
 - Web-based platform (in the cloud) developed by CDC and Palantir Technologies
 - Facilitates collaborative multistate outbreak investigations of enteric disease
- SEDRIC is a customized, off-the-shelf web-based software system with four major capabilities
 - Integrate multiple surveillance data sources in real time
 - Visualize outbreak data rapidly in one place
 - Provide a secure platform for partner collaboration
 - Manage a repository of historic surveillance and outbreak data



Who Uses SEDRIC?

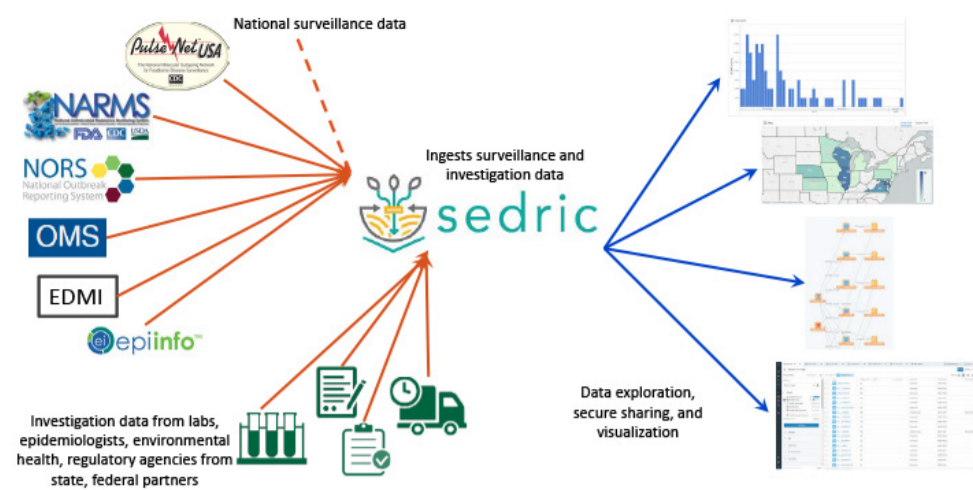
- SEDRIC facilitates secure electronic data-sharing among partners during outbreak investigations
- Partners currently using SEDRIC are epidemiologists, laboratorians, and regulators from
 - State and local health departments
 - CDC
 - FDA
 - USDA-FSIS, USDA-APHIS

How Does SEDRIC Work?

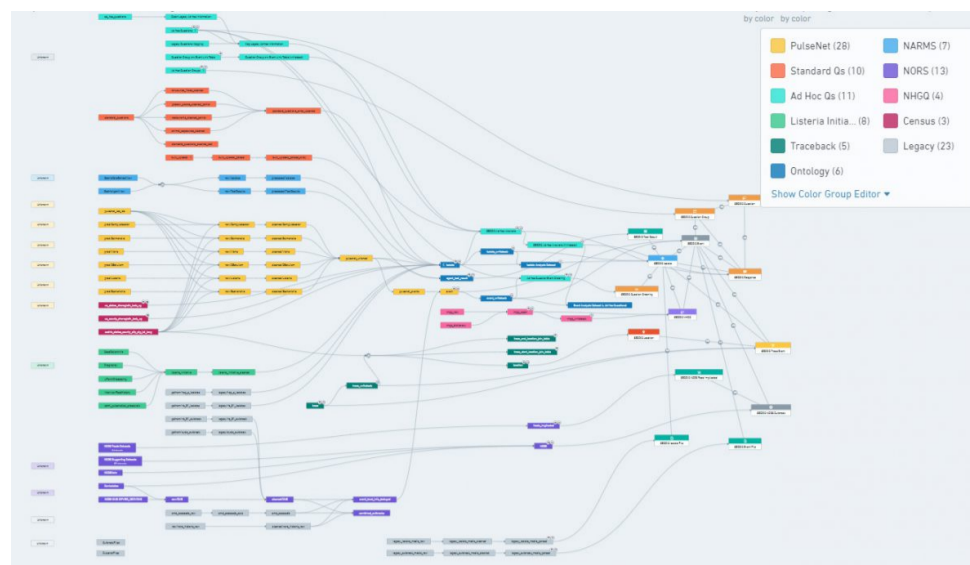
- CDC partners have access to SEDRIC for free
- Data Visualizations
 - Manage and visualize clusters under investigation
 - Visualize trends in time and space
 - Visualize relationships
- Data Management
 - Secure data sharing across agencies in real-time
 - Data exploration
 - Integration of future data sources

How Does This Happen?

