



**Wisconsin State
Laboratory of Hygiene**
UNIVERSITY OF WISCONSIN-MADISON



With a Little Help from My Friends:
**Update on Surveillance and
Diagnostics at WSLH**

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Who is Here Today?

- A) Laboratorian
- B) Administrator
- C) Public Health
- D) Infection Prevention
- E) Other



Public Health Laboratory Core Functions

- Reference & Specialized Testing
- Disease Prevention, Control & Surveillance
- Emergency (Outbreak) Response
- Partnerships & Communication
- Integrated Data Management
- Training & Education
- Food Safety
- PH-Related Research
- Policy Development
- Laboratory Improvement & Regulation
- Environmental Health & Protection



Reference Center

- Mycobacteriology (WMLN Conference, Oct. 8th)
- Virology (Virology Conference)
- Antibiotic Resistance (AR Lab Network)
- Bacterial Identification and Characterization
 - Serotyping, sequencing, toxin detection, AST
- STDs, Arboviruses
- Parasitology
- Select Agent Testing

Reference Manual- <http://www.slh.wisc.edu/wslhApps/RefMan/wslhSearch.php>



Training and Education

- WCLN Conferences and Webinars
- AR Lab Network fellows
- Bioinformatics fellow
- Micro Director (CPEP) fellows
- UW Medical Students
- UWHC Pathology Residents
- UWHC Infectious Disease Fellows
- UW-LAX Microbiology Masters students





Laboratory Surveillance Programs in Wisconsin

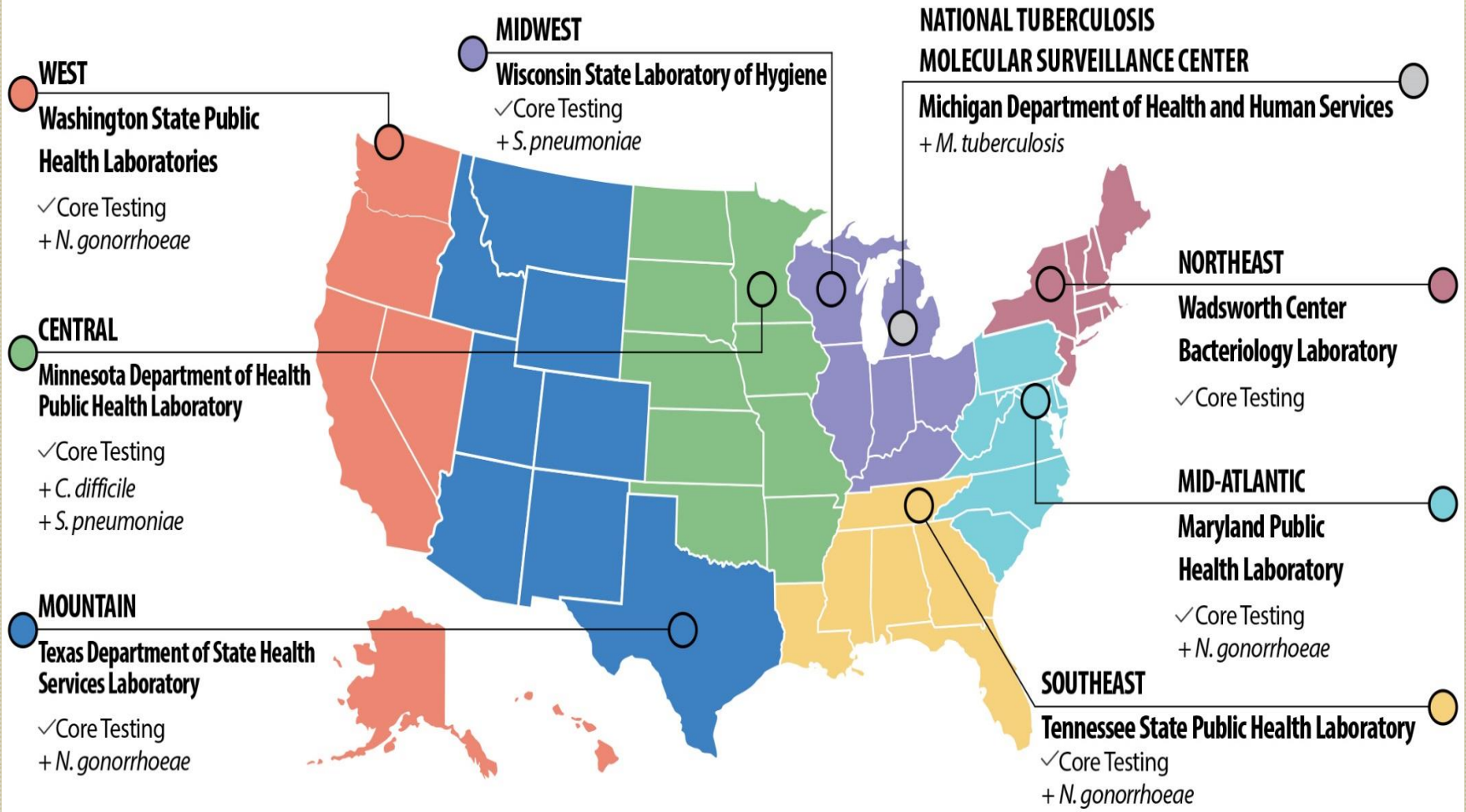
- Antimicrobial Resistance (AR Lab Network)
- Wisconsin Enteric Pathogens (WEPS)
 - PulseNet, NARMS, CryptoNet, CaliciNet
- Invasive Bacterial Surveillance (IBLS)
- Vectorborne Diseases
- Vaccine Preventable Diseases (VPD)
- Influenza and Respiratory Diseases (NIRC)

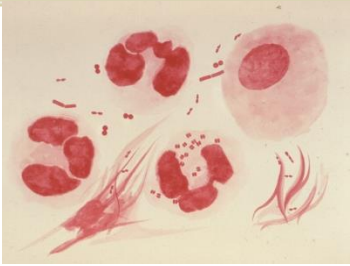


ANTIBIOTIC RESISTANCE

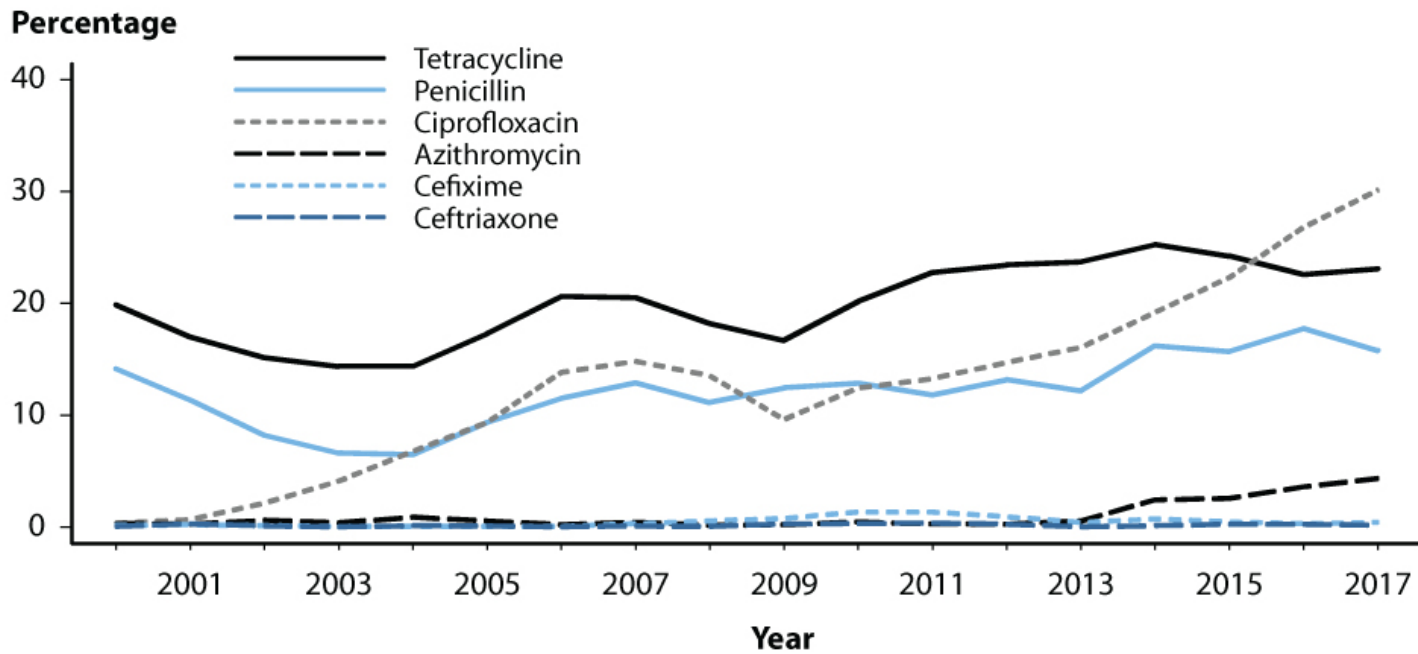


Regional ARLN Lab





Gonorrhea Resistance



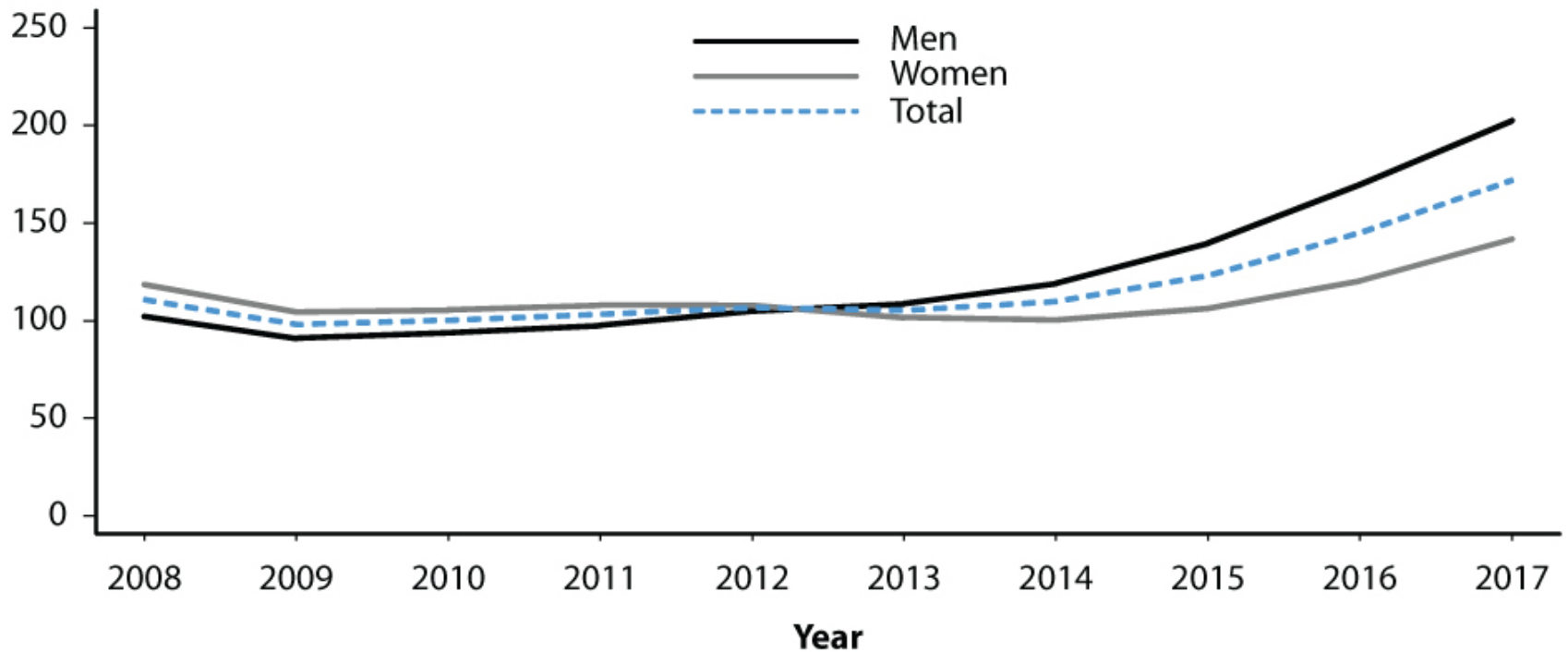


Gonorrhea Incidence

The Rate of Gonorrhea is Increasing
Now More Common in Men than Women

7,925 in WI 2018

Rate (per 100,000 population)



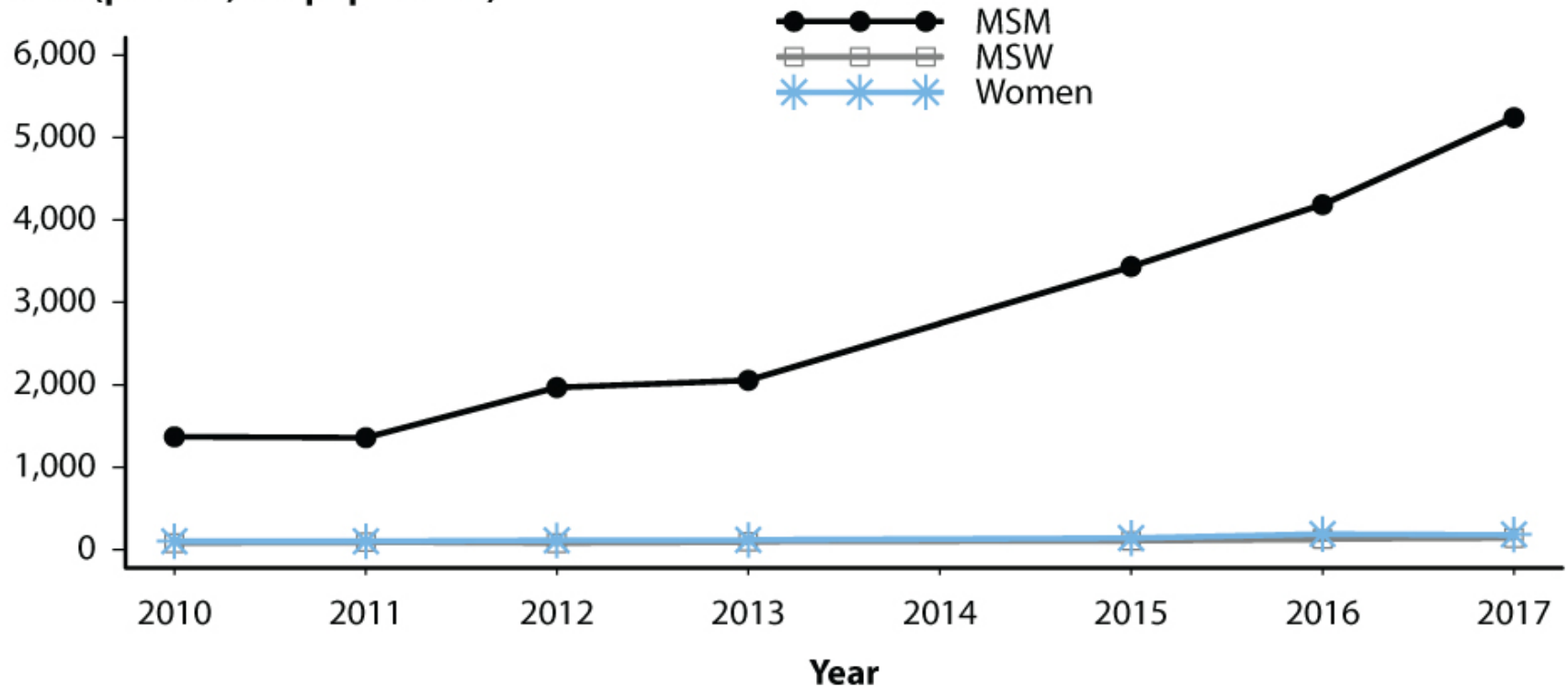


Gonorrhea Incidence

Most Disease is in MSM

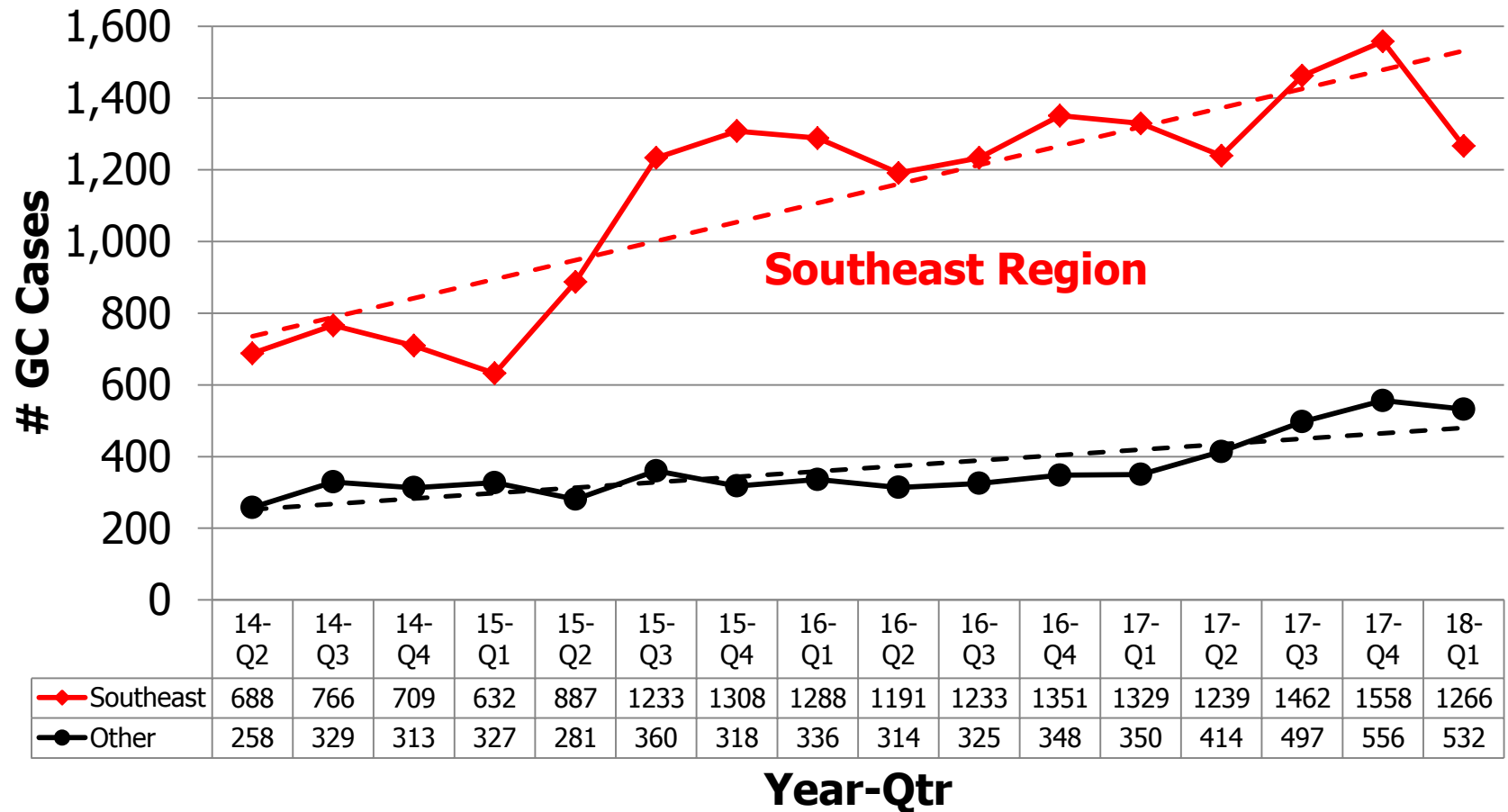
Massive increase in MSM rate in past 6 years

