



System for Enteric Disease, Response, Investigation, and  
Coordination

# 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

# 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

# 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

# How does this happen?

National surveillance data

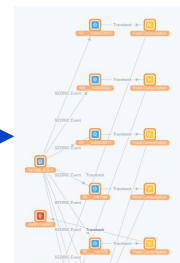
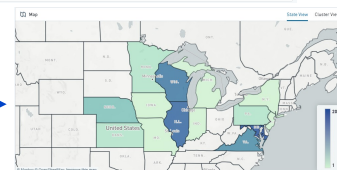
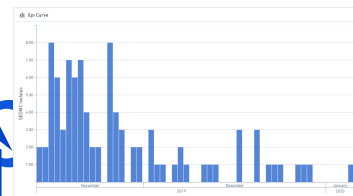


Ingests surveillance and investigation data



sedric

Data exploration,  
secure sharing, and  
visualization



Investigation data from labs,  
epidemiologists, environmental  
health, regulatory agencies from  
state, federal partners



# How does this happen?



# 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

# Tool Comparison

	Web Portal	CIFOR Epi-Lab Software	SEDRIC
<b>Cluster detection</b>	Y (sophisticated)	Y (basic)	Y (basic)
<b>Cluster detection speed</b>	Slower	Faster	Manual
<b>Exposure information</b>	N	Y	Y
<b>Mapping</b>	Y	Y	Y
<b>Ad hoc queries</b>	Y	N	Y
<b>Joining lab and epi data</b>	N	Y (single state data only)	Y (share multistate data)
<b>Automated</b>	Y (once/day)	Y (low, but improving?)	Y (every hour)
<b>Range of events/serotypes</b>	PulseNet only	PulseNet only	PulseNet <i>and</i> other pathogens



# Important Web Links

- <https://sedric.cdc.gov>
- [https://www.cdc.gov/foodsafety/outbreaks/inve](https://www.cdc.gov/foodsafety/outbreaks/investigation/)
  - Information about SEDRIC
  - Library of Training Documents
  - Link to login

# NEW UPGRADE, FEATURES, AND DATA!

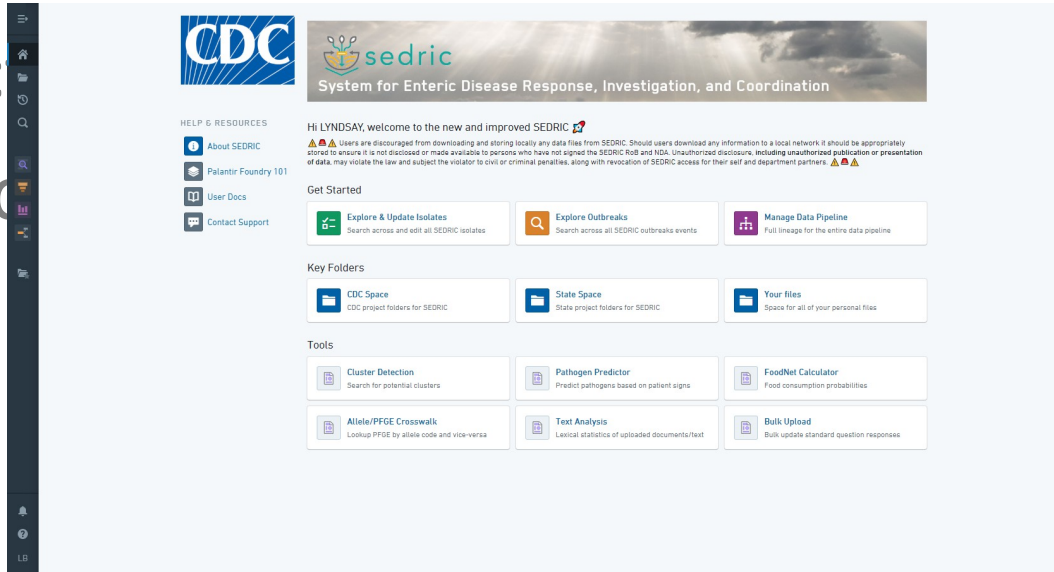
- As of March 12, 2020
  - SEDRIC upgraded platforms, no longer needing access to Java
  - Added integrations from Epi Info for our National Hypothesis Generating Questionnaire
  - Bulk uploading epidemiological updates has returned
  - Cluster detection
  - Allele Code/PFGE Pattern Crosswalk
  - ...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