SEDRIC ingests surveillance data from PulseNet, NARMS, NORS, OMS, EDMI, and Epi Info as well as investigation data from epidemiologists, environmental health, regulatory agencies from state, federal partners. SEDRIC then compiles this information for data exploration, secure sharing, and visualization.



[View Larger](#)



[View Larger](#)

Highlights and Limitations

- Highlights
 - Intuitive GUI design, easy to learn
 - No software to download, entirely web-based
 - Surveillance data available in almost real-time
 - Multiple surveillance sources available under a single platform (and more being added!)
 - Fast (and pretty!) graphics
 - Secure, real-time data sharing
- Limitations
 - Not an analytical platform
 - Uni-directional data flow

Important Web Links

- <https://sedric.cdc.gov>
- <https://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/sedric.html>
 - Information about SEDRIC
 - Library of Training Documents
 - Link to login

New Upgrade, Features, and Data!

- As of March 12, 2020:
 - SEDRIC upgraded platforms, no longer needing access to Java
 - Added integrations from Epi Info for our National Hypothesis Generating Questionnaire
 - Bulk uploading epidemiological updates has returned
 - Cluster detection
 - Allele Code/PFGE Pattern Crosswalk
 - ... and much, much more!

Data Views and Tools

- **Home Screen**
 - Navigate to multiple search features or select a tool to use
- **Explore Outbreaks**
 - Searchable information for events, from outbreak codes to NORS outbreaks to Outbreak Management System entries
- **Explore and Update Isolates**
 - Line views, searchable isolate information, dashboards, and mapping

- Line list views, searchable isolate information, dashboards, and mapping
- **Object Explorer**
 - All searchable data for filtering, viewing, sorting, and summary statistics
- **NHGQ**
 - Overall views of NHGQ data, along with analyzable charts for each outbreak
- **Test Results (NARMS)**
 - Provides antimicrobial susceptibility results for both phenotypic and genotypic testing
- **NORS Outbreak**
 - Provides read-only information on NORS reports and allows searching across the NORS dataset
- **Tools**
 - [Cluster detection](#)
 - [Allele code/PFGE pattern crosswalk](#)
 - [Pathogen predictor](#)
 - [Text analysis](#)
 - [FoodNet Calculator](#)

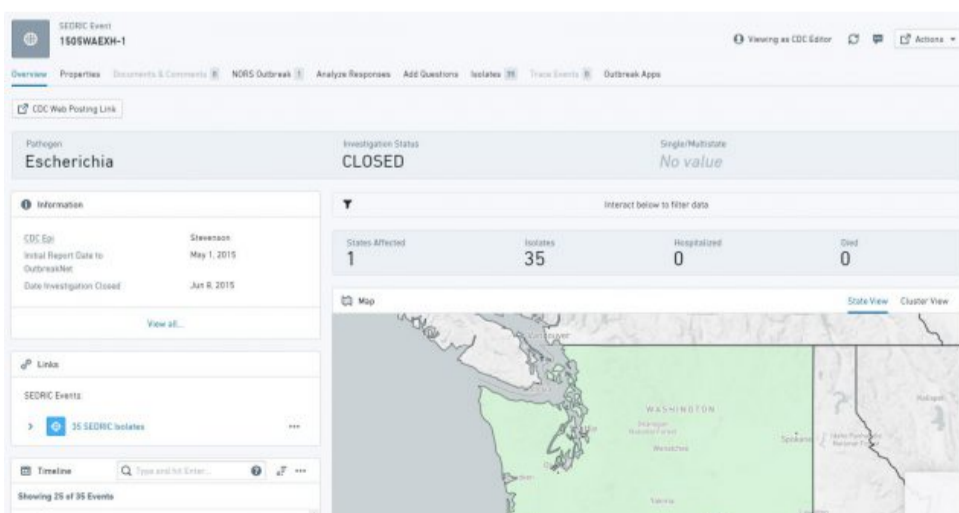
Home Screen

- Welcome screen where buttons for views and tools can be found
- Contact user support
- User documents available