Rate (per 100,000 population)

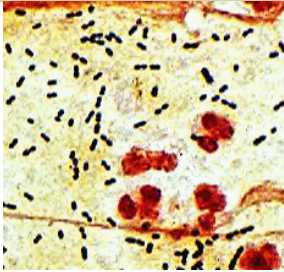




Gonorrhea Cases Reported Wisconsin, by Quarter Apr 2014- Mar 2018

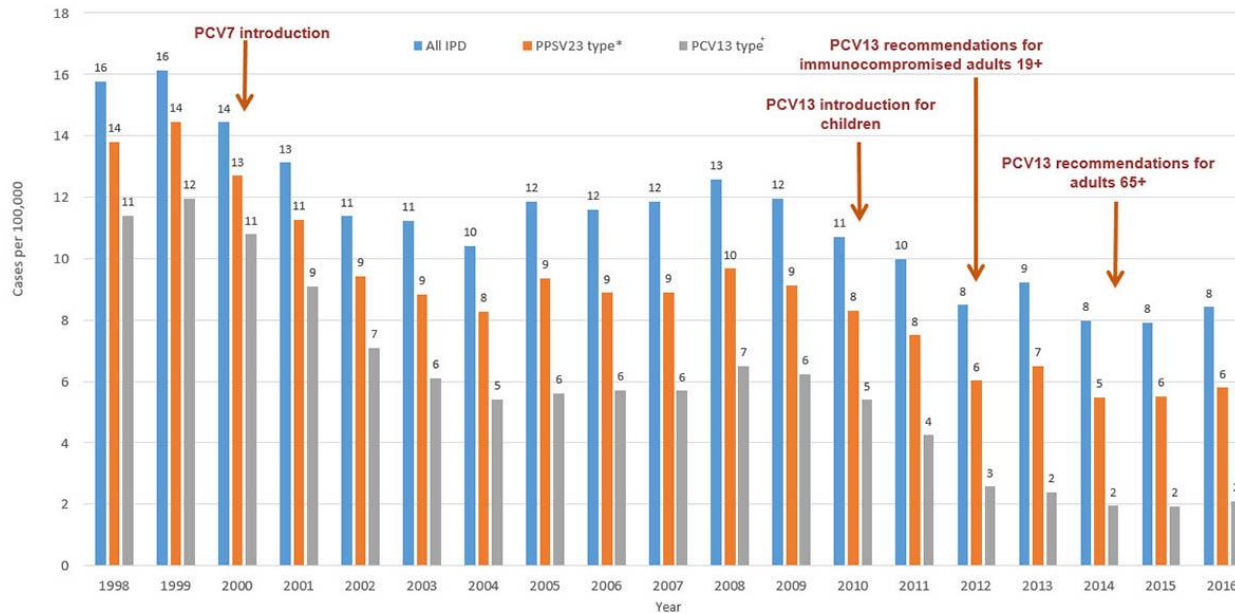


- Data should be considered presumptive; numbers of cases may differ from previously published or final reports.
- Data courtesy of John Pfister



Strep. pneumoniae Invasive Isolates

Trends in invasive pneumococcal disease among adults aged 19-64 years old, 1998-2016



*PPSV23 serotypes: 1, 2, 3, 4, 5, 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19A, 19F, 20, 22F, 23F, and 33F
 *PCV13 serotype: 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F

2018 WI Data

Serotype	#
3	4
7C/(7B/40)	1
10A	1
12F/(12A/44/46)	1
13	1
14	1
15A/15F	2
15B/15C	3
19A	2
19F	2
21	1
22F/22A	2
23A	4
23B	6
33F/33A/37	5
35B	2
38/25F	1
Unable to serotype	1
Total	40

518 Cases reported in WI, 2018

PPSV23 Vaccine
 PCV13 Vaccine

<https://www.cdc.gov/pneumococcal/surveillance.html>



S. pneumoniae Antibiotic Susceptibility

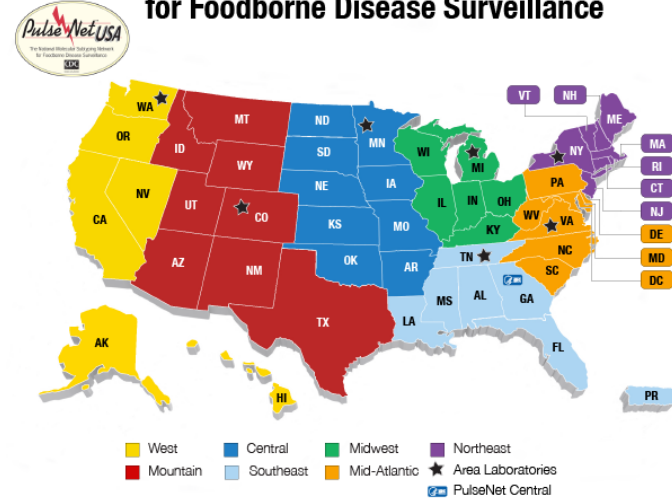
	2010	2011	2012	2017	2018
MENINGITIS Interpretation					
Penicillin	76.0	77.5	79.0	77.2	75.9
Ceftriaxone	92.5	98.3	95.7	90.5	93.1
NON-MENINGITIS Interpretation					
Penicillin	93.2	94.1	96.3	90.7	97.0
Ceftriaxone	96.3	98.3	98.2	98.9	97.3



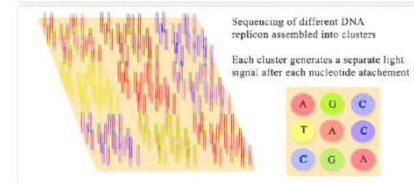
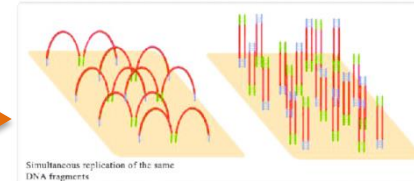
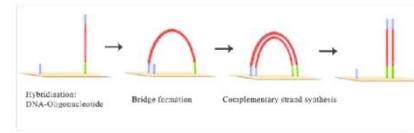
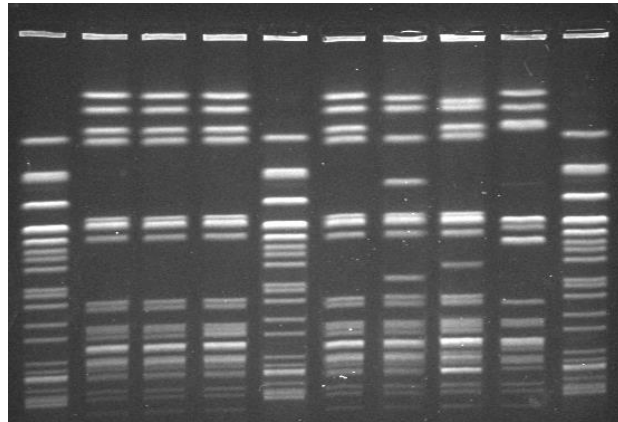
ENTERIC DISEASES