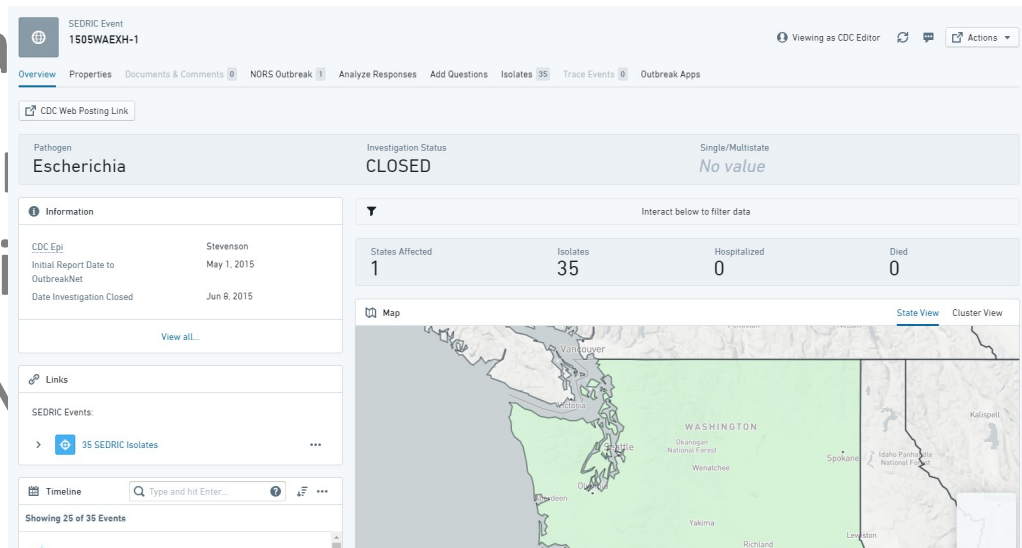
# Home Screen

- Welcome screen where buttons for views and tools can be found
- Contact
- User doc



# Explore and Update Outbreaks

- Look at lists and dashboards of information on events
- Search and filter events
- Import and export data
- Link to N



# Explore and Update Isolates

- Look at line list views and dashboards of isolate information
- Answer standard and ad hoc questions

The screenshot shows the CDC's Pathogen Explorer interface. At the top, the isolate ID is 1912MLJN6-1, and the pathogen is Salmonella. The patient's age is 72, sex is male, and the source state is IL. The isolate is confirmed, and the patient is not hospitalized. The location is shown on a map of the United States, with a pin in the Midwest. The 'Standard Questions' section is expanded, showing details about the onset date (11/19/2019), case status (Confirmed), hospitalization (Yes), and various other clinical and demographic details.

1912MLJN6-1  
IL\_C19END01804

Overview Properties Edit Properties Test Results NHGIs Trace Events Documents & Comments Ad Hoc Questions

Pathogen Name: **Salmonella** Age: **72** Sex: **Male** Hospitalized: **No** Died: **No** Source State: **IL**

Location

Standard Questions

Onset Date: 11/19/2019

Case Status: ☒ Confirmed ☐ Probable ☐ Suspect ☐ Not a Case

Hospitalized: ☒ Yes ☐ No ☐ Unknown

Died: ☐ Yes ☒ No ☐ Unknown

Hispanic or Latino Origin: ☐ Yes ☐ No ☐ Unknown

Race/Ethnicity:

Grocery Stores or Supermarkets:

Restaurants: 

Animal Exposures:

Animal Exposures Locations:

The screenshot shows the SEDRIC Bulk Isolates Uploader interface. It is a web-based tool for uploading bulk isolate data. The interface includes a 'Foundry Dataset Path' field, a 'Dataset Status' section, and a 'Last Dataset Uploaded' section. The 'File Selections' section shows a table with columns for File Names, File Sizes (MB), and File Types. The 'Upload Ready Check' section shows the results of a schema check and file size verification.

SEDRIC Bulk Isolates Uploader

Welcome to the bulk uploading tool. LYNDISAY

Foundry Dataset Path: /CDC/SEDRIC/Workflows/Bulk-Upload/Data/bulk\_uploads

Dataset Status: READY FOR UPLDAD  
Feel free to upload your file(s).