Explore and Update Outbreaks

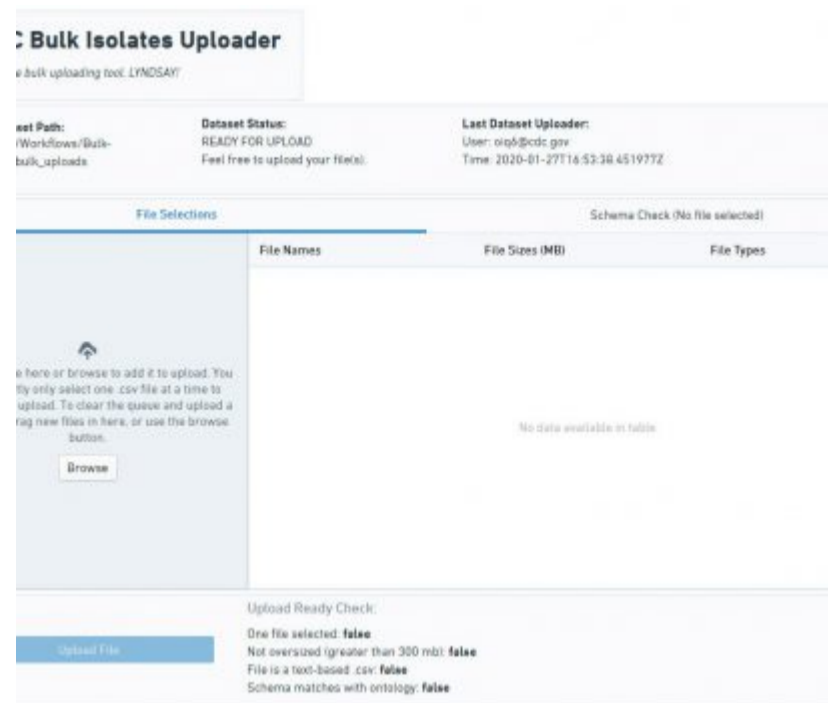
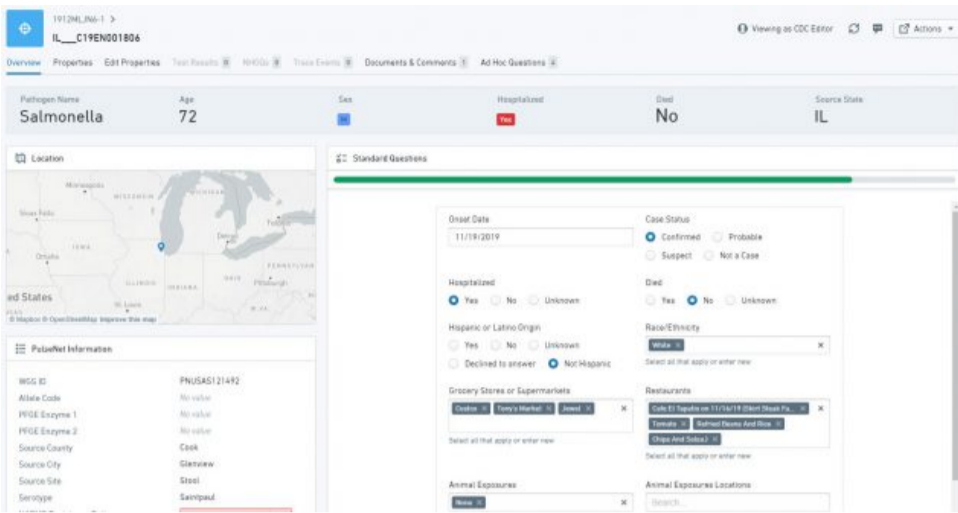
- Look at lists and dashboards of information on events
- Search across outbreaks
- Important documents and questionnaires housed in a single location
- Link to NORS