The National Molecular Subtyping Network for Foodborne Disease Surveillance



PFGE

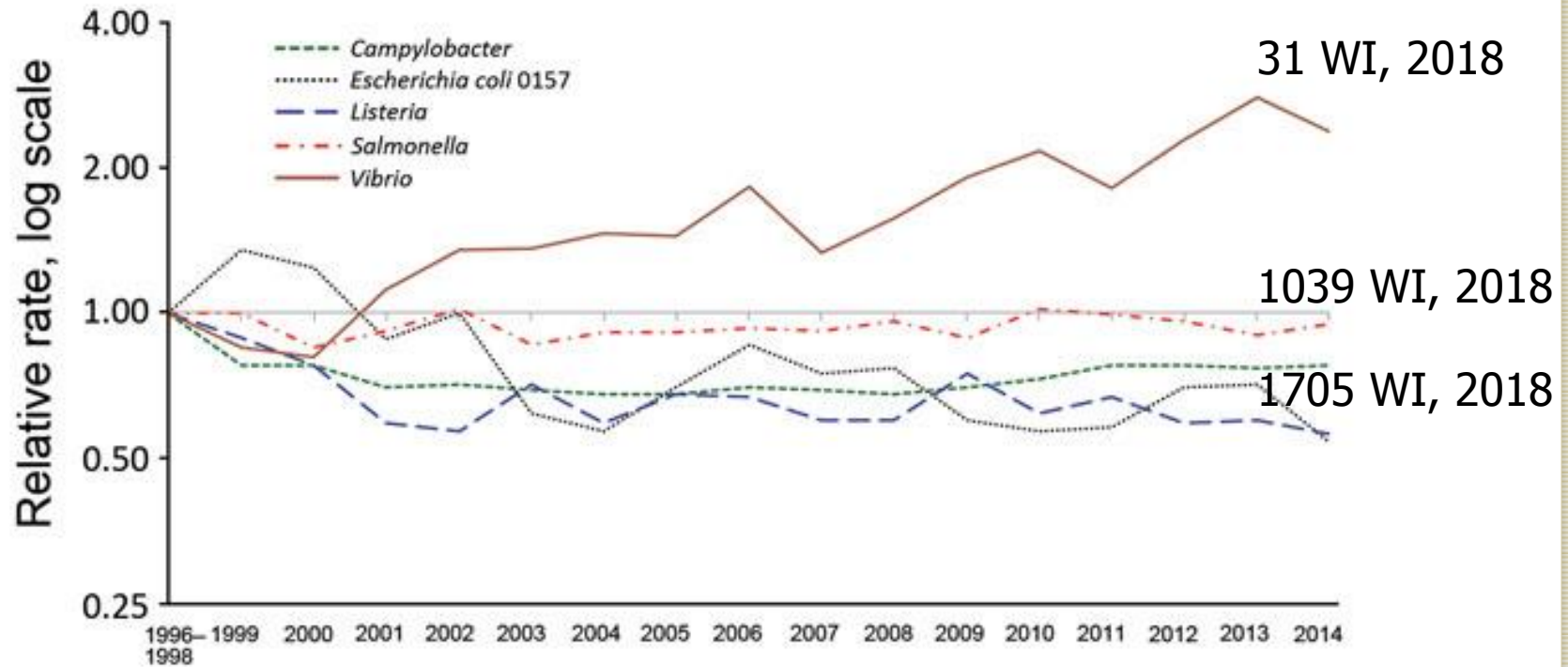


NGS



Bacterial Enteric Disease

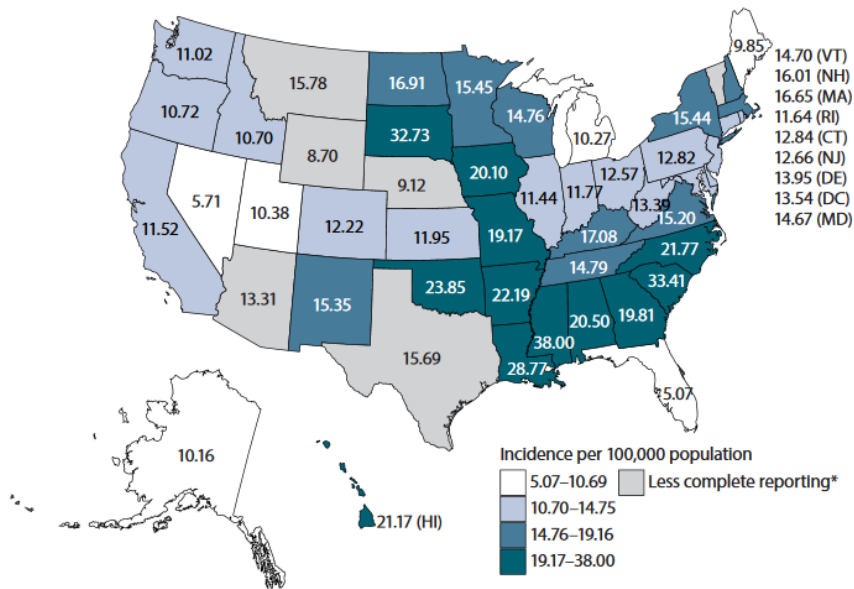
US Rates 1996-2014



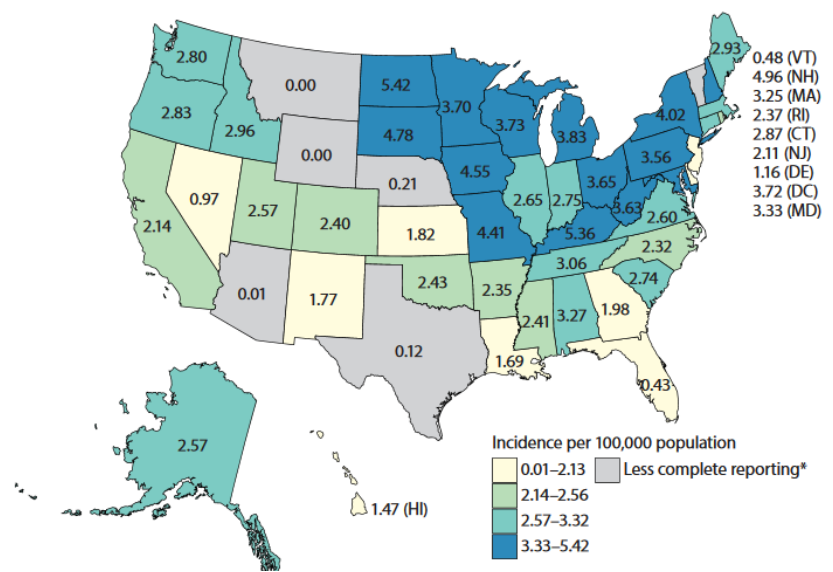


Salmonella

All Salmonella 2016



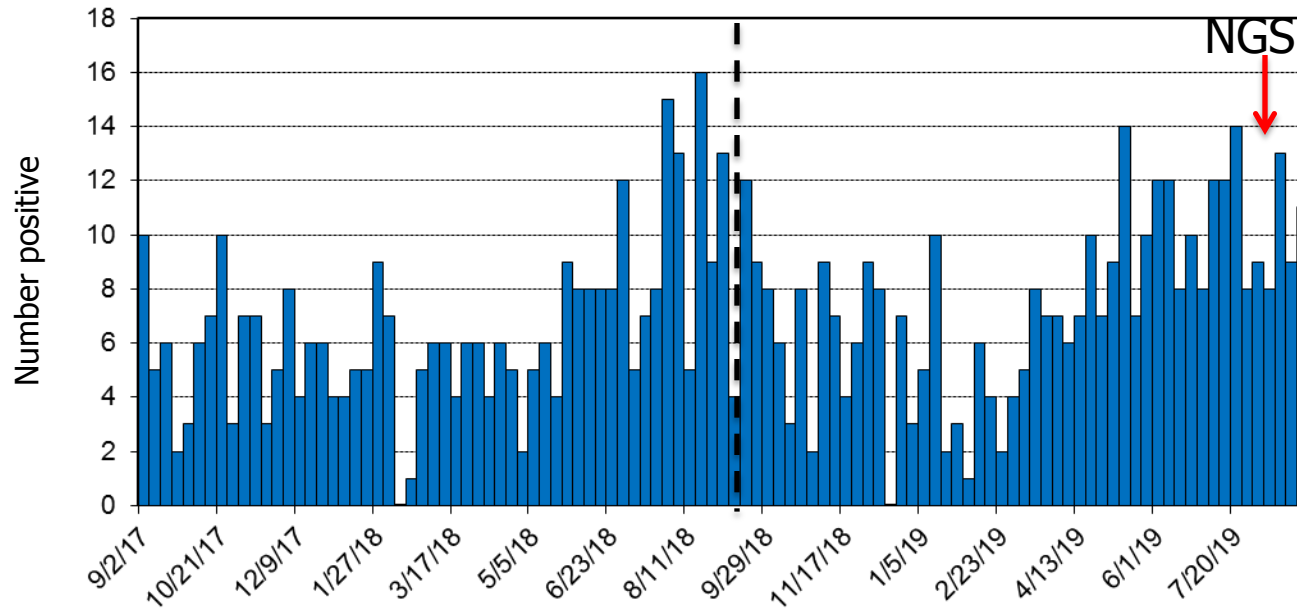
Enteritidis 2016





Salmonella

Salmonella Positives by PCR Sept 2018- Aug 2019



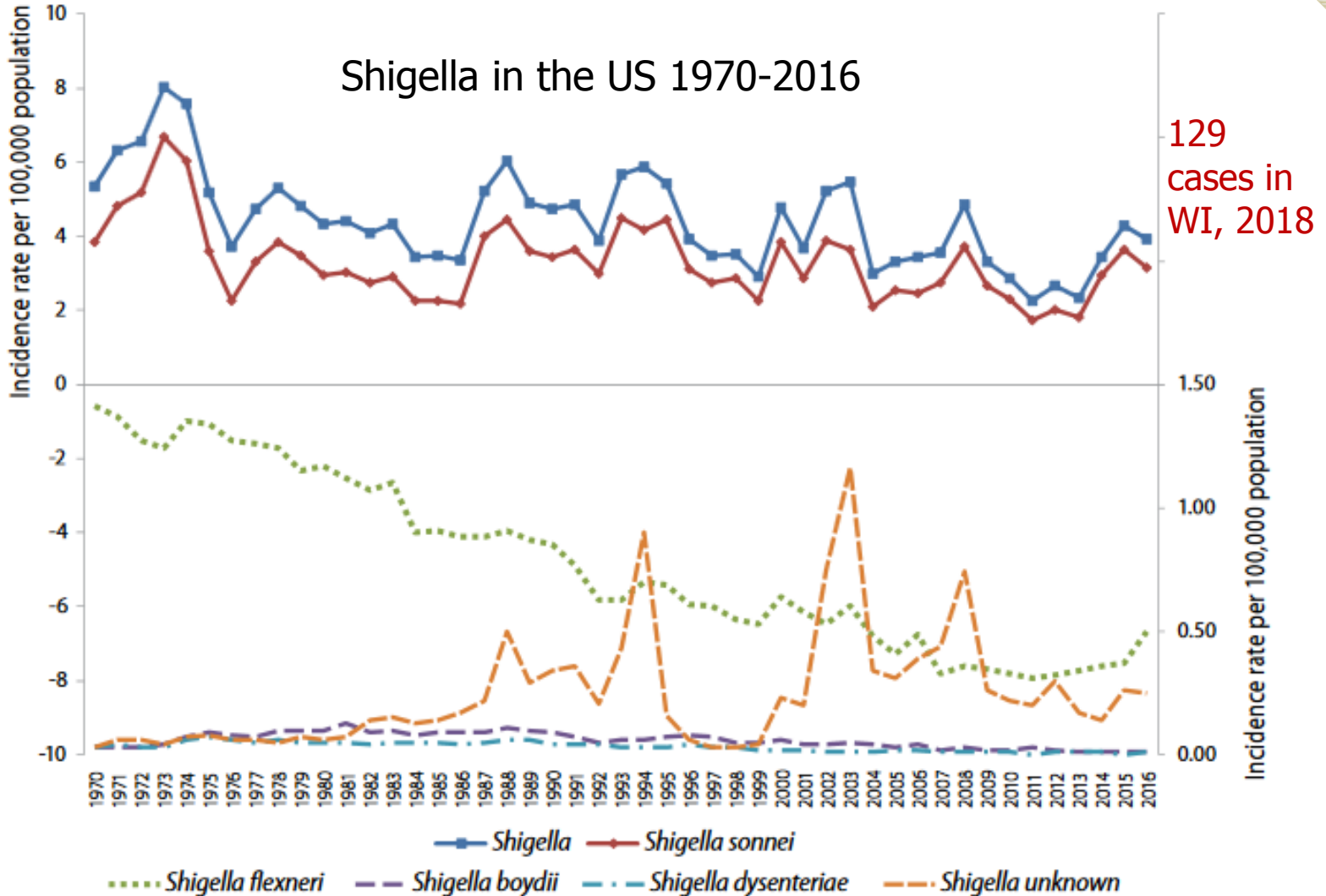
1039 Cases reported in WI, 2018



Shigella



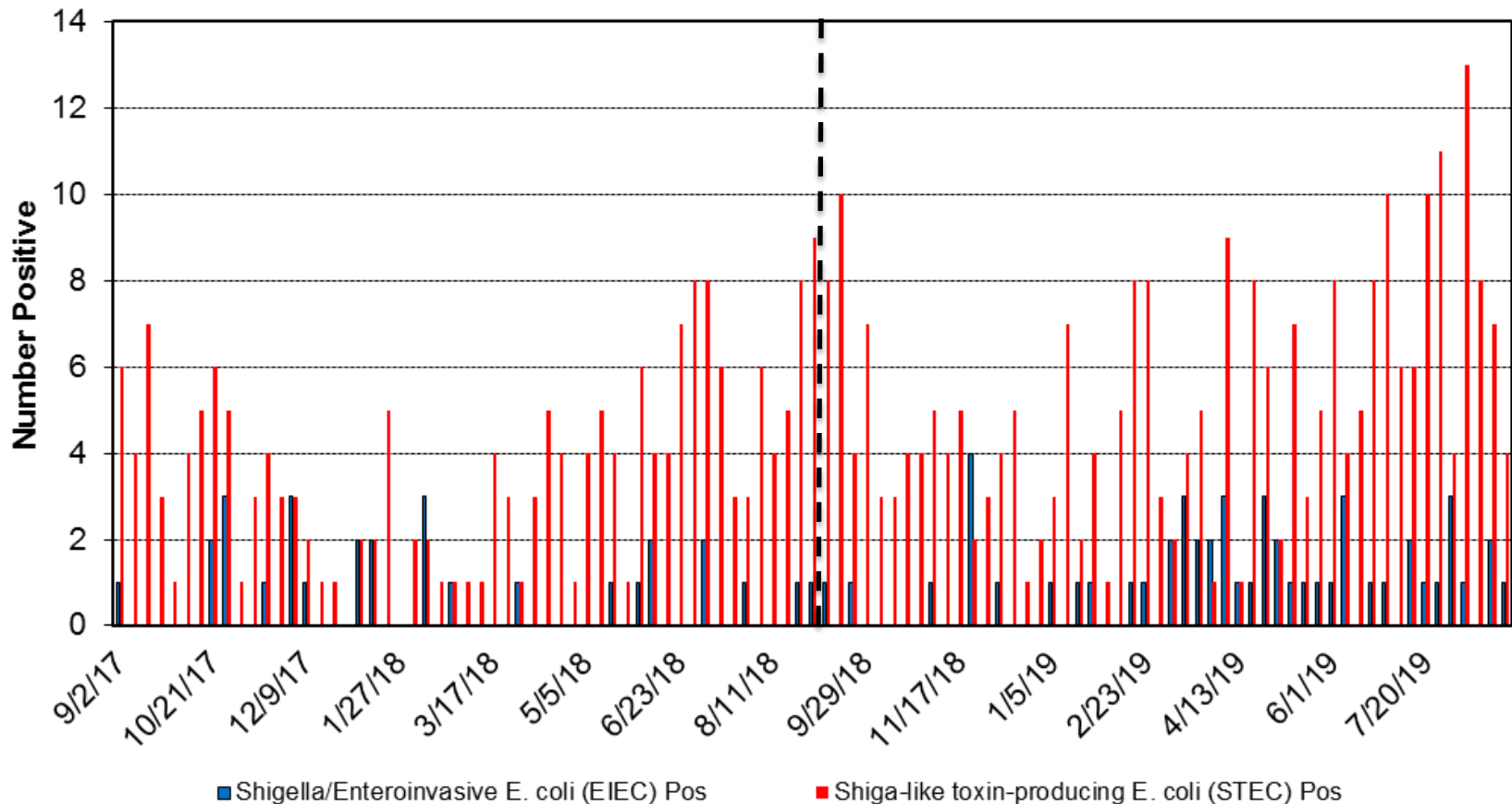
Shigella in the US 1970-2016





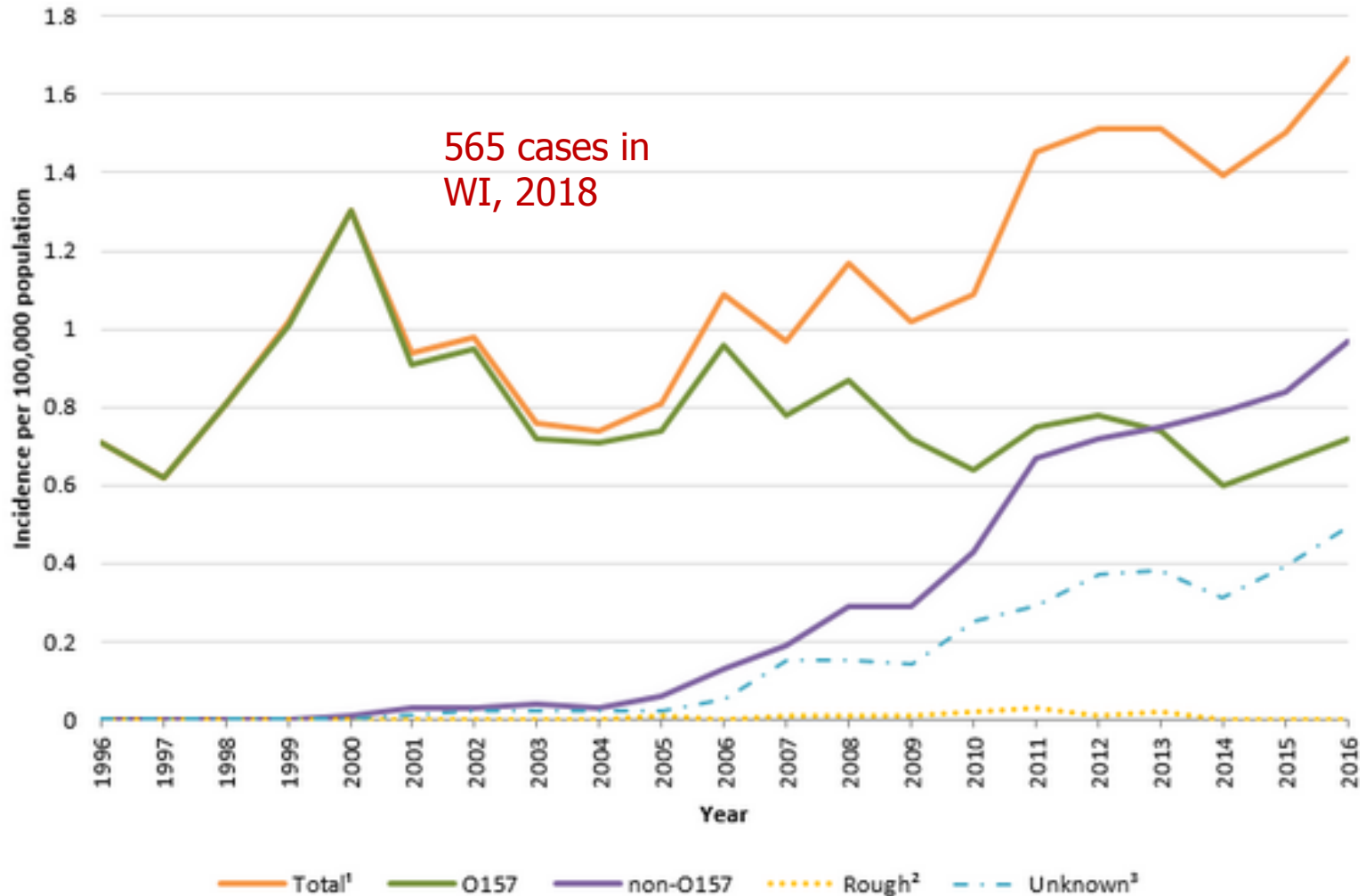
Shigella + STEC in WI 2017-2019

Shigella Positives by PCR Sept 2018- Aug 2019



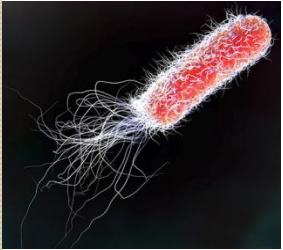


STEC in the US 1996-2016

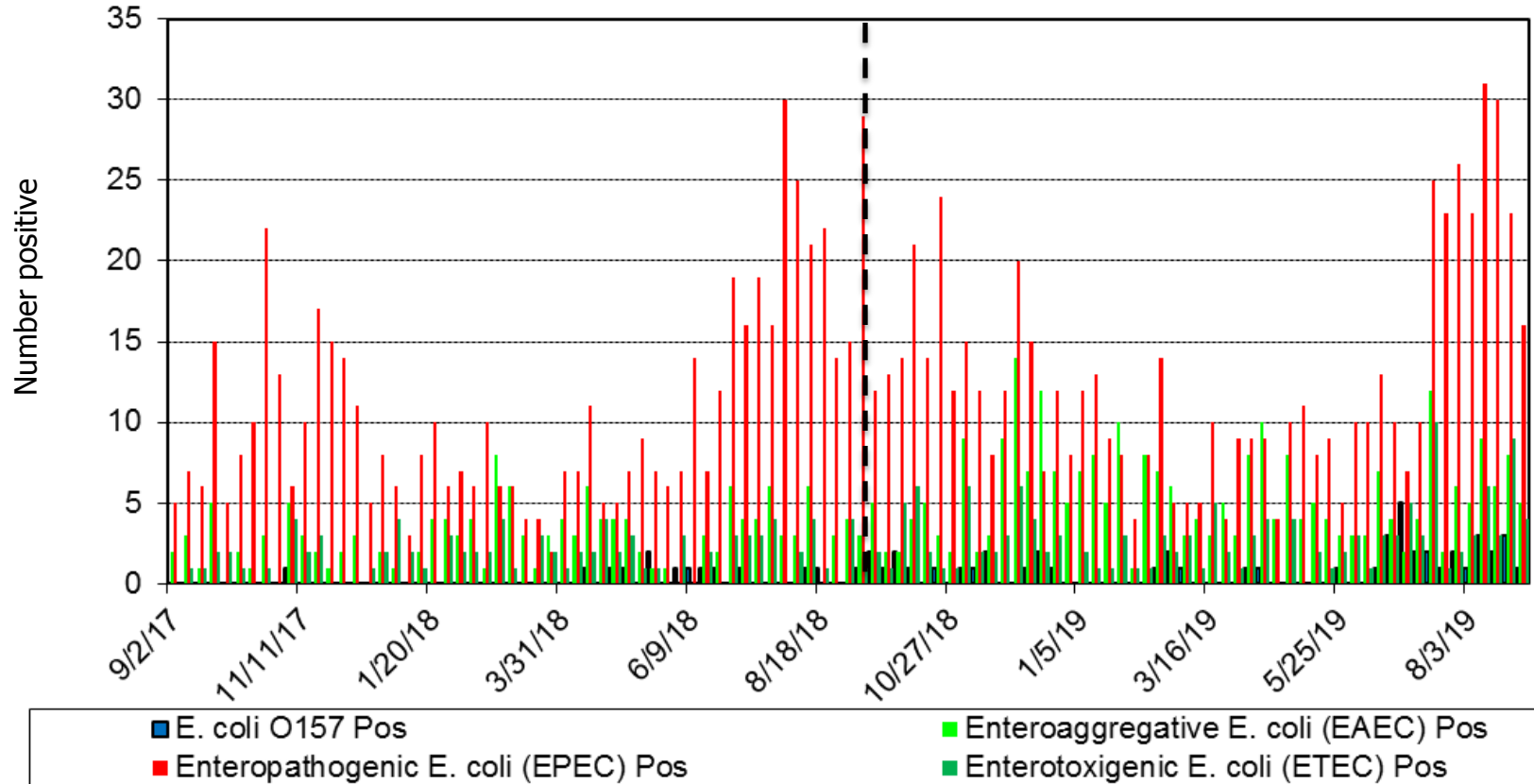


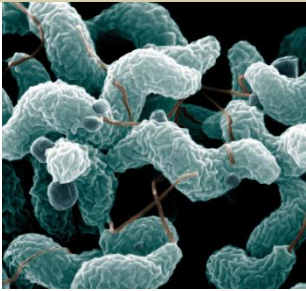


E. coli



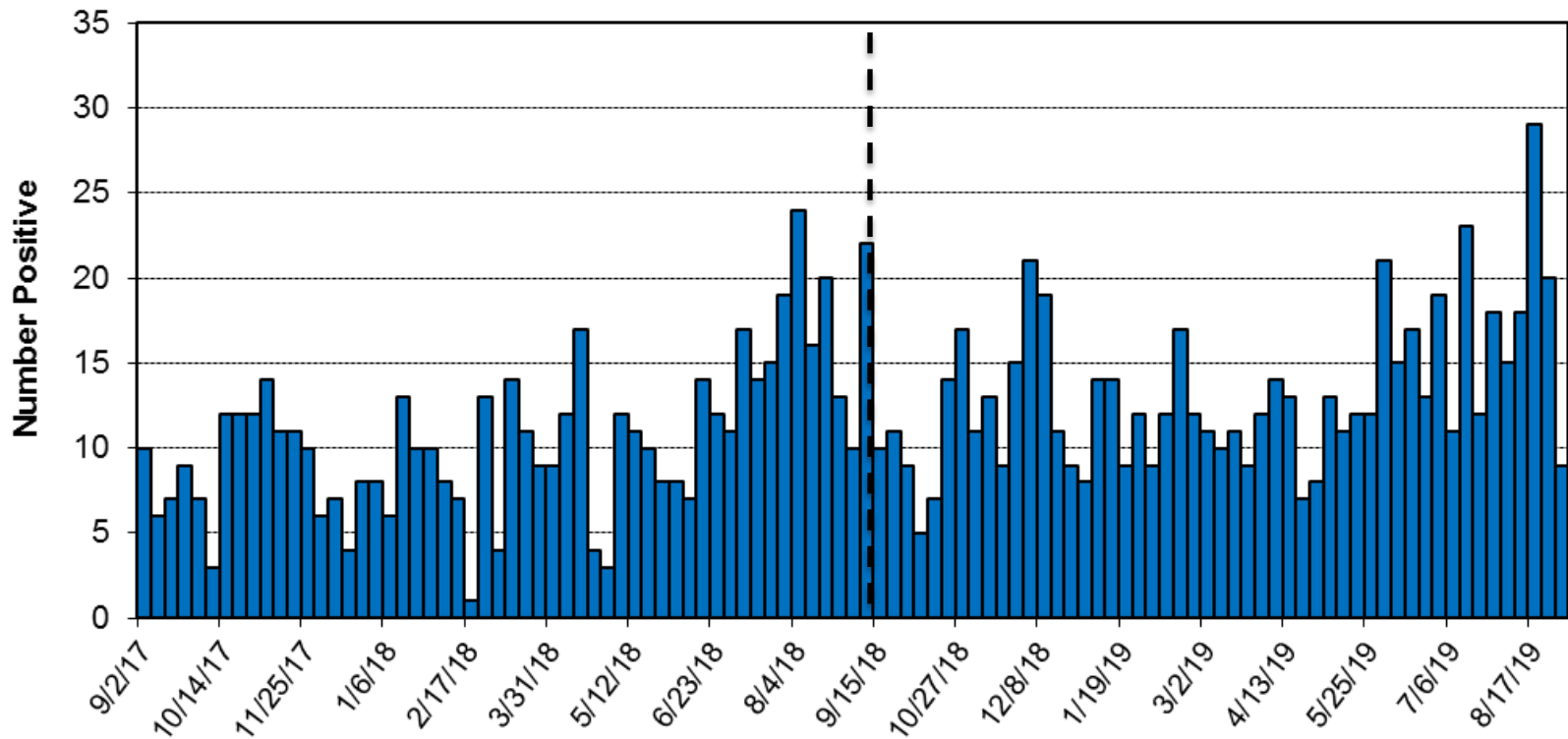
E. coli Positives by PCR Sept 2018- Aug 2019





Campylobacter

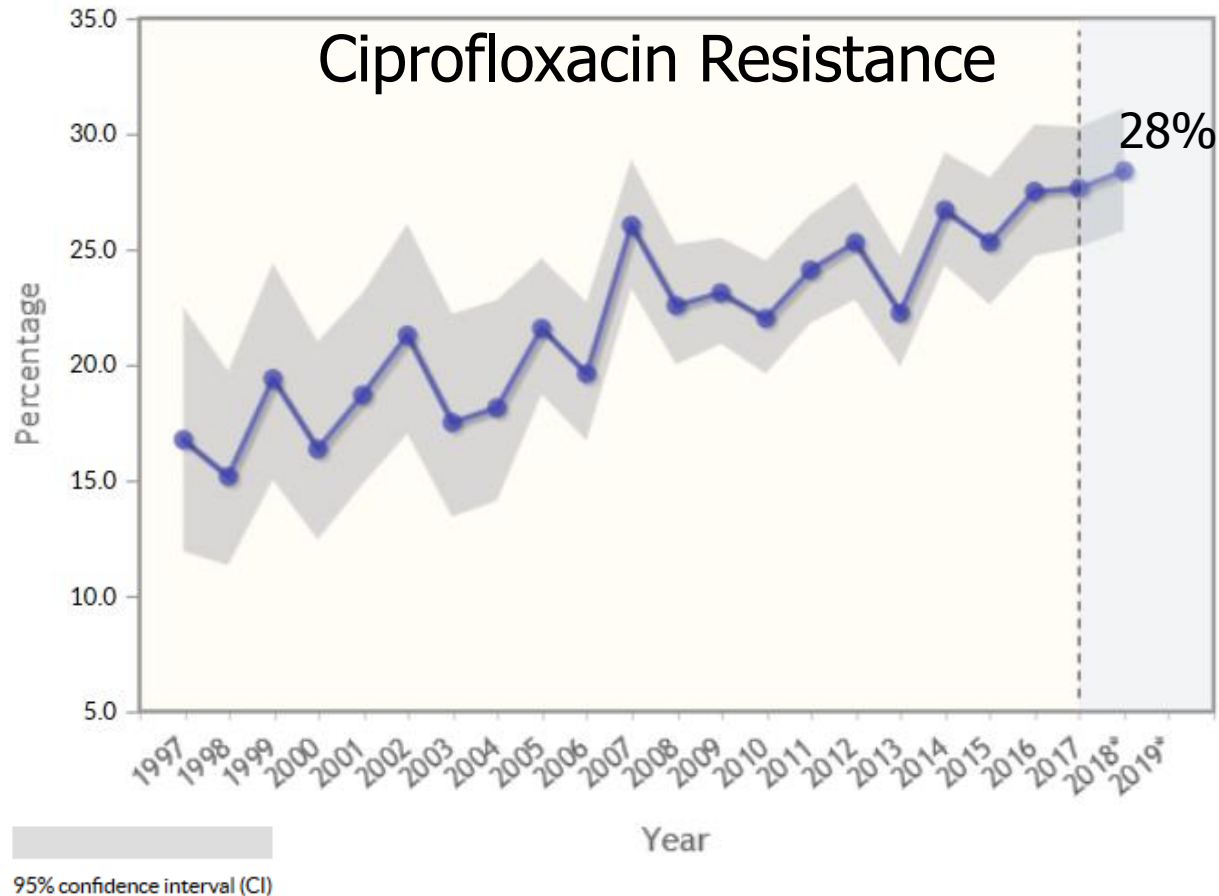
Campylobacter by PCR Sept 2018 - Aug 2019