Last Dataset Uploaded: User: upldcdc.gov  
Time: 2020-01-27T16:53:38.451977Z

File Selections

Schema Check (No file selected)

File Names	File Sizes (MB)	File Types
No data available in table		

Upload Ready Check:

One file selected: **false**

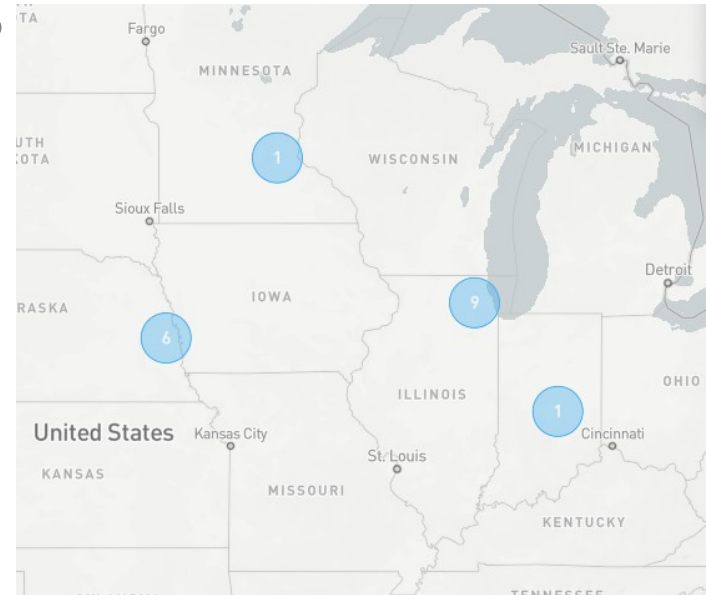
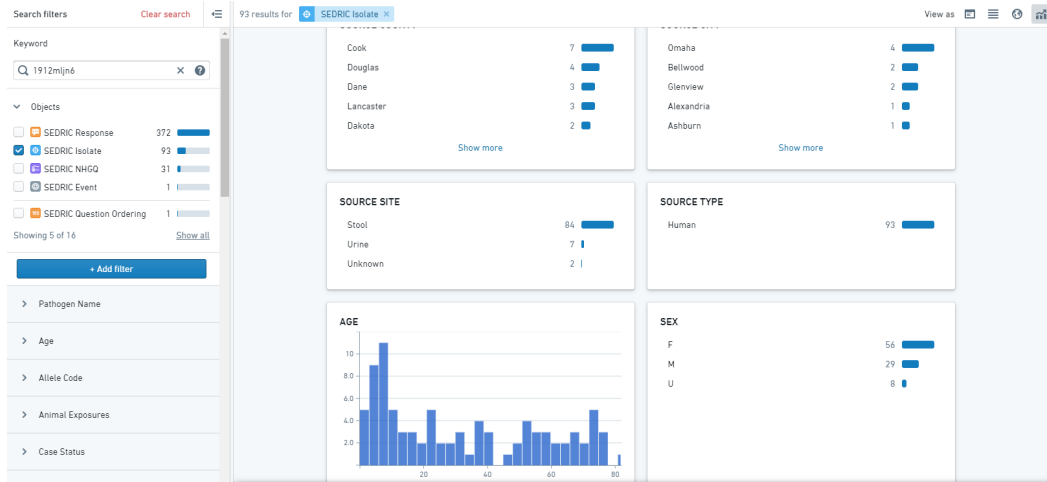
Not oversized (greater than 300 mbi): **false**

File is a text-based csv: **false**

Schema matches with ontology: **false**

# Object Explorer

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



# NHGO

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

31 results for SEDRIC NHGO						View as
TITLE	OUTBREAK CODE	BELL PEPPERS?	SEX	PATHOGEN		
IL2_S19EN001628	1912MLJN6-1	Don't Know	Female	Salmonella Saintpaul		
MD_MDA19133041	1912MLJN6-1	No	Female	Salmonella Saintpaul		
IL_C19EN001813	1912MLJN6-1	No	Female	Salmonella Saintpaul		
MD_MDA19130280	1912MLJN6-1	Don't Know	Male	Salmonella Saintpaul		
MD_MDA19130279	1912MLJN6-1	No	Female	Salmonella Saintpaul		
MD_MDA19130626	1912MLJN6-1	No	Male	Salmonella Saintpaul		
MD_MDA19128446	1912MLJN6-1	No	Female	Salmonella Saintpaul		
IL19-201808	1912MLJN6-1	No	Female	Salmonella Saintpaul		
IL_19-202595	1912MLJN6-1	No	Female	Salmonella Saintpaul		
IL_19MP015048	1912MLJN6-1	No	Male	Salmonella Saintpaul		
WL19MP015231	1912MLJN6-1	No	Male	Salmonella Saintpaul		
MD_MDA19132409	1912MLJN6-1	Maybe		Salmonella Saintpaul		