Explore and Update Isolates

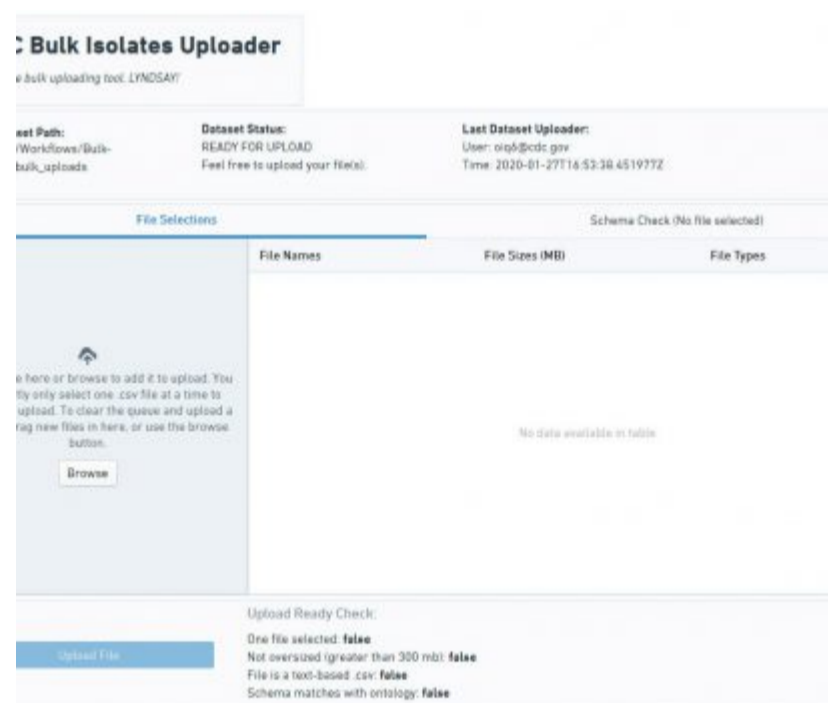
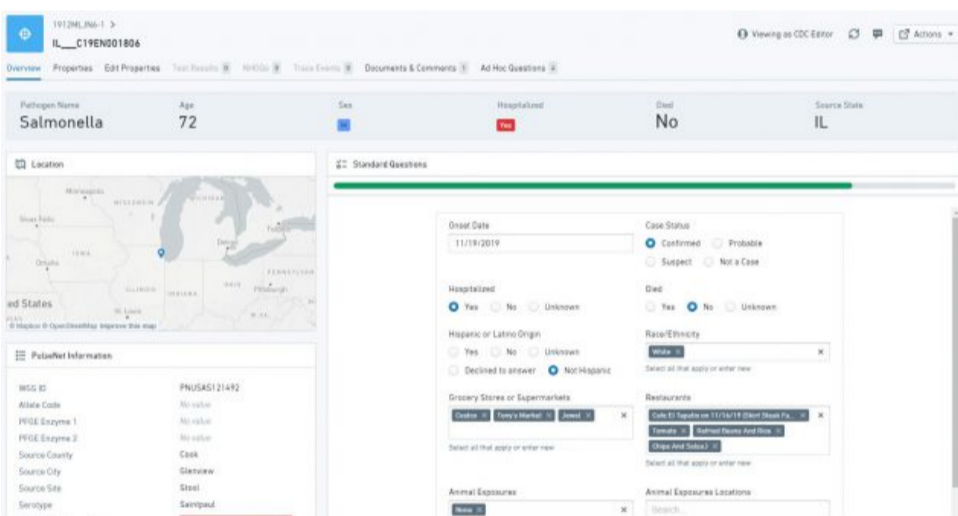
- Look at line list views and dashboards of isolate information

- Answer standard and ad hoc questions
- Store important documents and questionnaires in a single location
- Link to NHGQ data
- Bulk upload of isolates, through a specialized tool