1705 Cases reported in WI, 2018



Campylobacter jejuni in US (NARMS)





Cryptosporidium (CryptoNet)



- 862 reported in 2018
- 95% *C. parvum/hominis*
- Validating Genotyping

Figure 2. Incidence* of cryptosporidiosis cases, by jurisdiction — National Notifiable Diseases Surveillance System, United States, 2017 (n=11,423)

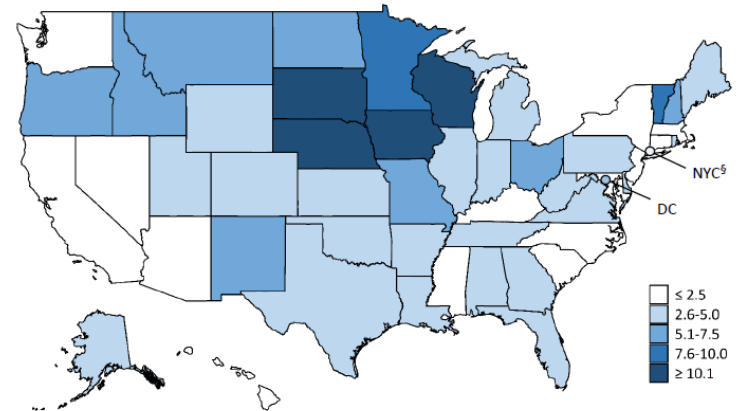
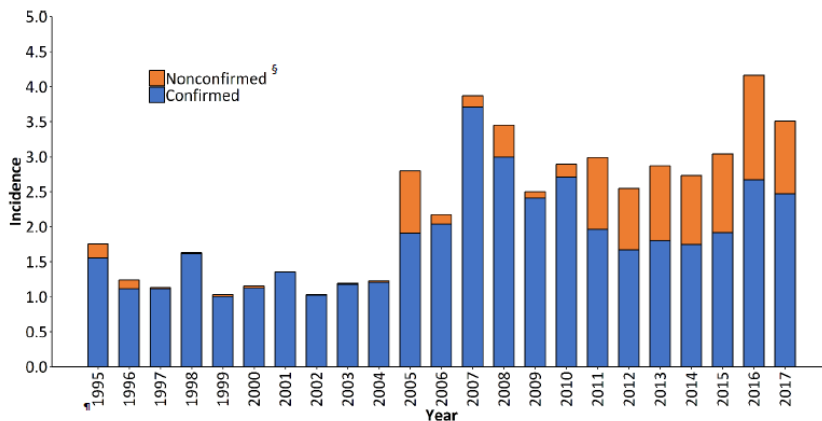
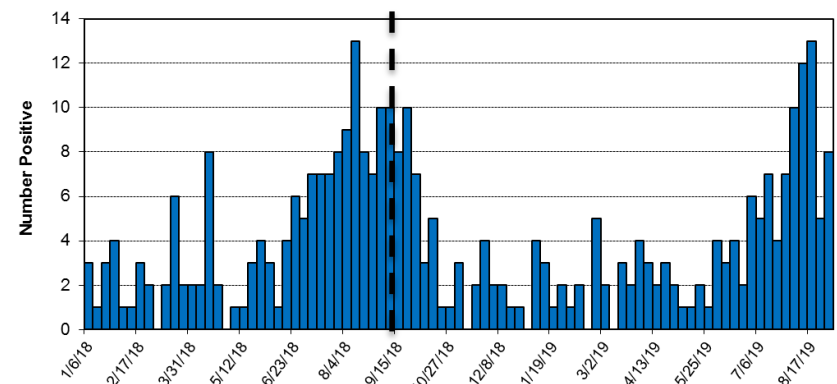
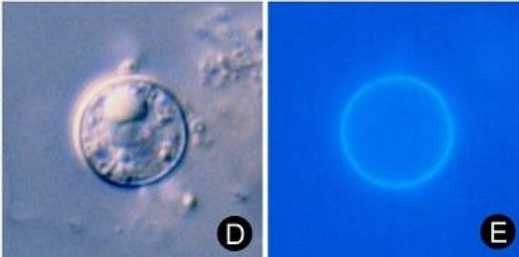


Figure 1. Incidence* of cryptosporidiosis cases, by year and case classification — National Notifiable Diseases Surveillance System, United States, 1995–2017 (n=155,105)



Crypto by PCR Jan 2018 - Aug 2019

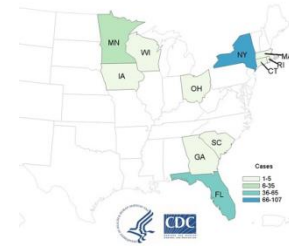
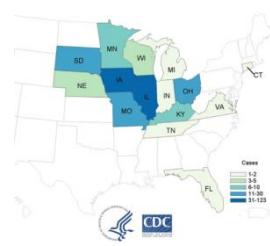
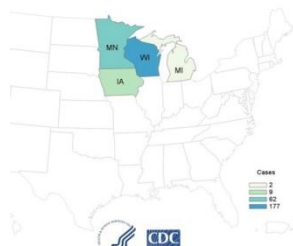
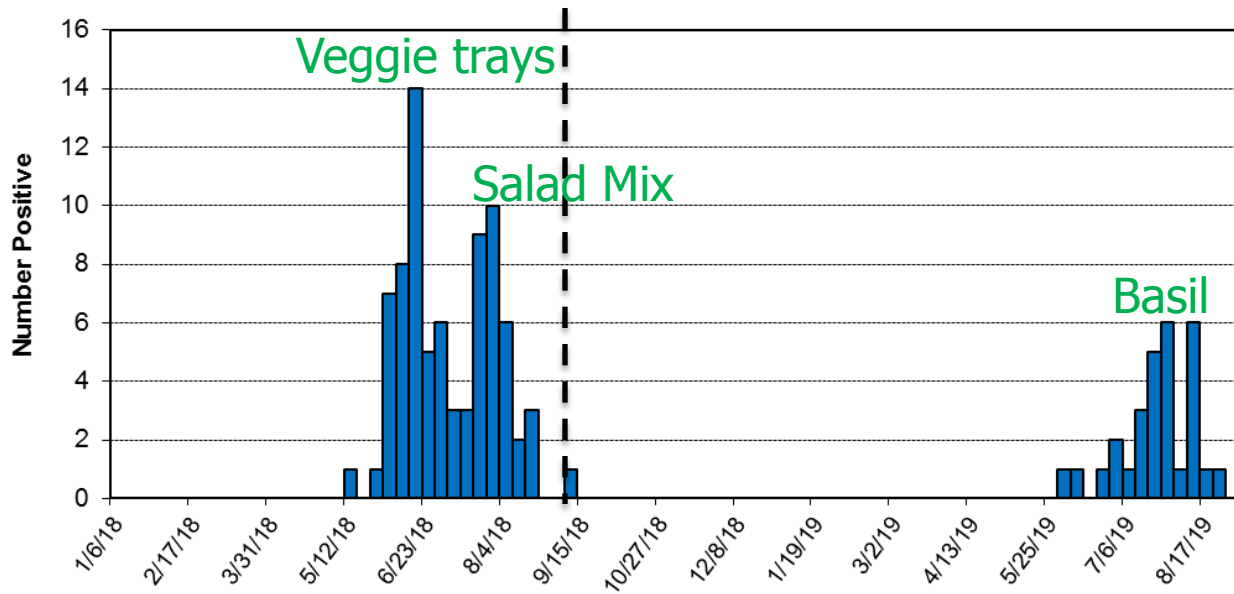


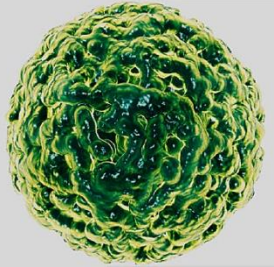


Cyclospora

319 Cases reported in WI, 2018

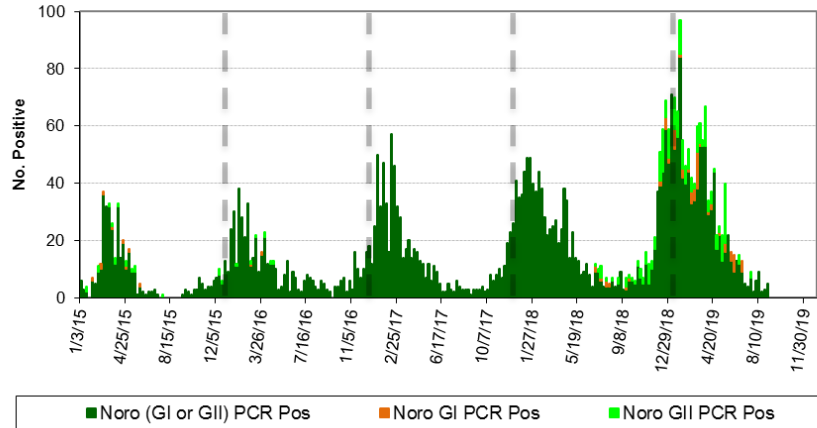
Cyclo by PCR Jan 2018 - Aug 2019



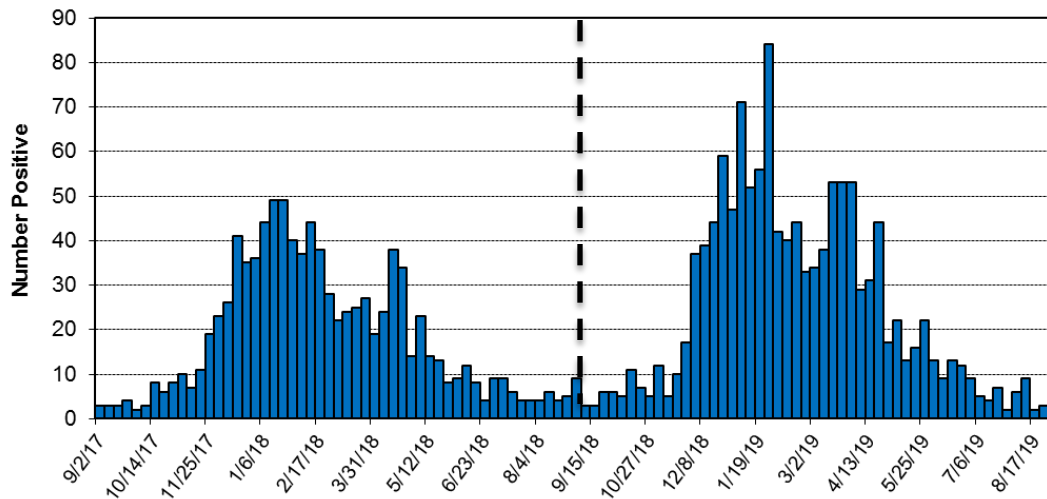


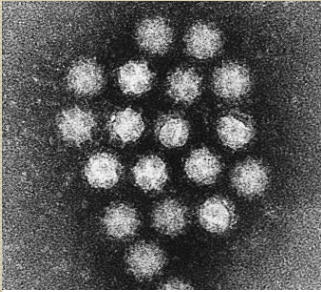
Norovirus (CaliciNet)

Norovirus by PCR 2015-2019



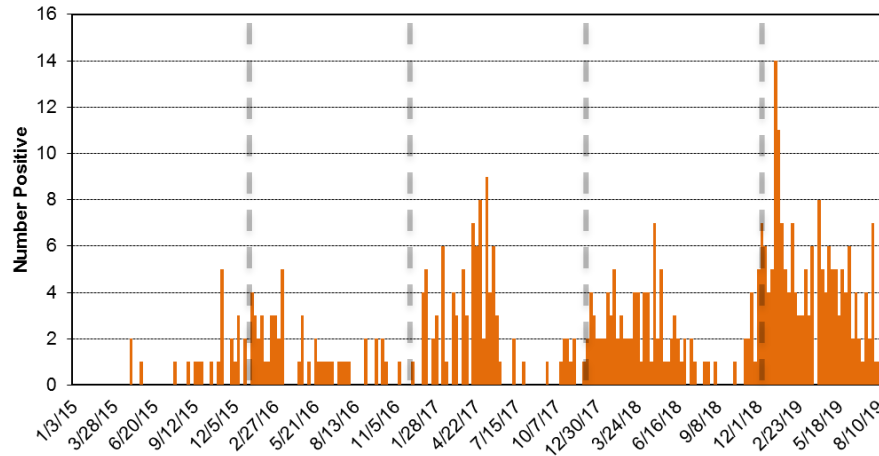
Noro by PCR Sept 2018 - Aug 2019



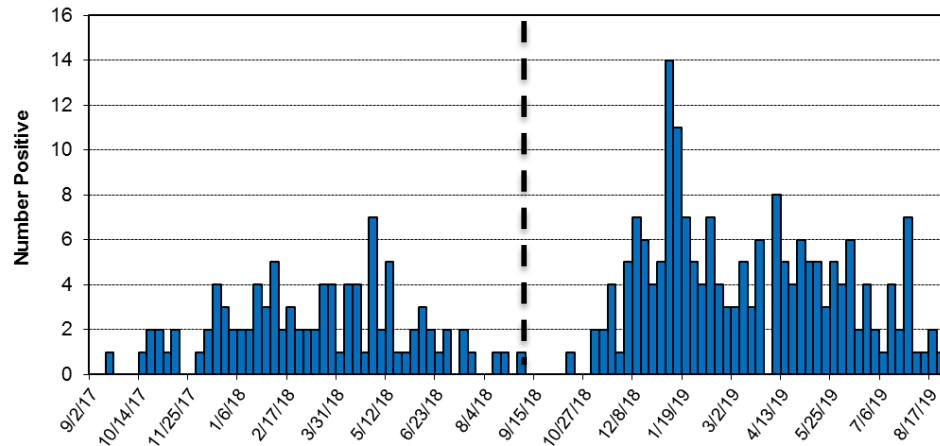


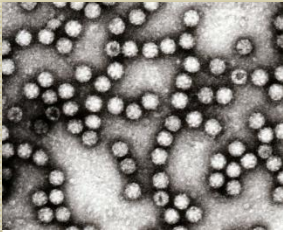
Sapovirus

Sapovirus Positives by PCR 2014- 2019



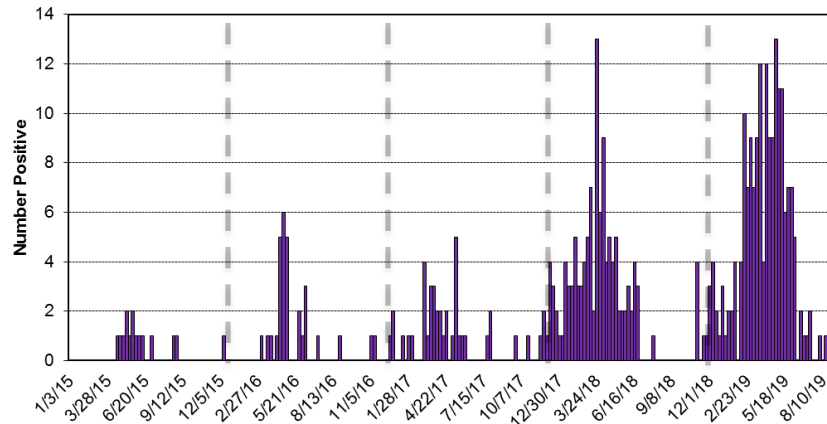
Sapo by PCR Sept 2018 - Aug 2019



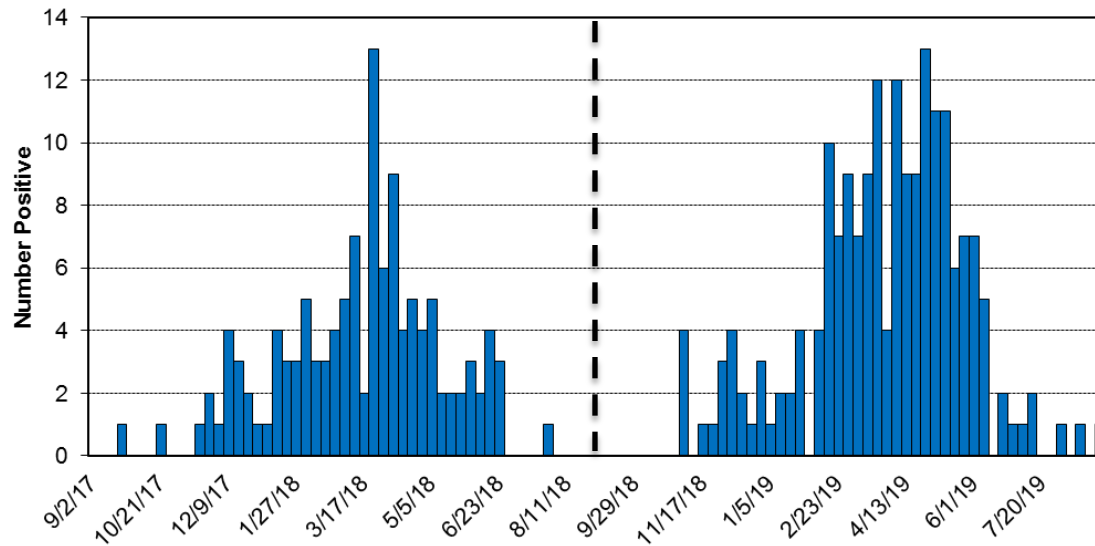


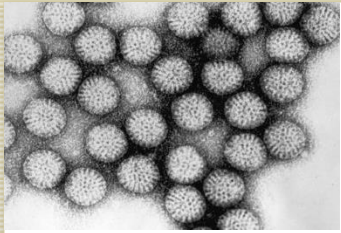
Astrovirus

Astrovirus Positives by PCR 2014-2019



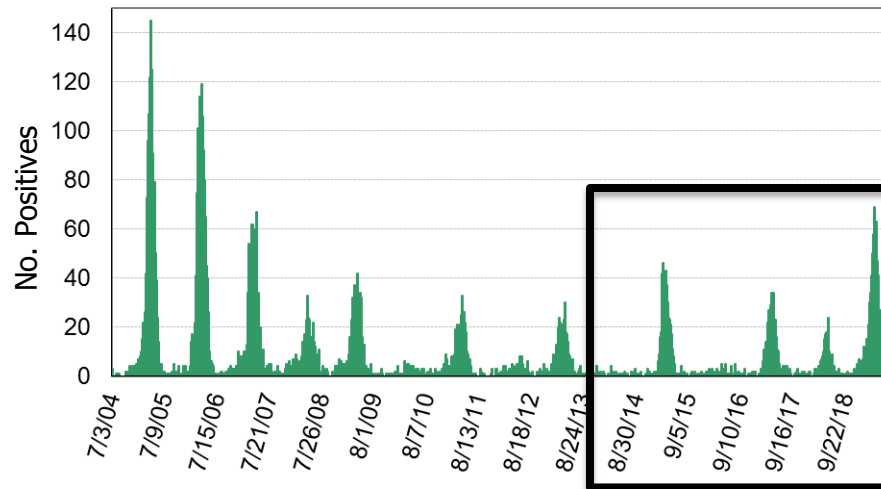
Astro Positives by PCR Sept 2018- Aug 2019