### Chicken & Poultry

Whole Chicken? No

Whole Chicken Details No value

Pre Cut Chicken? Yes

Pre Cut Chicken Details Tyson - grilled strips frozen

Ground Chicken? No

Ground Chicken Details No value

Turkey? No

Turkey Details No value

Ground Turkey? No

Ground Turkey Details No value

### Pork, Lamb, Processed Meat, and Alternative Meats

Pork? Yes

Pork Market Type Other grocery store/supermarkets

Pork Details Skinny Pork Chops

Bacon? No

Bacon Details No value

Lamb? No

Goat? No

Sausage? No

Hot Dogs? No

Pepperoni? No

Jerky? No

Packaged Deli Meat? Yes

Packaged Deli Meat Details Turkey, Natural Fresh Carboard box, woodmans

### Beef Steaks?

Beef Steaks Details Maybe

Pre Made Hamburger Patties? No

Pre Made Hamburger Patties Details No value

Ground Beef? No

Ground Beef Details No value

Extra Beef Comments No value

Veal? No

### Fish & Seafood

Fresh Fish? No

Raw Fish? No

Raw Fish Details No value

Smoked Fish? No

Shrimp? No

Crab Or Lobster? No

Oysters? No

Oyster Details? No value

Clams Mussels Scallops Or Other Shell Fish? No

Other Fish? No

Other Fish Details No value

### Eggs, Dairy, and Cheese Products

Egg At Home? No



# Test Results (NARMS)

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












- Sample resistance
- Efficacy form att

CSSuTCotTmp (WGS)
CSSuTCotTmp (WGS)
CSSuTCotTmp (WGS)
CSSuTCotTmp (WGS)
CSSuTCotTmp (WGS)
ACSSuTCxTioCotTmp (WGS)
ACSSuT (WGS)
CSSuTCotTmp (WGS)
CSSuTCotTmp (WGS)
No determinants detected (WGS)

1804MEXH-1 > OH__2018001930			
Overview Properties Edit Properties <b>Test Results</b> NNGDs Trace Events Documents & Comments Ad Hoc Questions			
Agent Test Results 19 results			
<b>Sareptomycin</b> SEDRIC Test Result	<b>Trimethoprim-Sulfamethoxazole</b> SEDRIC Test Result	<b>Trimethoprim-Sulfamethoxazole</b> SEDRIC Test Result	<b>Cefoxitin</b> SEDRIC Test Result
Agent Name Conclusion Sareptomycin R	Agent Name Conclusion Trimethoprim-Sulfamethox R	Agent Name Conclusion Trimethoprim-Sulfamethox R	Agent Name Conclusion Cefoxitin S
Equivalence PulseNet Isolate Key > OH__2018001930	Equivalence PulseNet Isolate Key No value OH__2018001930	Equivalence PulseNet Isolate Key > OH__2018001930	Equivalence PulseNet Isolate Key = OH__2018001930
Result 64 Specimen ID 2018AM-0750	Result No value Specimen ID 2018AM-0750	Result 4 Specimen ID 2018AM-0750	Result 8 Specimen ID 2018AM-0750
State Type OH AST	State Type OH WGS	State Type OH AST	State Type OH AST
<b>Meropenem</b> SEDRIC Test Result	<b>Ciprofloxacin</b> SEDRIC Test Result	<b>Tetracycline</b> SEDRIC Test Result	<b>Gentamicin</b> SEDRIC Test Result
Agent Name Conclusion Meropenem S	Agent Name Conclusion Ciprofloxacin S	Agent Name Conclusion Tetracycline R	Agent Name Conclusion Gentamicin S
Equivalence PulseNet Isolate Key <= OH__2018001930	Equivalence PulseNet Isolate Key <= OH__2018001930	Equivalence PulseNet Isolate Key > OH__2018001930	Equivalence PulseNet Isolate Key = OH__2018001930
Result 0.06 Specimen ID 2018AM-0750	Result 0.015 Specimen ID 2018AM-0750	Result 32 Specimen ID 2018AM-0750	Result 0.5 Specimen ID 2018AM-0750
State Type OH AST	State Type OH AST	State Type OH AST	State Type OH AST
<b>Azithromycin</b> SEDRIC Test Result	<b>Chloramphenicol</b> SEDRIC Test Result	<b>Ampicillin</b> SEDRIC Test Result	<b>Naalidixic Acid</b> SEDRIC Test Result
Agent Name Conclusion Azithromycin S	Agent Name Conclusion Chloramphenicol R	Agent Name Conclusion Ampicillin S	Agent Name Conclusion Naalidixic Acid S