Object Explorer

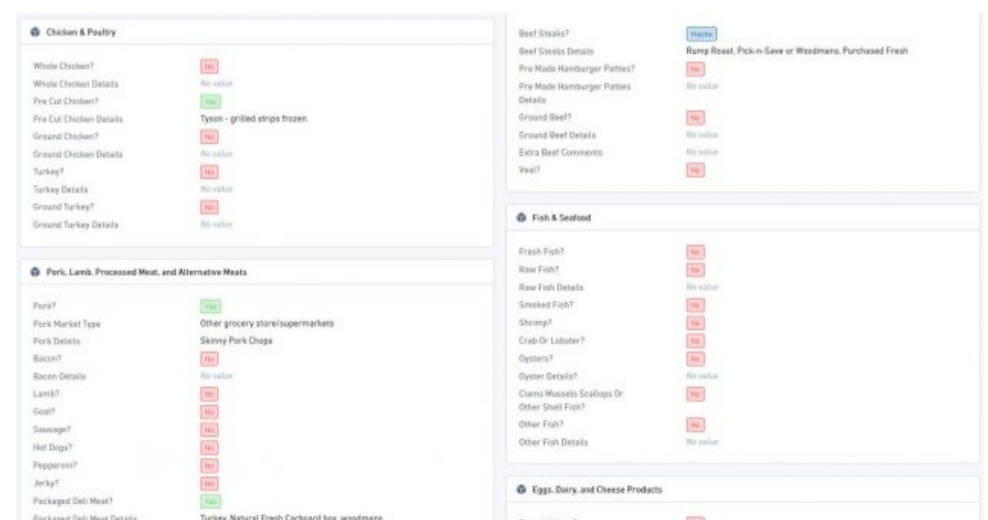
- Search for anything available in the system
- Filter, map, sort, dashboards



NHGQ

- Direct linkage to Epi Info Web Surveys, syncs every 2 hours
- Searchable forms, vehicles, grocery stores
- Easy view form attached to isolates

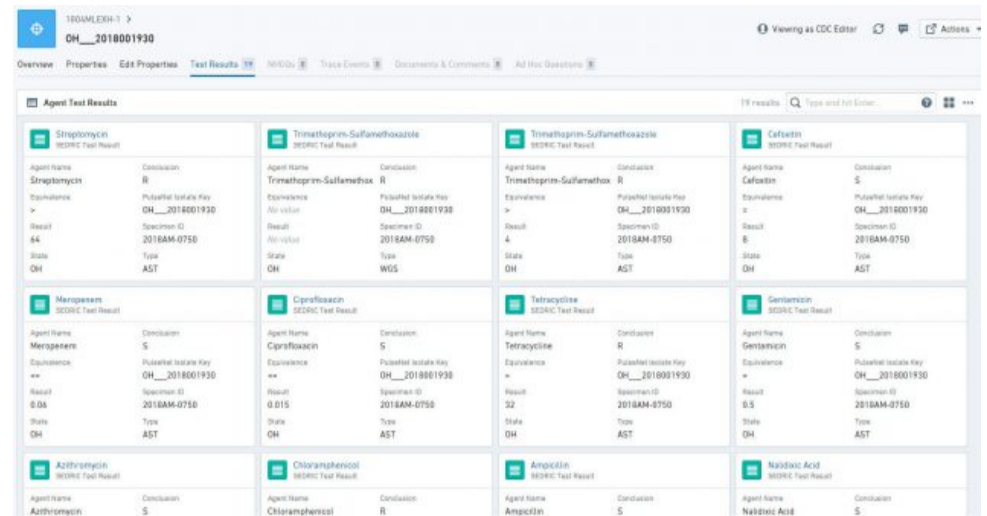
TITLE	OUTBREAK CODE	BELL PEPPER?	SEX	PATHOGEN	SDOH
IL2_S19EN001628	1912MLJN6-1	Don't Know	Female	Salmonella Saintpaul	IL
MD_MDA19133041	1912MLJN6-1	Yes	Female	Salmonella Saintpaul	MD
IL_C19EN001813	1912MLJN6-1	Yes	Female	Salmonella Saintpaul	IL
MD_MDA19130280	1912MLJN6-1	Don't Know	Male	Salmonella Saintpaul	MD
MD_MDA19130279	1912MLJN6-1	Yes	Female	Salmonella Saintpaul	MD
MD_MDA19130626	1912MLJN6-1	Yes	Male	Salmonella Saintpaul	MD
MD_MDA19128446	1912MLJN6-1	Yes	Female	Salmonella Saintpaul	MD
IL19-201908	1912MLJN6-1	Yes	Female	Salmonella Saintpaul	IL
IL19-202595	1912MLJN6-1	Yes	Female	Salmonella Saintpaul	IL
IL19MP015048	1912MLJN6-1	Yes	Male	Salmonella Saintpaul	IL
WI19MP015231	1912MLJN6-1	Yes	Male	Salmonella Saintpaul	WI
MD_MDA19132409	1912MLJN6-1	Maybe		Salmonella Saintpaul	MD