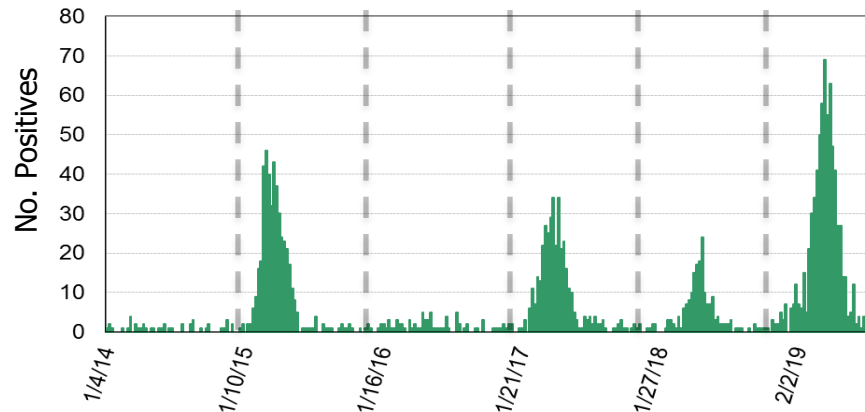
Rotavirus

Rota Positives 2004-2019
(Antigen + PCR)

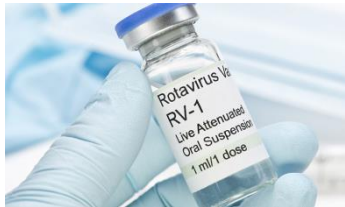


July 2004-
Aug 2019

Rota Positives
(Antigen + PCR)