# NORS Outbreak

- All finalized reports now available
- Searchable from object explorer


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

Lab Samples - Water 44  
Lab Samples - Other 15  
Lab Tested Etiologies Bacteria, Chemicals  
Lab Test Methods Culture  
AST Performed Yes  
AST Lab NARMS  
AST Outbreak Yes  
Etiology Known Yes  
Etiology Genus Name Escherichia  
Etiology Species Name coli: Shiga toxin-producing  
Etiology Serotype Name O157:H7, other  
Etiology Other Characteristics O61  
Etiology Confirmed true  
Etiology Lab Confirmed Cases 2, 237  
Etiology Identified Patient Specimen, Patient Specimen, Water Sample  
Etiology Bacteria

## Foods Implicated


1 result

Q Type and hit Enter...

<input type="checkbox"/>	TITLE	INGREDIENTS (CONTAMINATED)	FOOD CONFIRMED
<input type="checkbox"/>	 romaine lettuce, unspeci...	romaine lettuce*	Confirmed

## Schools

## Food

Food Vehicle Undetermined	false
Foodborne Evidence	No value
Kitchen Manager	Unknown
Food Worker Implicated	No
Food Worker Implicated Evidence	No value
Contamination Point	Before Preparation
Contamination Point Before Prep	Pre Harvest
Contamination Evidence	Environmental Evic
Where Eaten	 Prison/jail, Private service or pay at cc or unknown type
Where Prepared	Prison/jail, Private service or pay at cc or unknown type
Contributing Factors Unknown	Yes
Contributing Factor Name	No value
Contributing Factor Type	No value
Ground Beef Percentage Consumed	No value
Ground Beef Case Ready	No value
Ground Beef Reground	No value
Egg Information	No value
Egg SE Found On Farm	No value

# 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 <sup>1</sup>  
2019-09-30 → YYYY-MM-DD

Source Type <sup>1</sup>

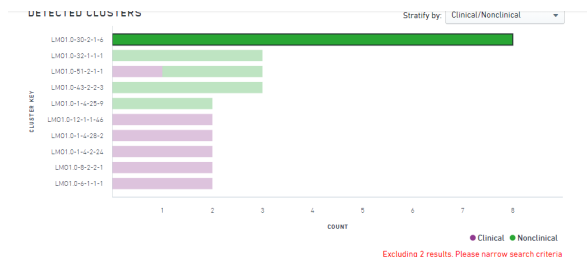
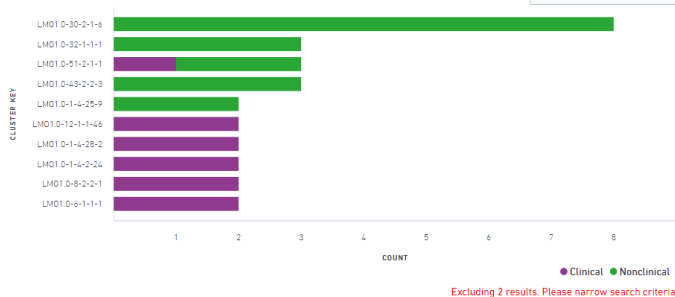
Minimum Isolates <sup>1</sup> 2 Minimum Allele Digits <sup>1</sup> 4

Matching Cluster Properties <sup>1</sup>

Age  
0-5 X 6-17 X 18-49 X  
50-64 X 65+ X allow null X

States  
AK X AL X AR X AZ X CA X  
CO X CT X DC X DE X FL X  
GA X HI X IA X ID X IL X IN X  
KS X KY X LA X MA X MD X

## DETECTED CLUSTERS



## SELECTED ISOLATES

Key	Outbreak	Allele Code	Isolation Date	Sex	Age	Source Type	Species	State
NYAG_19809479-8		LMO1 0 - 30.2.1.6.1.1	2019-09-09	U		Food	monocytogenes	NYAG
NYAG_19809479-5		LMO1 0 - 30.2.1.6.1.1	2019-09-09	U		Food	monocytogenes	NYAG
NYAG_19810266-5		LMO1 0 - 30.2.1.6.1.1	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19810266-6		LMO1 0 - 30.2.1.6.1.1	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19810266-4		LMO1 0 - 30.2.1.6.1.6	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19810265-4		LMO1 0 - 30.2.1.6.1.1	2019-09-23	U		Food	monocytogenes	NYAG
NYAG_19810264-4		LMO1 0 - 30.2.1.6.1.6	2019-09-23	U		Food	monocytogenes	NYAG