Test Results (NARMS)

- Direct linkage to NARMS, syncs every 2 hours from both phenotypic and predicted genotypic testing

- Direct linkage to NARMS, syncs every 2 hours from both phenotypic and predicted genotypic testing
- Searchable resistance patterns and drugs
- Easy view form attached to isolates



NORS Outbreak

- All finalized reports now available
- Searchable from object explorer
- Full report attached to corresponding outbreaks

TITLE	EXPOSURE SCOPE	EXPOSURE STATE	NORS ID	LAST EXPOSURE
247053		North Carolina	247053	
247057		North Carolina	247057	
248290		Wyoming	248290	
256748		Maine	256748	
247475		Maryland	247475	Sep 2, 1998
248209		Colorado	248209	
250773		California	250773	Jan 22, 2001
256469		Michigan	256469	Mar 31, 2005
257933		Colorado	257933	Jun 19, 2006
260238		Oregon	260238	Nov 29, 2007
260714		Arizona	260714	May 9, 2008

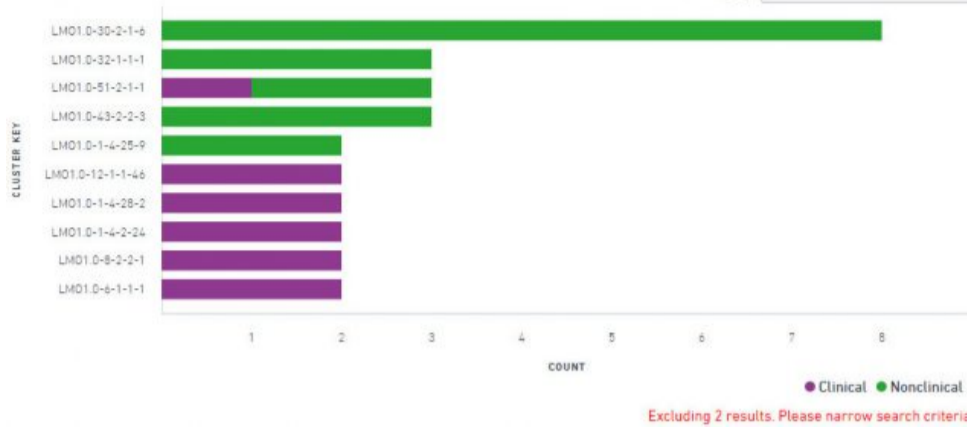
Tools – Cluster Detection

- Enables users to set easy parameters to find clusters of isolates based on allele codes
- Provides exportable listing of isolates for line list generation