Jan 2014-
June 2019

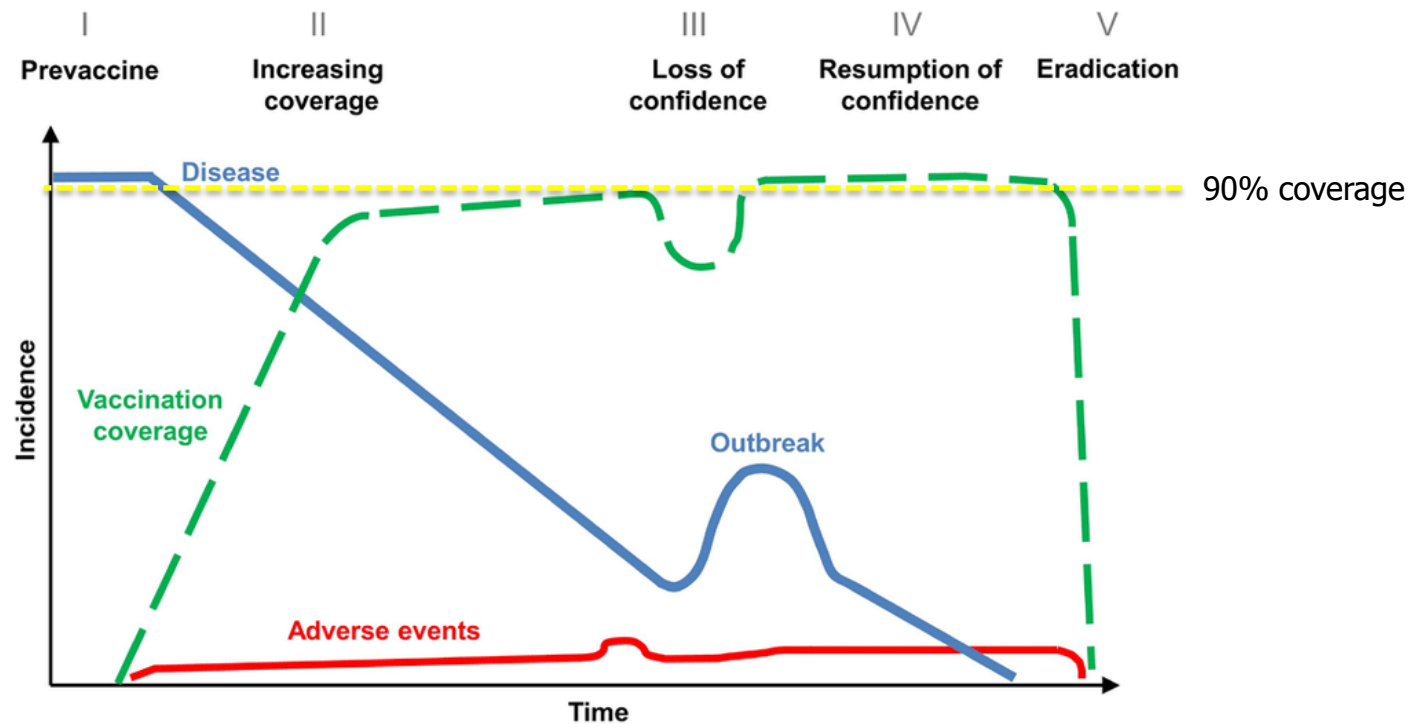




VACCINE PREVENTABLE DISEASES

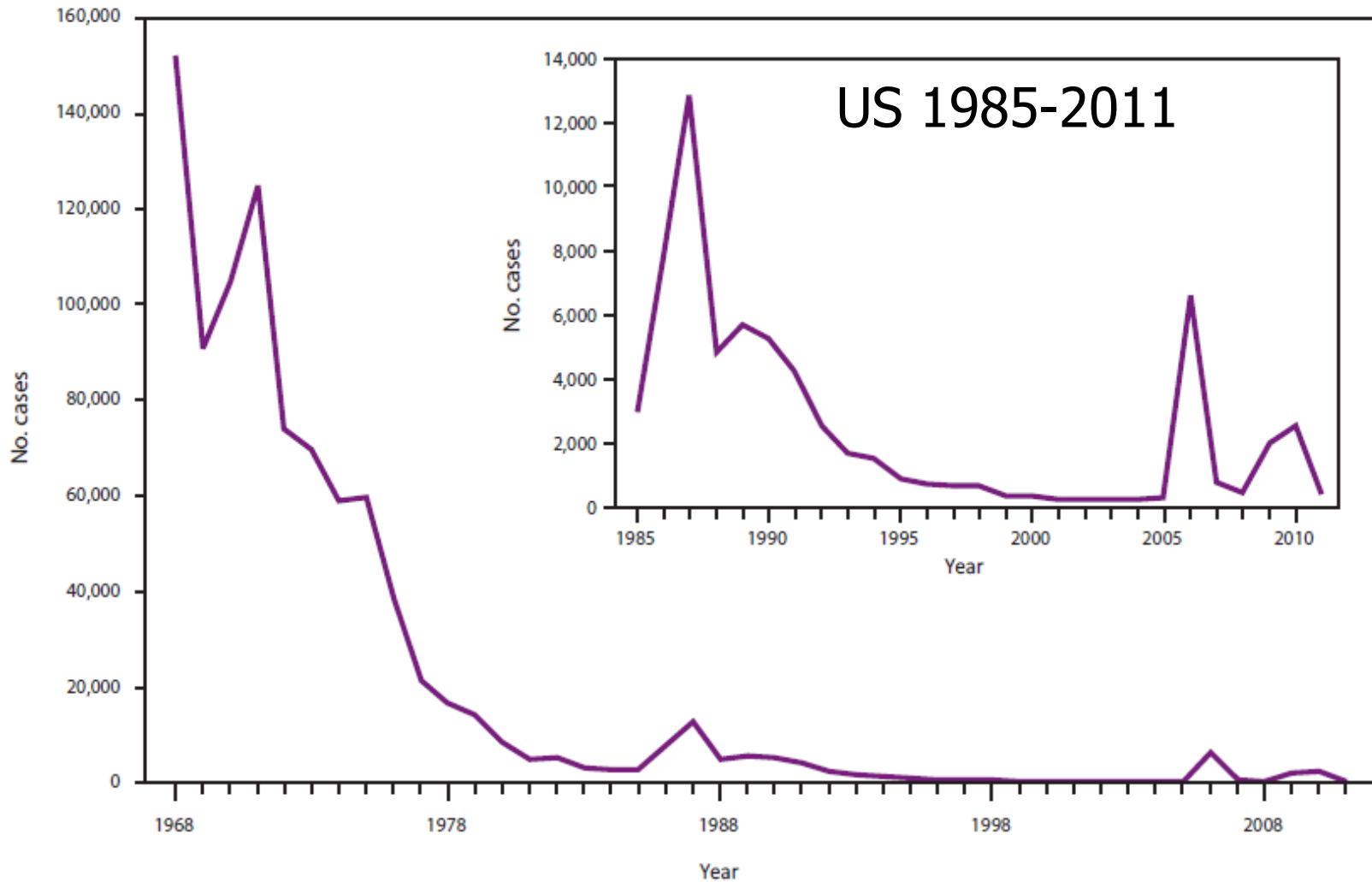


The Vaccine Process



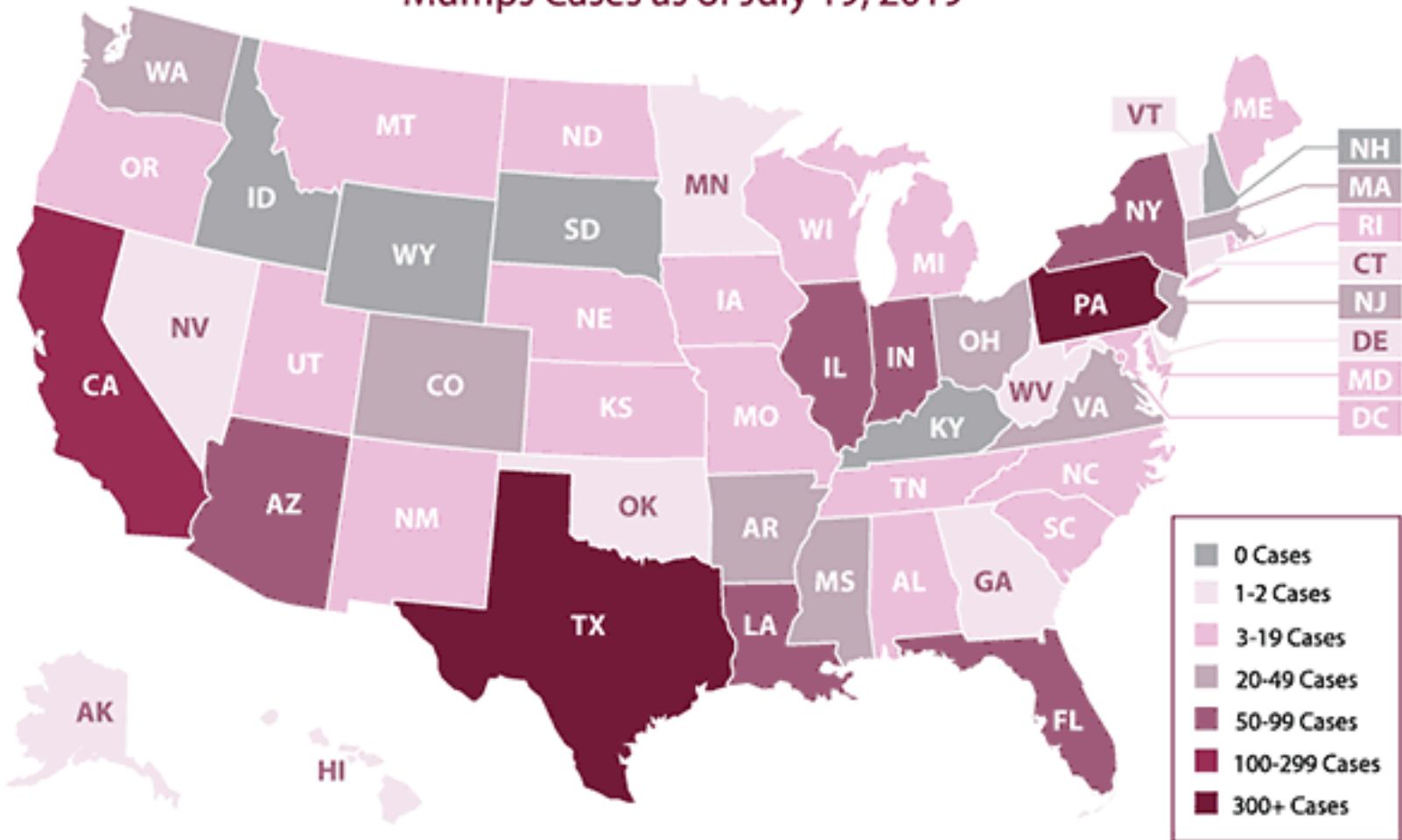


Mumps in the US 1968-2011



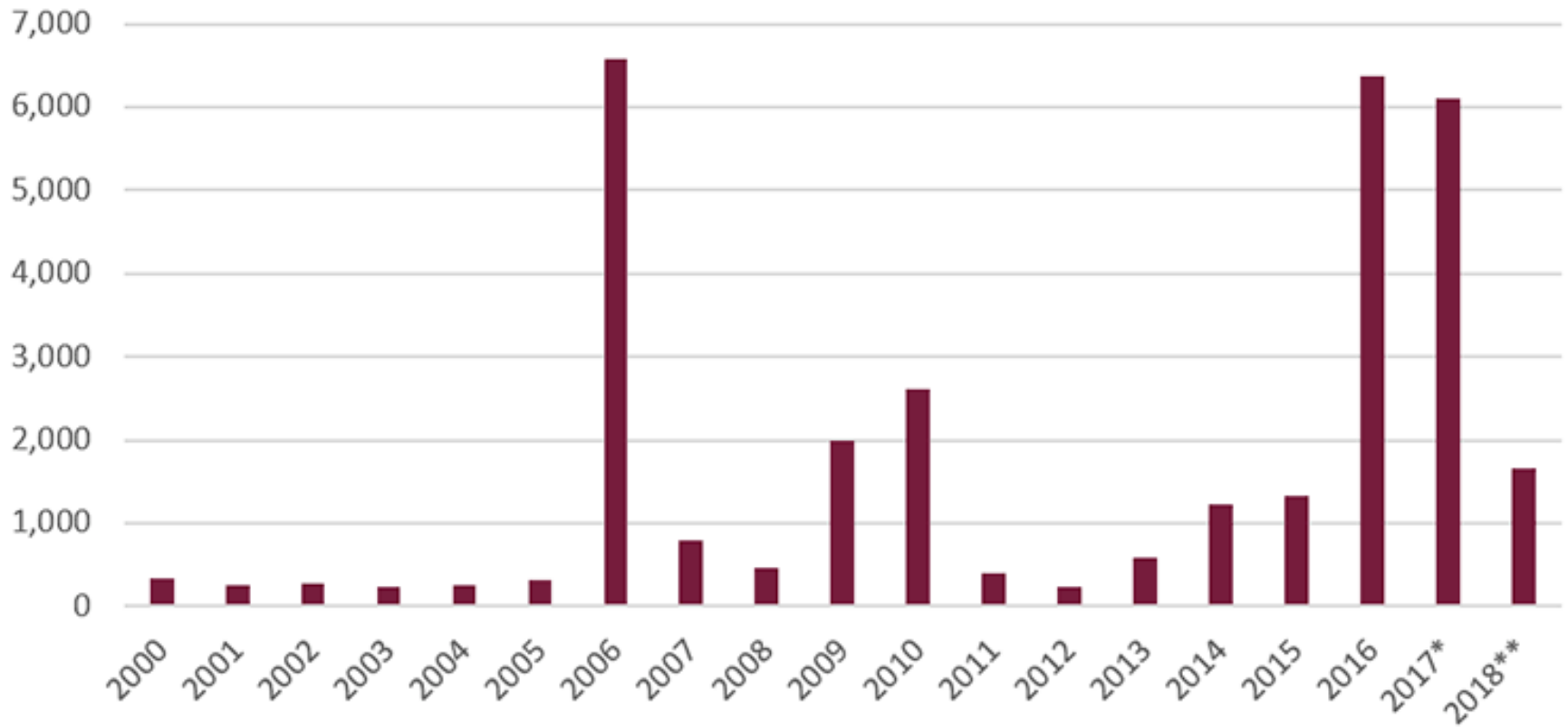


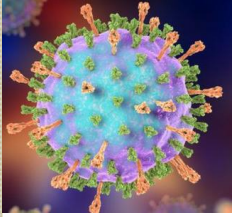
Mumps Cases as of July 19, 2019





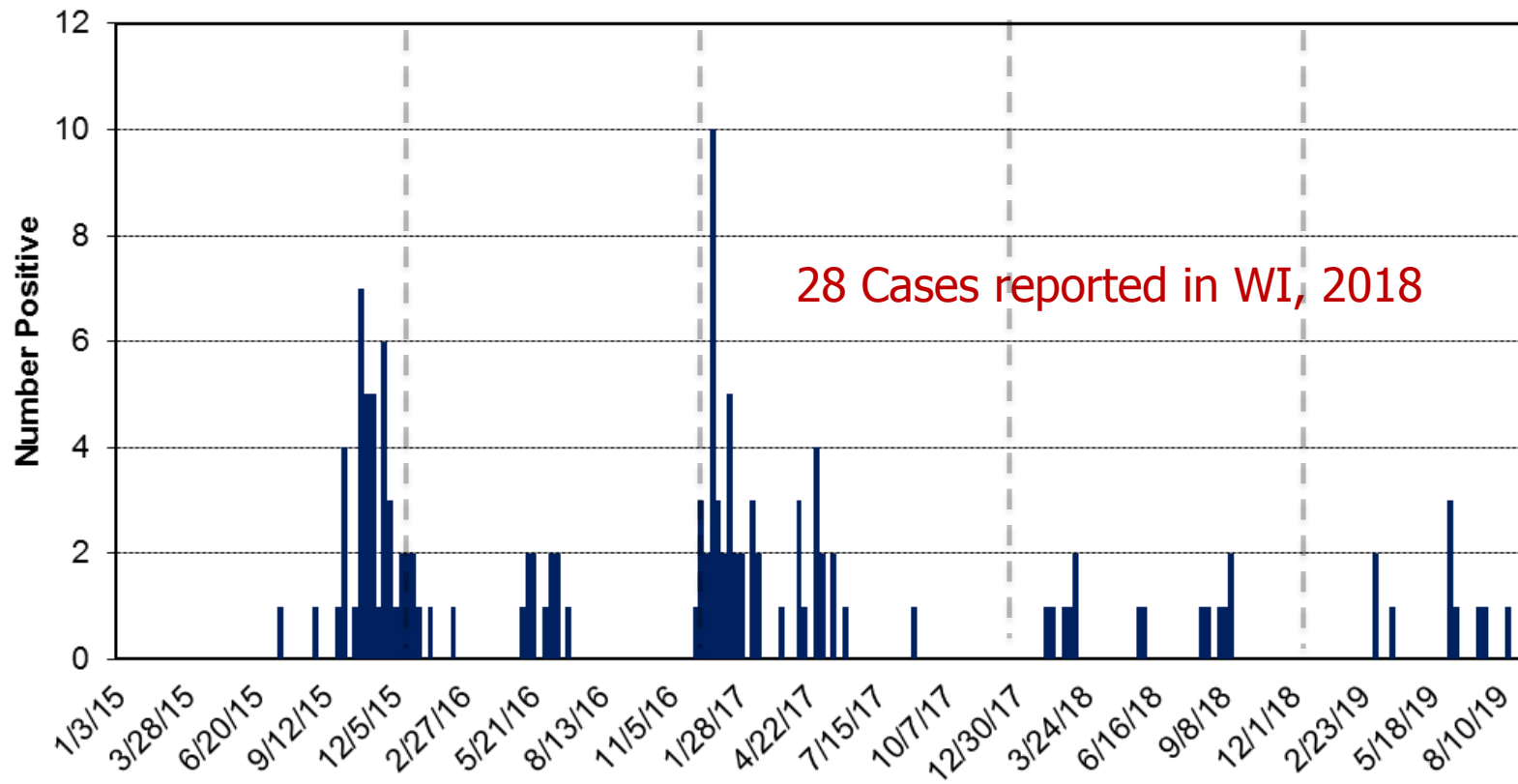
Mumps Cases in U.S., by Year 2000-2018





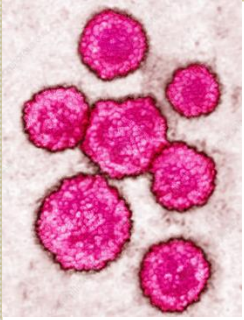
Mumps in WI

Mumps Positives by PCR 2015- 2019

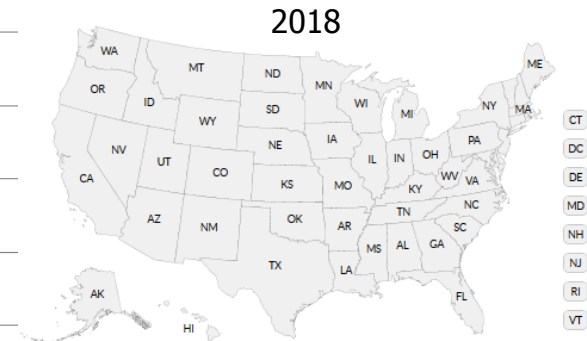
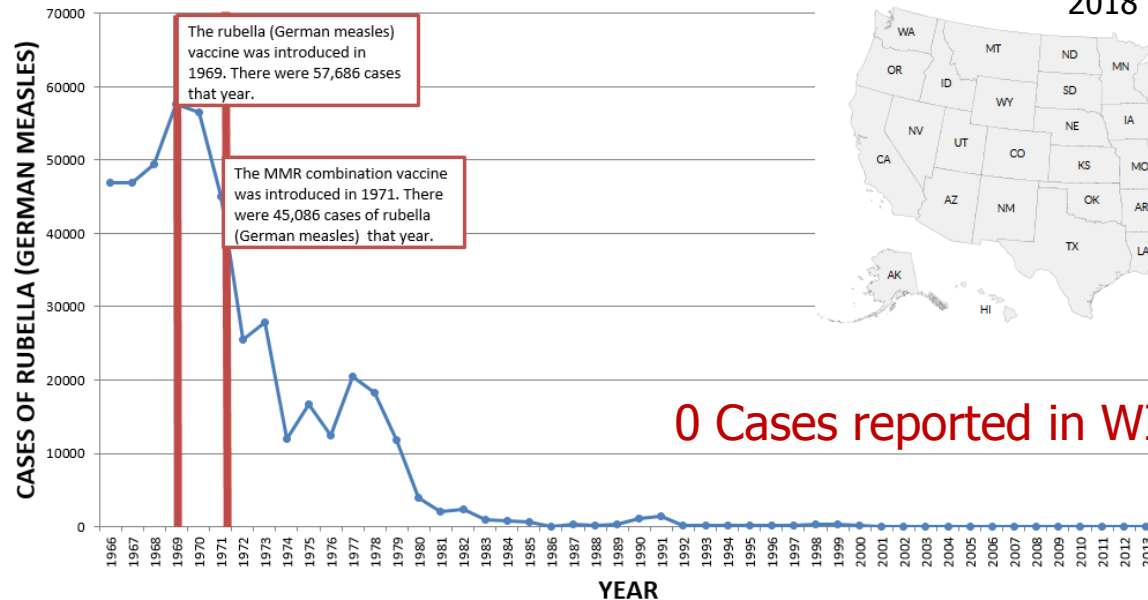




Rubella



Rubella (German Measles) Cases
1966-2013



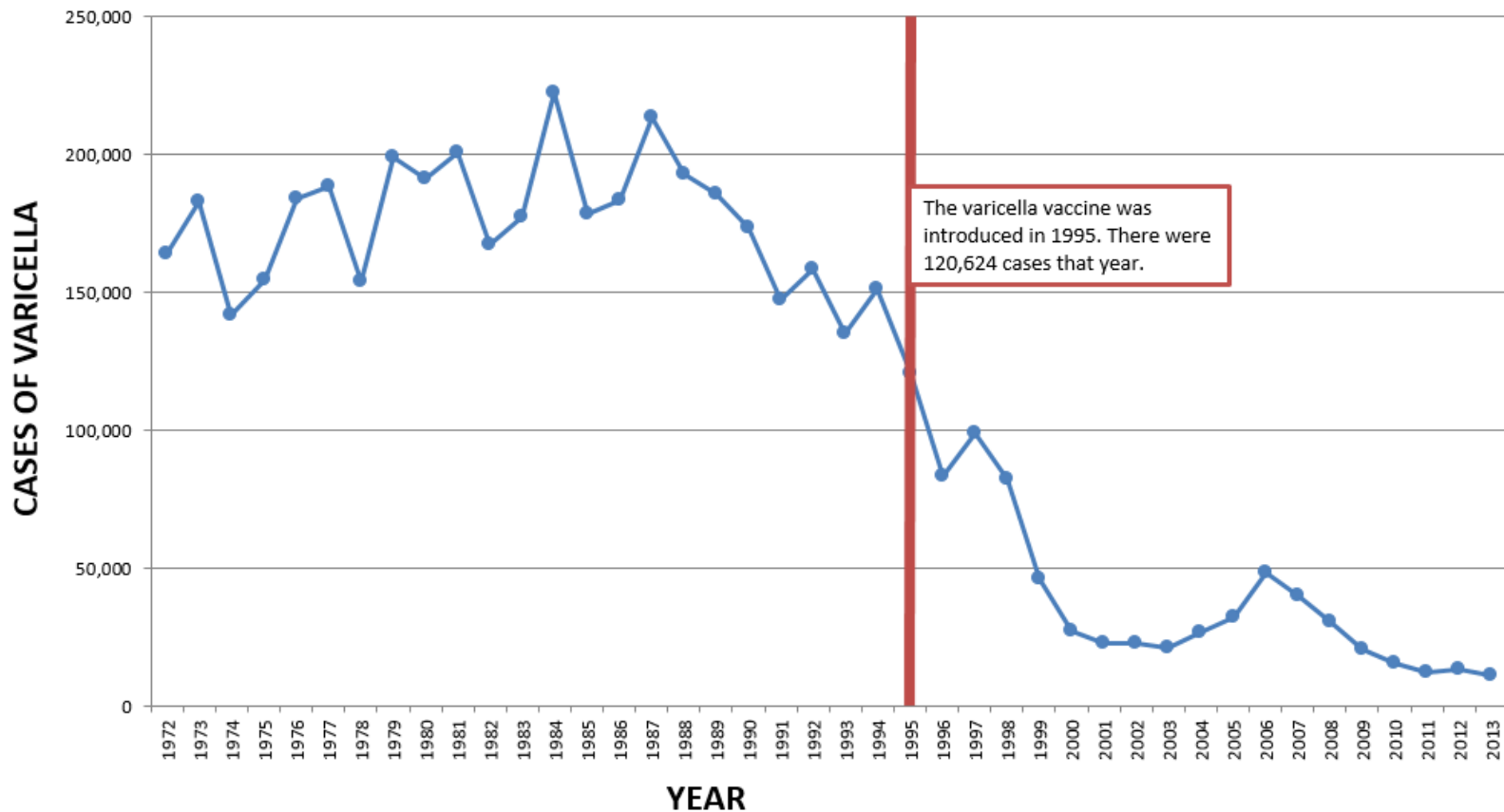
0 Cases reported in WI, 2018

- Endemic rubella was declared eliminated in the US in 2004
- Still endemic in other parts of the world
 - Requires continued vaccination in the US