Export to CSV

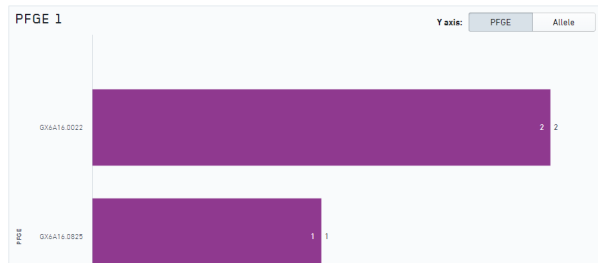
# Tools – Allele Code/PFGE

## 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)

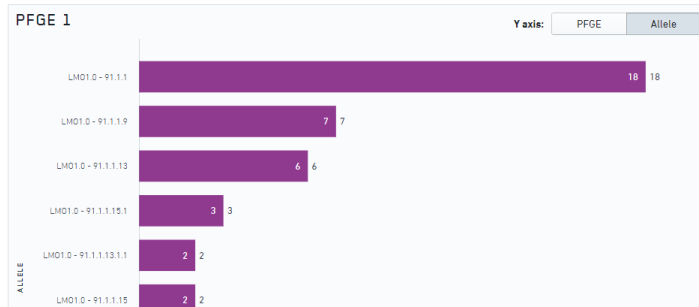
Search by: Allele PFGE

Allele Code	Source Site	Source Type	PFGE 1	PFGE 2
LM01.0 - 26.1.1.1	Blood, Ncs	Human	GX6A16.0825	GX6A12.2282
LM01.0 - 26.1.1.1	Cantaloupe	Food	GX6A16.0022	GX6A12.1336
LM01.0 - 26.1.1.1	Cef	Human	GX6A16.0022	GX6A12.1336
LM01.0 - 26.1.1.1	Cef	Human	GX6A16.1665	GX6A12.1749



Search by: Allele PFGE  AND OR

Allele Code	Source Site	Source Type	PFGE 1	PFGE 2
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.9	Blood	Human	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.1.1	Cantaloupe	Food	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.1.1	Cantaloupe	Food	GX6A16.0022	GX6A12.0028
LM01.0 - 91.1.1.1.1	Blood	Human	GX6A16.0022	GX6A12.0028



# 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)

Show model

Reset

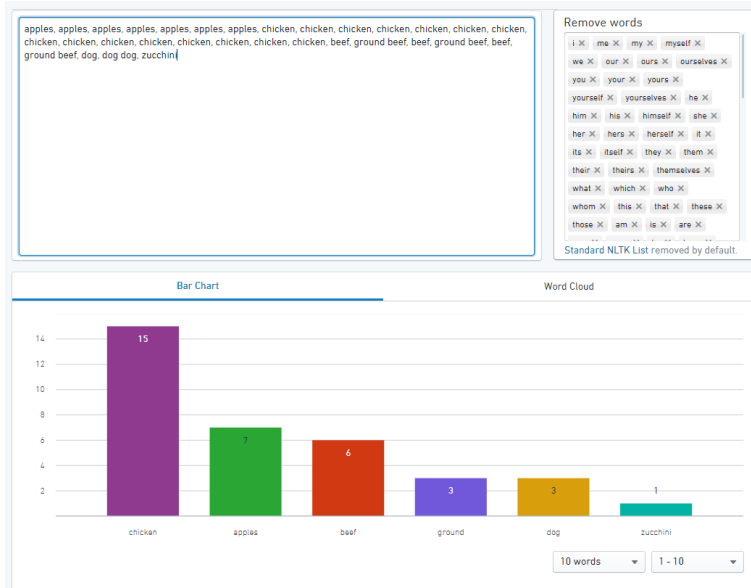
### PREDICTED PATHOGENS

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



# 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



# 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



# 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

For more information, contact:  
[sedric@cdc.gov](mailto:sedric@cdc.gov)  
<https://sedric.cdc.gov>

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