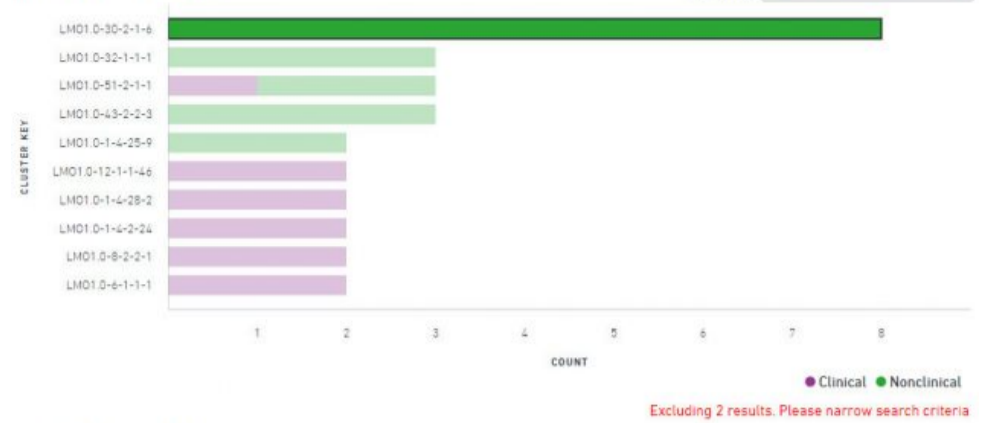
CLUSTER SEARCH CRITERIA

Uploaded Date Range: 2019-09-30 → YYYY-MM-DD
 Source Type: Clinical Nonclinical
 Minimum Isolates: 2 Minimum Allele Digits: 4
 Matching Cluster Properties: Species Genus Pathotype Serotype
 Age: 0-5 6-17 18-49 50-64 65+ allow null
 States: AK, AL, AR, AZ, CA, CO, CT, DC, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD

DETECTED CLUSTERS



DETECTED CLUSTERS



SELECTED ISOLATES

Key	Outbreak	Allele Code	Isolation Date	Sex	Age	Source Type	Species	State
NYAG_19B09479-8		LMD1.0 - 30.2.1.6.1.1	2019-09-09	U		Food	monocytogenes	NYAG
NYAG_19B09479-5		LMD1.0 - 30.2.1.6.1.1	2019-09-09	U		Food	monocytogenes	NYAG
NYAG_19B10266-5		LMD1.0 - 30.2.1.6.1	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19B10266-6		LMD1.0 - 30.2.1.6.1	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19B10264-6		LMD1.0 - 30.2.1.6.1.6	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19B10265-4		LMD1.0 - 30.2.1.6.1	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19B10264-4		LMD1.0 - 30.2.1.6.1.6	2019-09-23	U		Food	monocytogenes	NYAG

Export to CSV

Tools – Allele Code/PFGE Pattern Crosswalk

- Provides a quick comparison of PFGE patterns under an allele code
- Provides a quick comparison of allele codes under a PFGE pattern (or pattern combination)

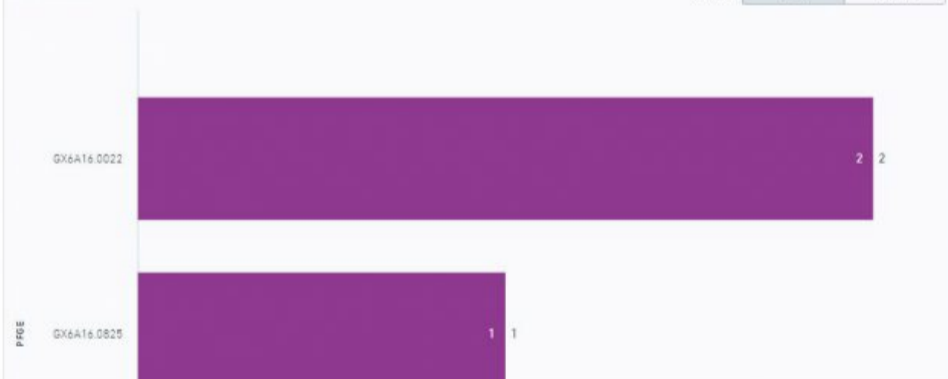
Search by: Allele PFGE 26.1.1.1

Allele Code	Source Site	Source Type	PFGE 1	PFGE 2
LMD1.0 - 26.1.1.1	Blood, Nos	Human	GX6A16.0825	GX6A12.2282
LMD1.0 - 26.1.1.1	Cantaloupe	Food	GX6A16.0022	GX6A12.1336
LMD1.0 - 26.1.1.1	Caf	Human	GX6A16.0022	GX6A12.1336
LMD1.0 - 26.1.1.1	Caf	Human	GX6A16.1665	GX6A12.1749