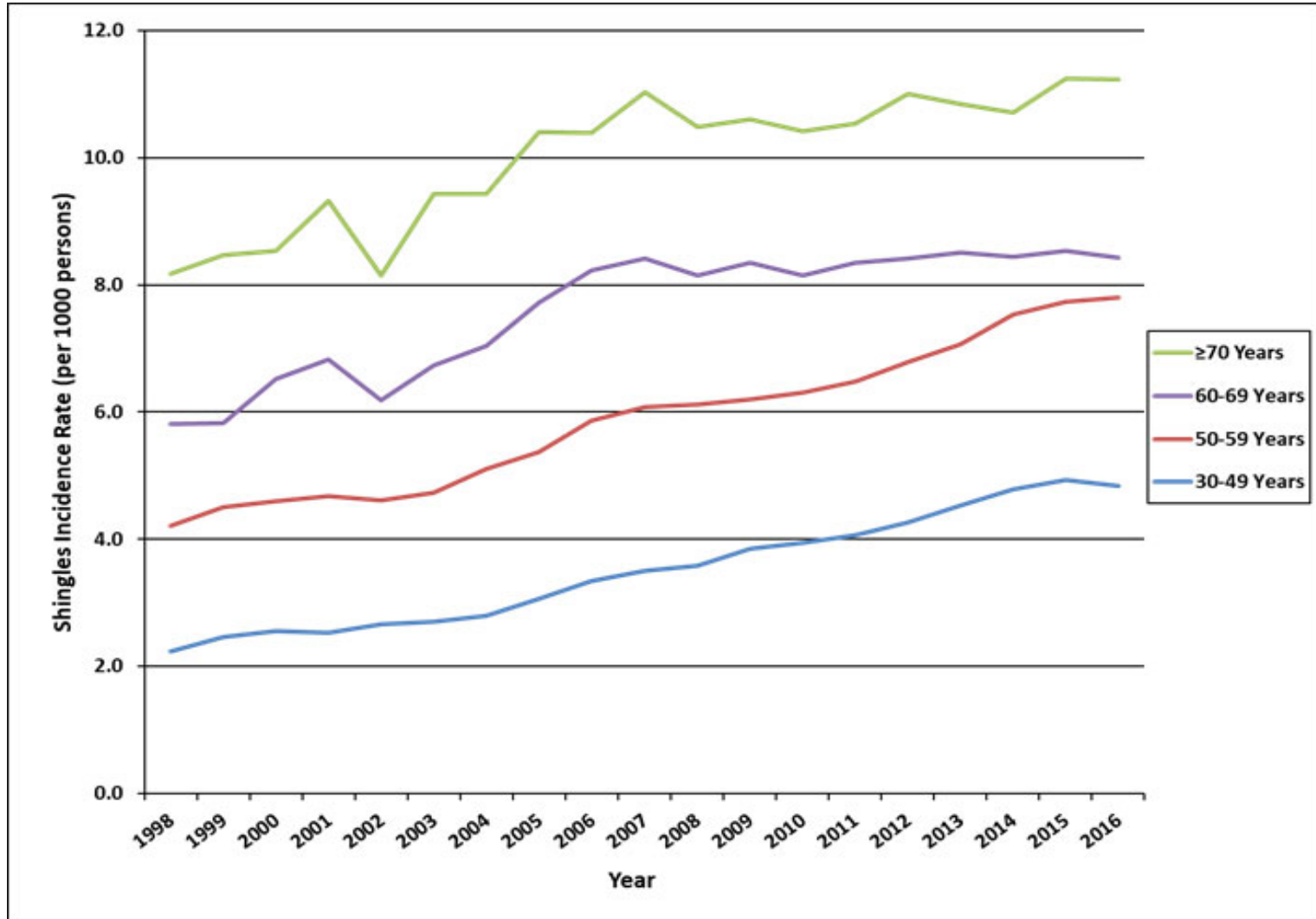
Varicella Zoster

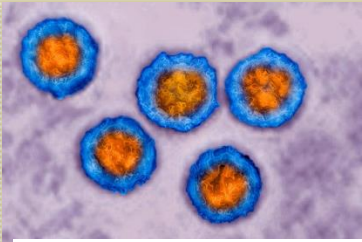
Varicella (Chickenpox) Cases
1972-2013



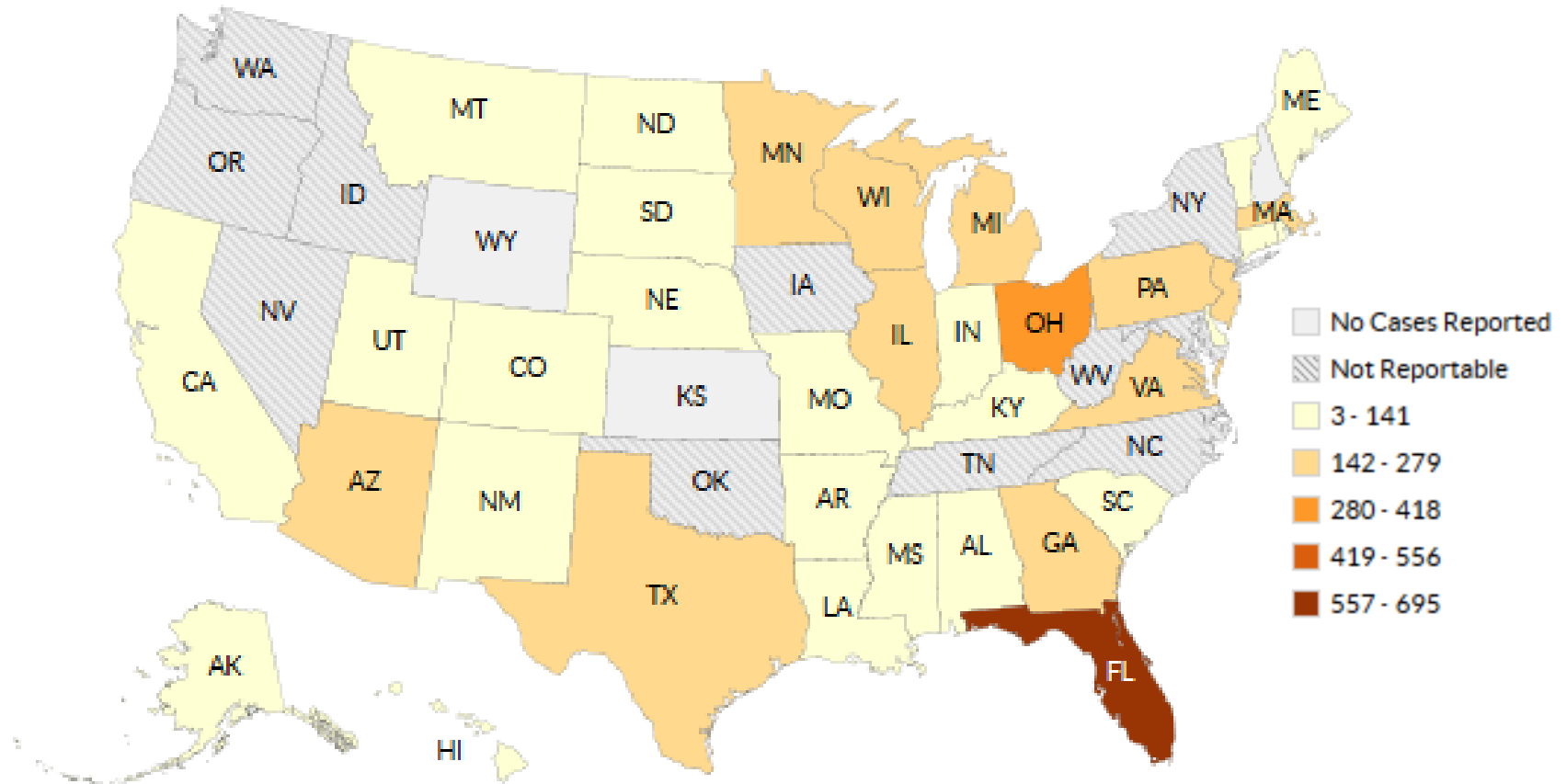


US Shingles Rates

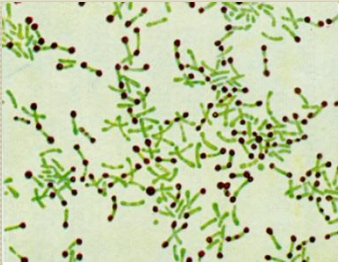




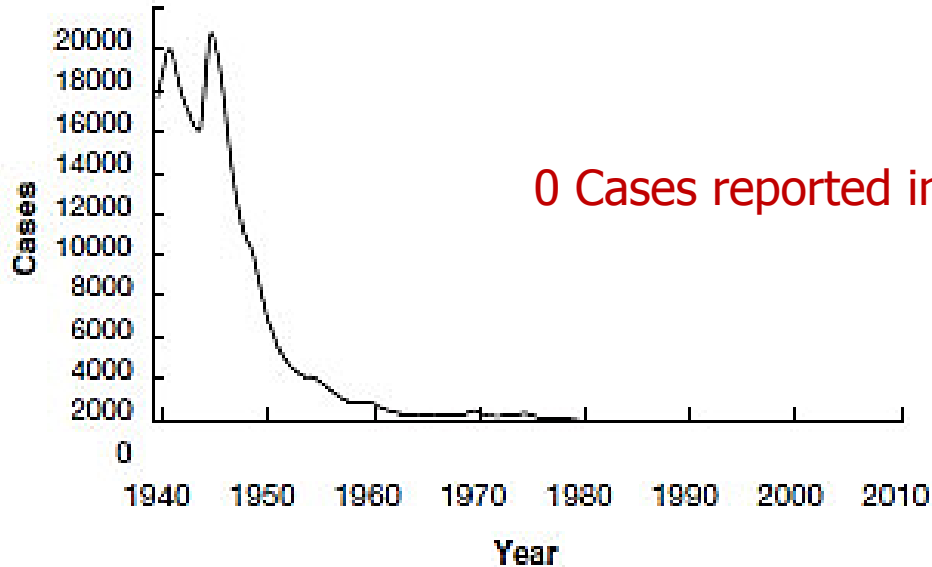
Varicella Zoster



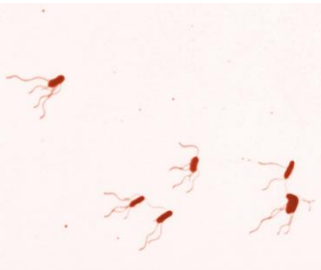
300 Cases reported in WI, 2018



Diphtheria

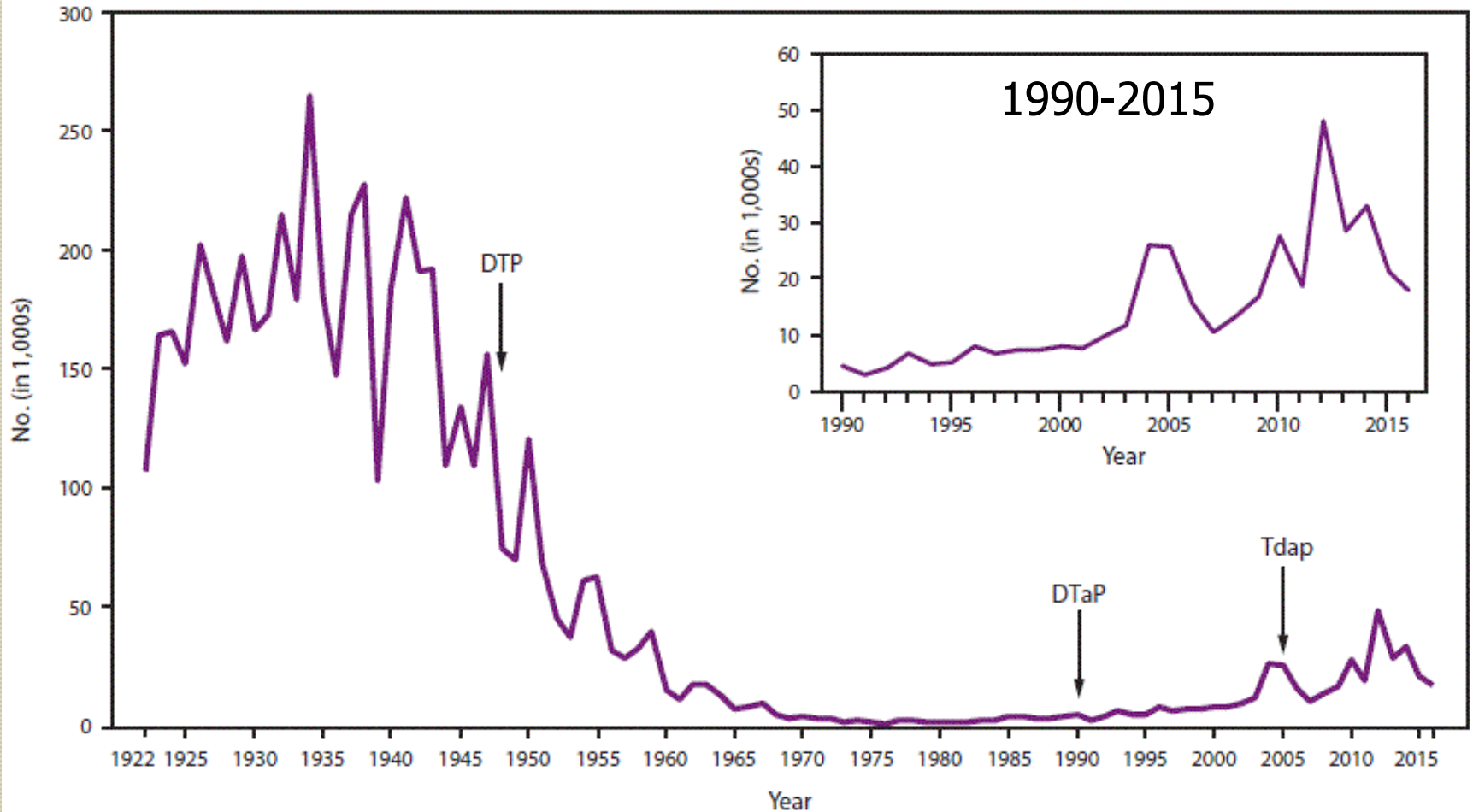


- No toxin producing strains cultured in US since 1996
- Still endemic in other countries but decreasing
- Discontinued at WSLH
 - 5 year review: 4 tests/yr, no positives
- Testing still available at the CDC



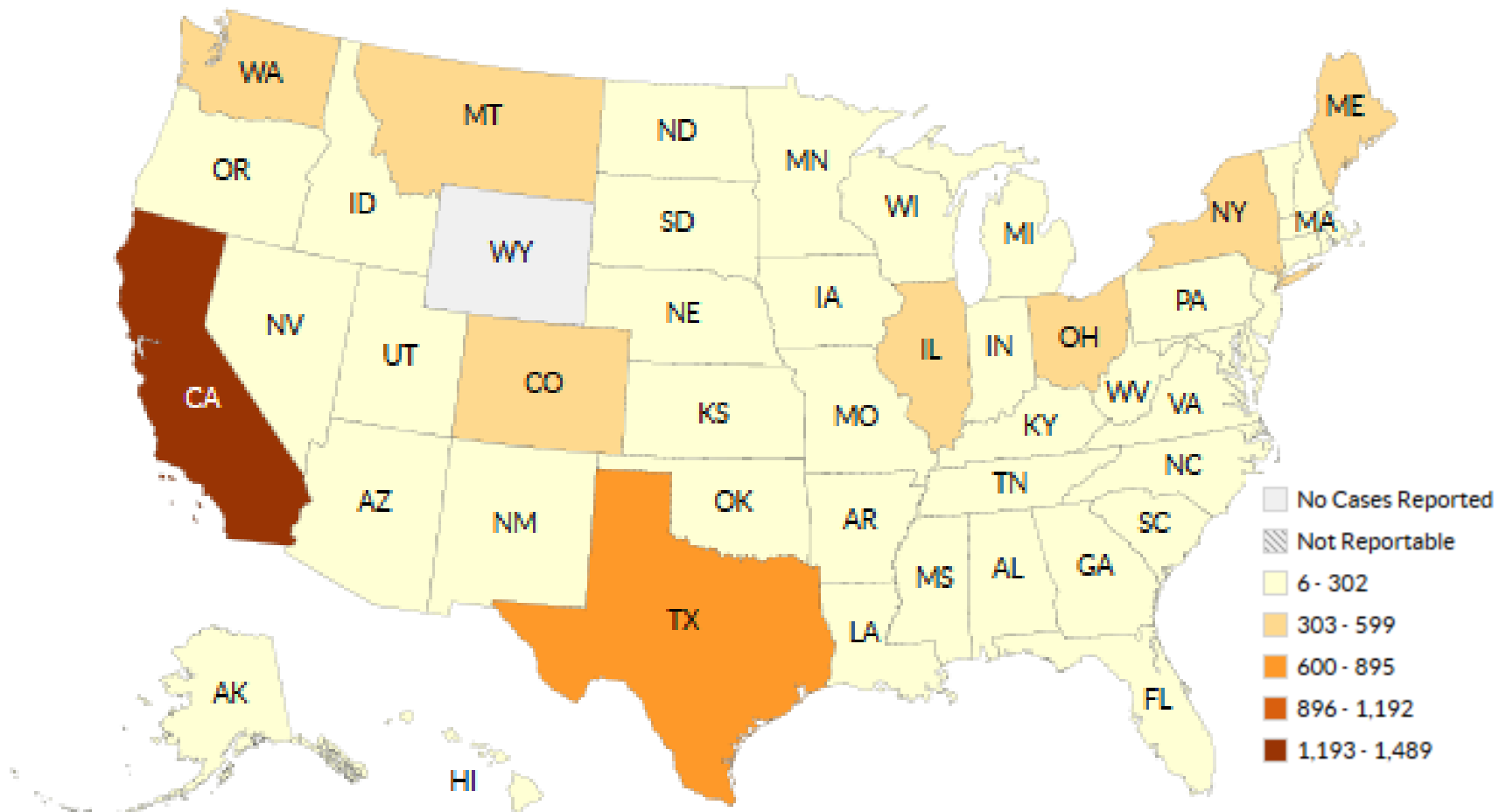
Pertussis in the US

1922-2015





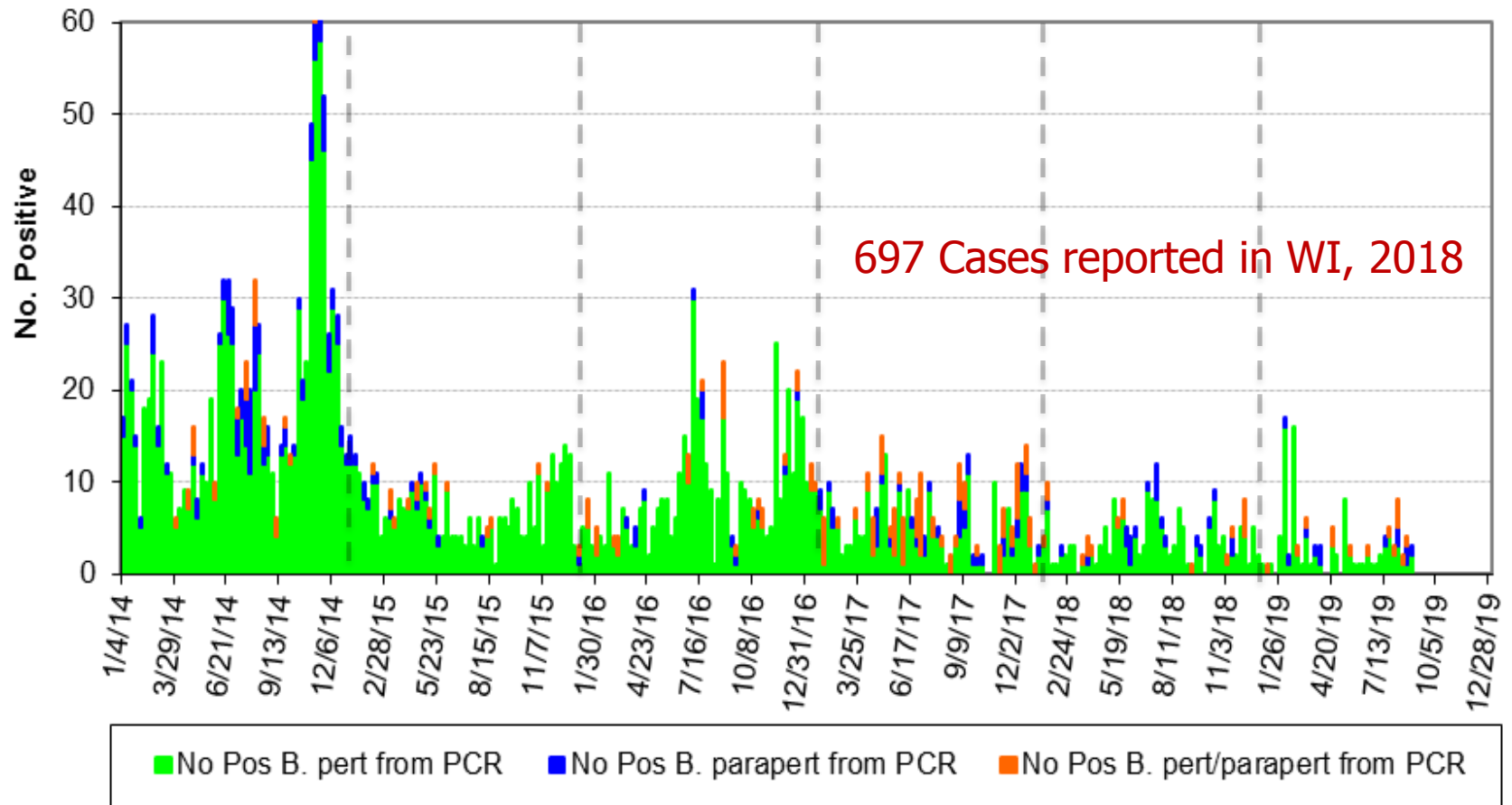
Pertussis cases in the US, 2019





Pertussis in WI

Bordetella Positive by PCR Jan 2014-Sept. 2019





VECTORBORNE DISEASES



Vectorborne Diseases

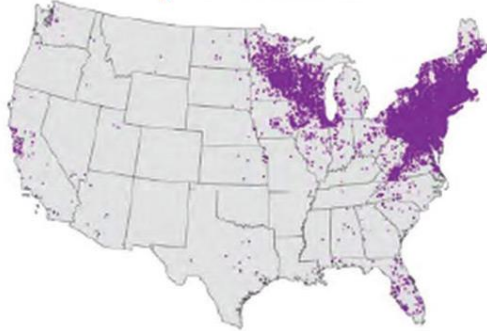
Disease	2018 Cases
Babesiosis	64
Ehlichiosis/Anaplasmosis	517
Jamestown Canyon virus	22
La Crosse virus	0
Lyme	1883
Malaria	16
Powassan	3
Rocky Mountain spotted fever	29
West Nile virus	33
Zika	0





Vectorborne Diseases

Lyme disease



Anaplasmosis



Babesiosis



Ehrlichiosis



Rocky Mountain Spotted Fever



Tularemia

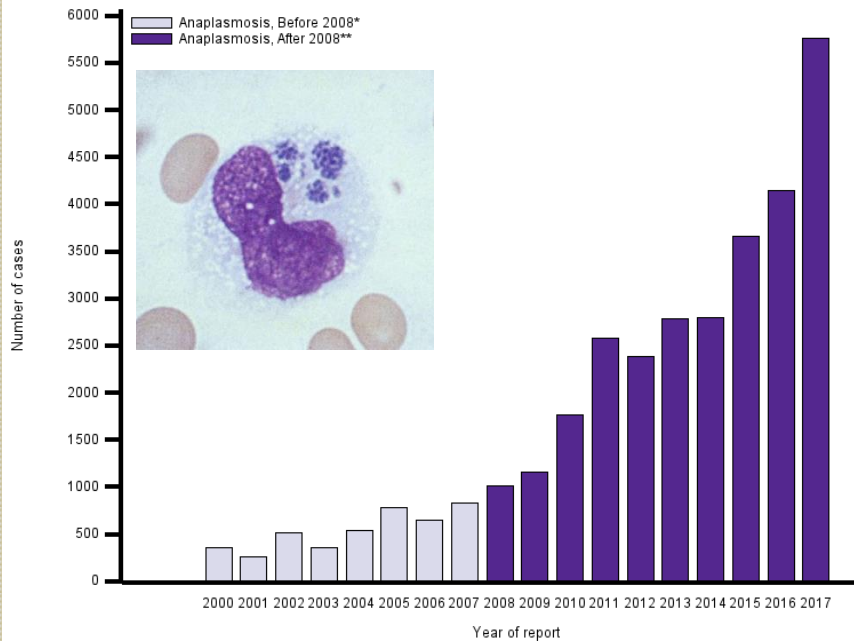


Each dot represents a reported case in the county of residence

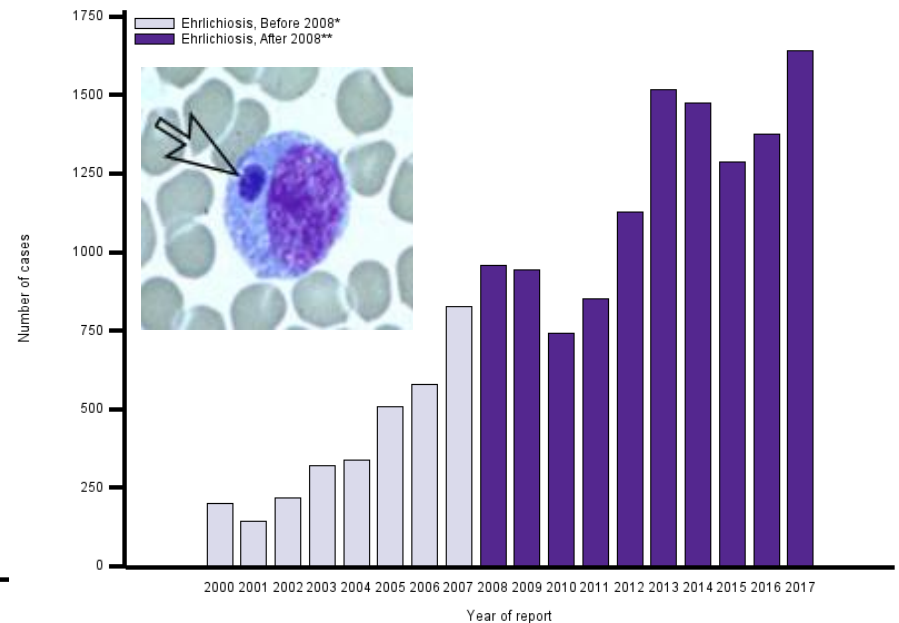
Eisen R. Emerging tickborne diseases. CDC Public Health Grand Rounds, March 21, 2017.
www.cdc.gov/cdcgrandrounds/archives/2017/March2017.htm. Accessed June 7, 2017.



Anaplasmosis



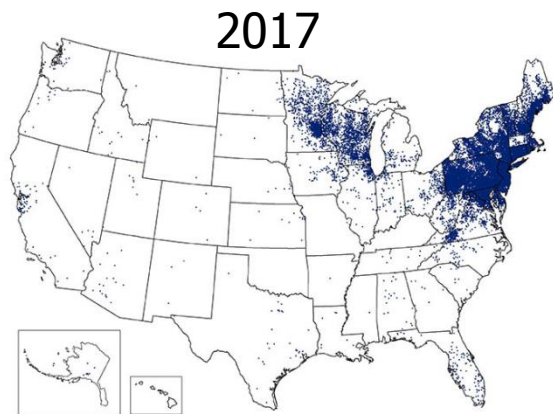
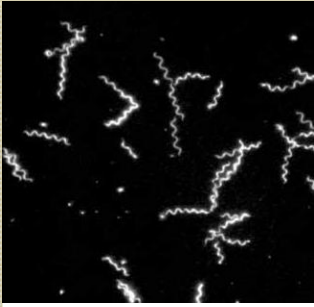
Ehrlichiosis



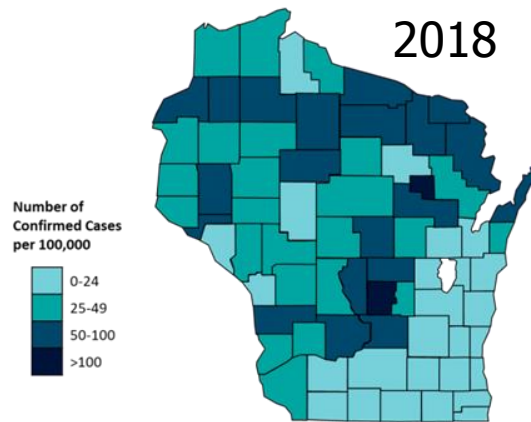
US Disease Rates
2000-2017



Lyme Disease



1 dot placed randomly within county of residence for each confirmed case



Data Source: Wisconsin Department of Health Services



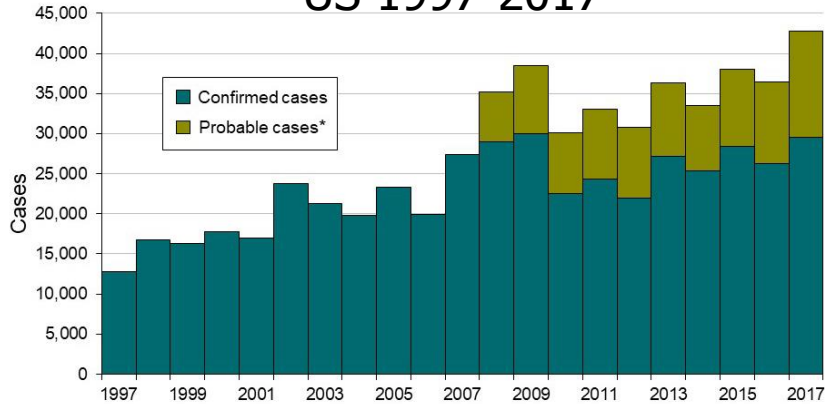
- New CDC guidance allowing a second EIA instead of Western Blot for confirmation