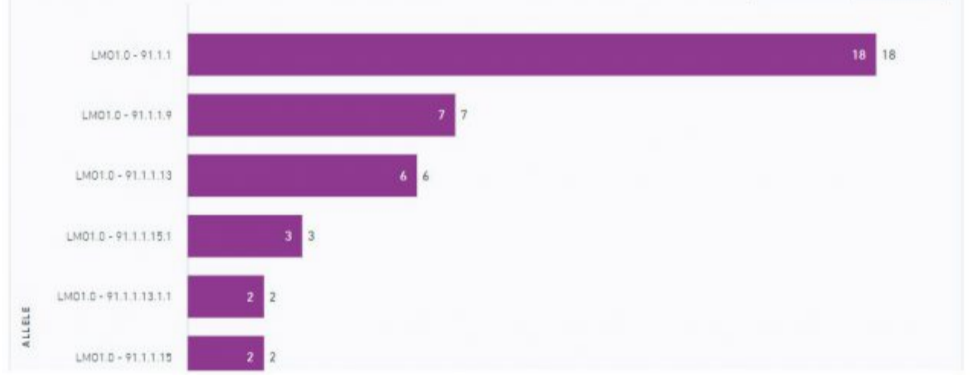
Search by: Allele PFGE GX6A16.0022 AND OR GX6A12.0028

Allele Code	Source Site	Source Type	PFGE 1	PFGE 2
LMD1.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.6.1.1	Cantaloupe	Food	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.6.1.1	Cantaloupe	Food	GX6A16.0022	GX6A12.0028
LMD1.0 - 91.1.1.18	Blood	Human	GX6A16.0022	GX6A12.0028

PFGE 1



PFGE 1



Tools – Pathogen Predictor

- Enter percentage of patients with certain symptoms, get back predicted pathogens to help figure out what testing may need completed

NORS PATHOGEN PREDICTOR

Patient signs	% of patients with symptom
% Bloody Stools	<input type="text" value="50"/>
% Fever	<input type="text" value="0.00"/>
% Vomiting	<input type="text" value="0.00"/>
% Diarrhea	<input type="text" value="90"/>
% Hospitalized	<input type="text" value="30"/>
% Cramps	<input type="text" value="0.00"/>
Shortest Incubation Period (Days)	<input type="text" value="2"/>

PREDICTED PATHOGENS

Pathogen†	Probability
STEC‡	82.83
Campylobacter	14.87
Salmonella	1.98
Shigella	0.31
Norovirus	0.01
Cryptosporidium	0.00
B. cereus	0.00
Staphylococcus	0.00
C. perfringens	0.00

†Campylobacter used as referent pathogen
 ‡Shiga-toxin producing E. coli

Tools – Text Analysis

- Copy and paste, or type, text to get bar charts of word counts
- Word clouds also available
- Can remove common words from the analysis

apples, apples, apples, apples, apples, apples, chicken, beef, ground beef, beef, ground beef, beef, ground beef, dog, dog dog, zucchini

Remove words

I X me X my X myself X
 we X our X ours X ourselves X
 you X your X yours X
 yourself X yourselves X he X
 him X his X himself X she X
 her X hers X herself X it X
 its X itself X they X them X
 their X theirs X themselves X
 what X which X who X
 whom X this X that X these X
 those X am X is X are X

Standard NLTK List removed by default.

Bar Chart

Word	Count
chicken	15
apples	3
beef	6
ground	3
dog	3
zucchini	1

10 words | 1-10

Word Cloud

Tools – FoodNet Calculator

- Use the binomial calculation against the static 2006-2007 FoodNet Population Survey dataset to determine statistical significance of a hypothesized vehicle

FOODNET CALCULATOR

US consumption: 71.3%

Hits	p(at least # hits)	p(exactly # hits)
42	0.00000068	0.00000068
41	0.00001210	0.00001142
40	0.00010636	0.00009426
39	0.00061228	0.00050592
38	0.00259781	0.00198553
37	0.00867191	0.00607410
36	0.02374926	0.01507735
35	0.05496128	0.03121202
34	0.10992705	0.05496576
33	0.19351064	0.08358360
32	0.30453732	0.11102668

10 Year Experience

- Increased speed and efficiency in cluster management and triage
 - Easy, ad-hoc queries at our fingertips
 - Search across surveillance sources
 - Meeting times more effectively utilized
 - Increased efficiency in creating summaries and visualizations for meetings, presentations, publications
- Empowering state and local epidemiologists, laboratorians, and food safety staff to easily mine and visualize their own surveillance data
- **Collaboration!**



Looking Ahead for 2020

- Incorporation of allele codes for all pathogens, new analysis widgets
- Integrating COVIS data
- Integrating Shigella NNDSS data for outbreak response
- Connection with NCBI Pathogen Detection Pipeline
- Additional cluster detection tools