<https://www.cdc.gov/mmwr/volumes/68/wr/mm6832a4.htm>

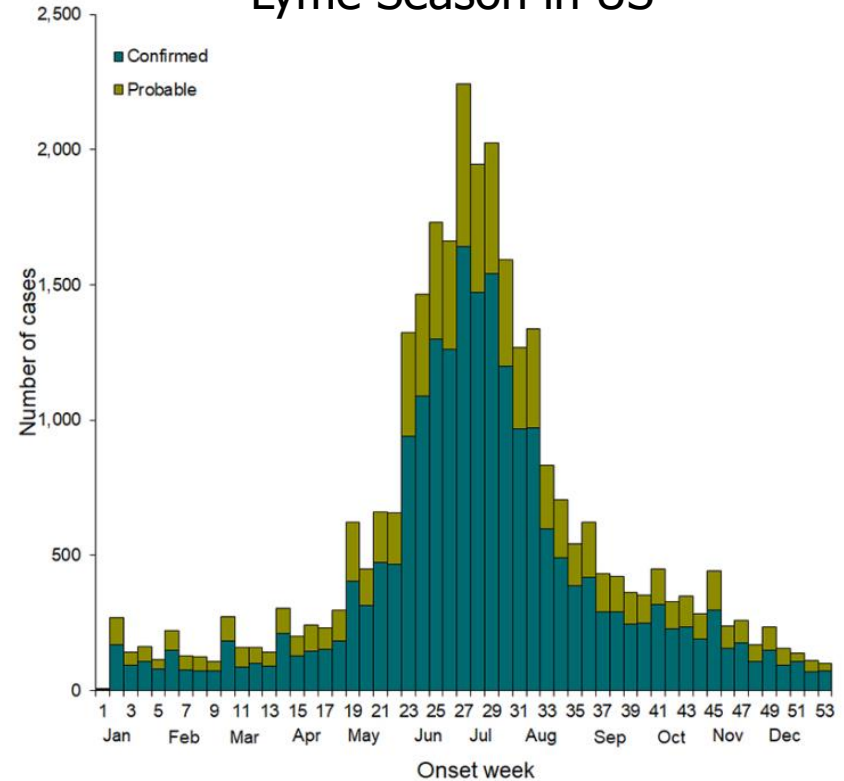


Lyme Disease

US 1997-2017

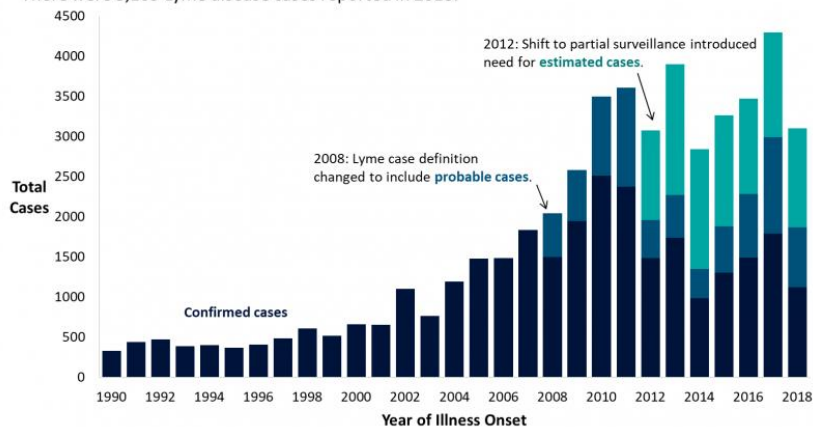


Lyme Season in US



Lyme Disease (*B. burgdorferi*) Cases in Wisconsin

There were 3,105 Lyme disease cases reported in 2018.



Data Source: Wisconsin Department of Health Services



RESPIRATORY VIRUSES



NIRC

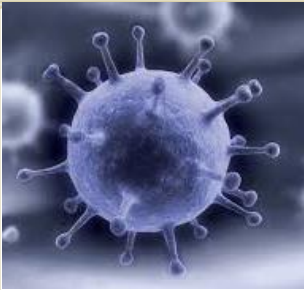
National Influenza Reference Center





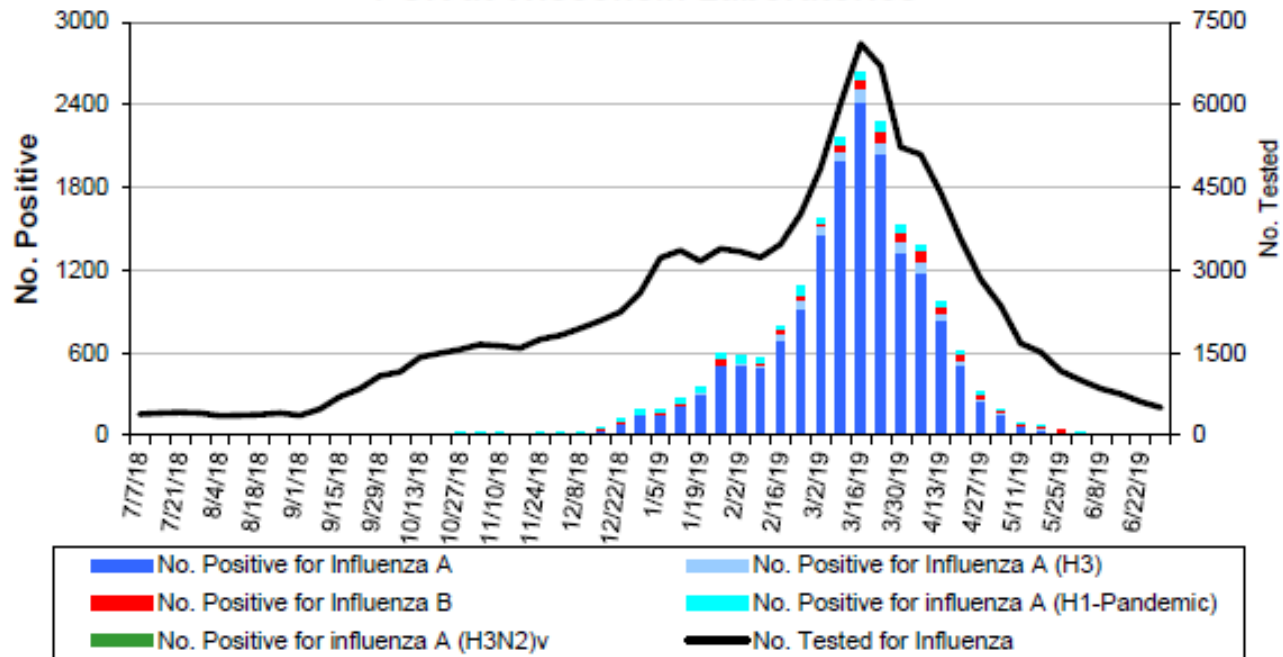
Influenza Surveillance

- Providing situational awareness:
 - When season begins/ends
 - types/subtypes/strains of influenza circulating
 - when and where circulating
 - clinical severity
 - community impact
 - age groups targeted
 - # tests performed/positivity rate
 - reliability of diagnostic methods
- Detecting novel or reassortant viruses
- Informing vaccine strain selection by CDC
- Detecting and monitoring antiviral resistance



Influenza

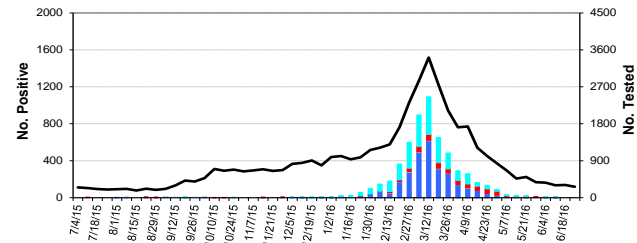
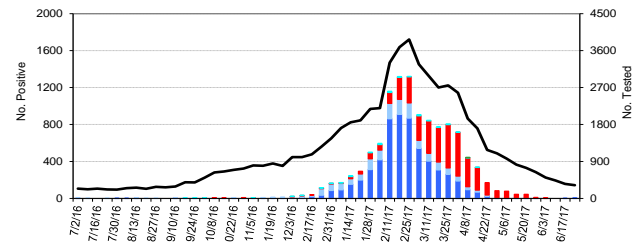
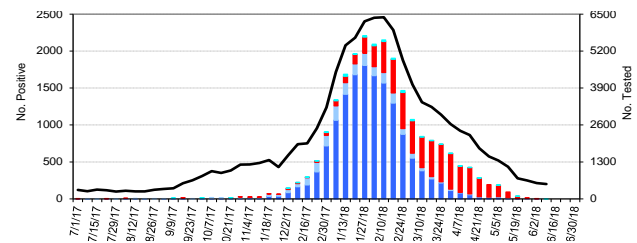
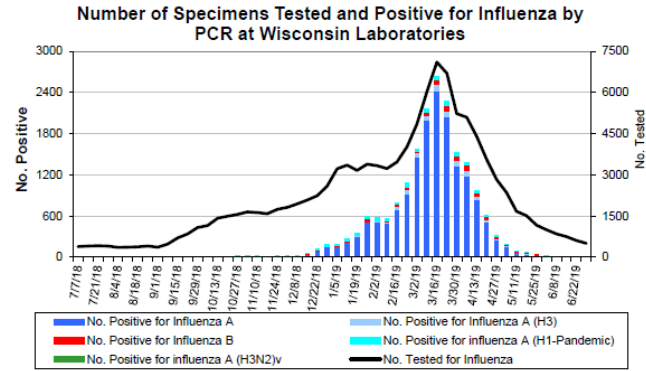
Number of Specimens Tested and Positive for Influenza by PCR at Wisconsin Laboratories





Influenza Positives by PCR, 4 Years

6243 Influenza-associate hospitalizations in WI, 2018





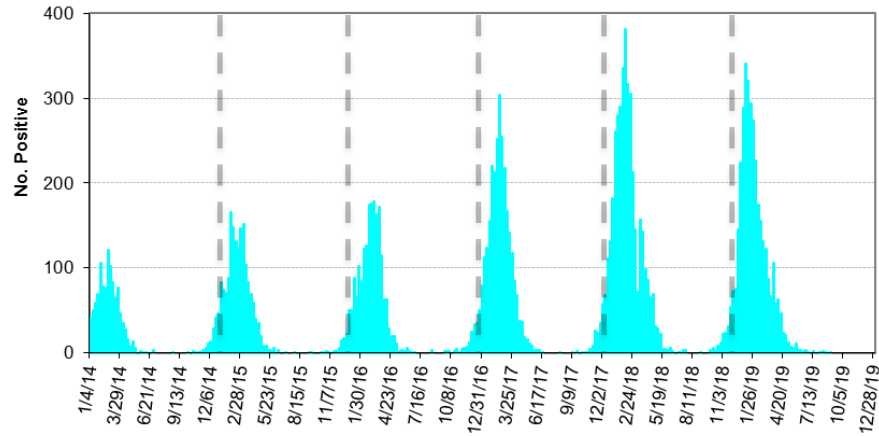
Influenza Peaks, 24 years

2018-2019								^				
2017-2018						^						
2016-2017							^					
2015-2016								^				
2014-2015					^							
2013-2014						^						
2012-2013						^						
2011-2012								^				
2010-2011							^					
2009-2010			^									
2008-2009								^			^	
2007-2008							^					
2006-2007							^					
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2004-2005							^					
2003-2004					^							
2002-2003							^					
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1999-2000						^						
1998-1999								^				
1997-1998							^					
1996-1997					^							
1995-1996					^							
	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July

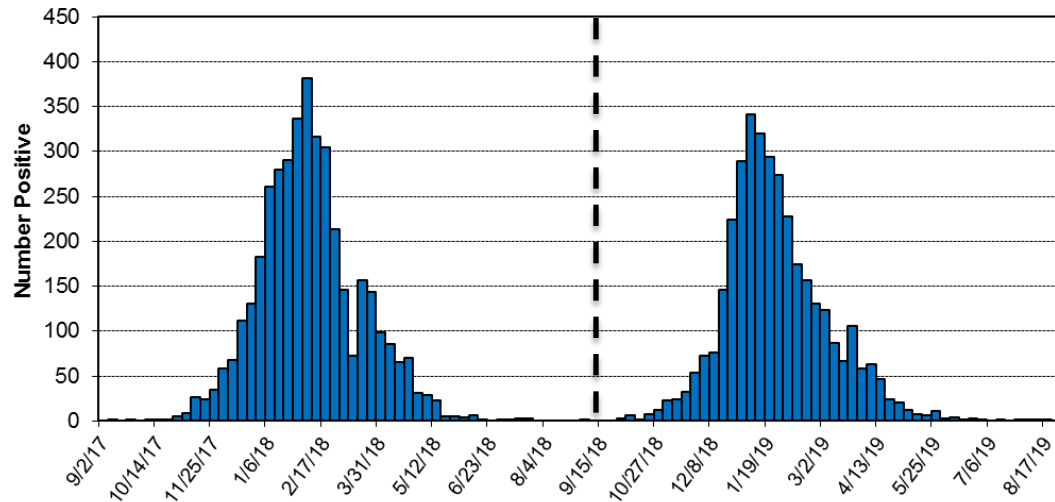


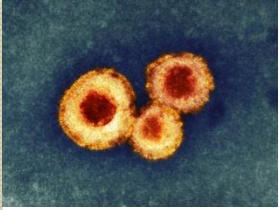
RSV

RSV by PCR 2014-2019



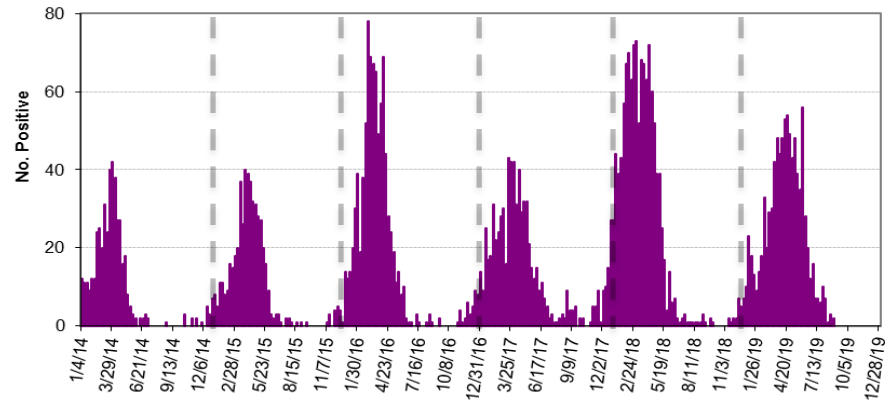
RSV by PCR Sept 2018 - Aug 2019



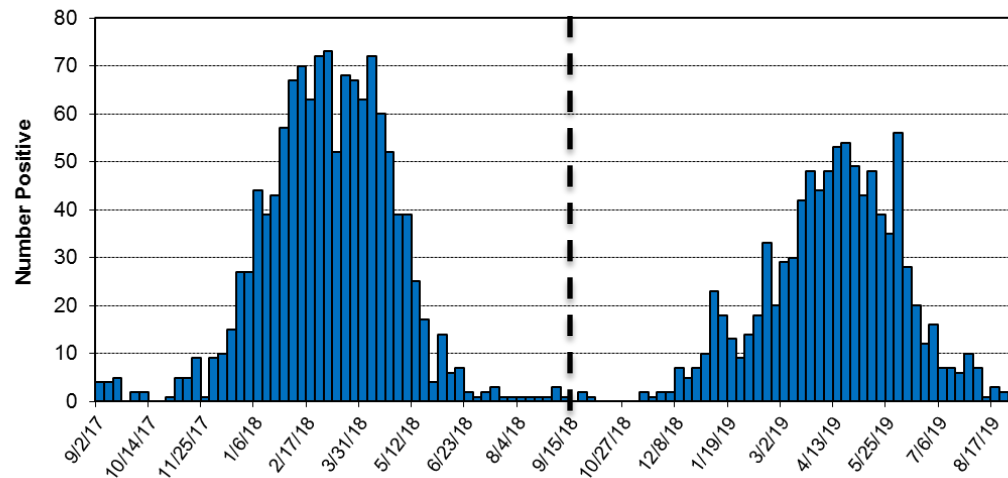


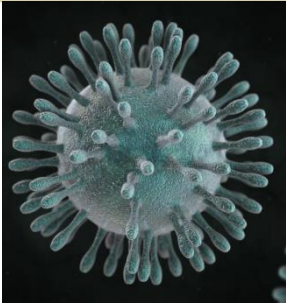
Human Metapneumovirus

hMPV Positives by PCR



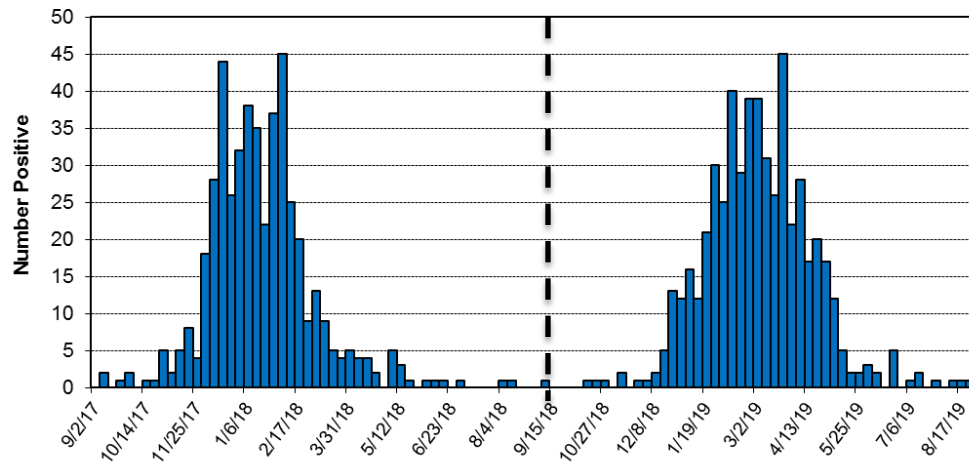
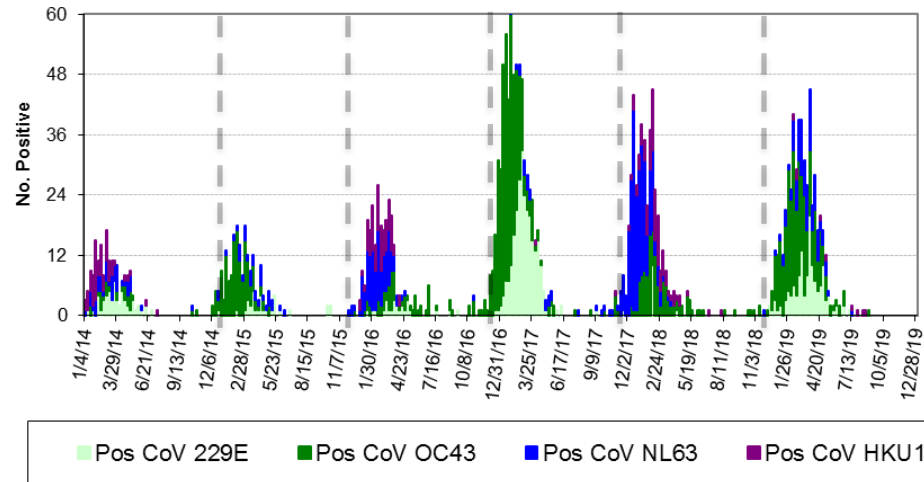
hMNV by PCR Sept 2018 - Aug 2019

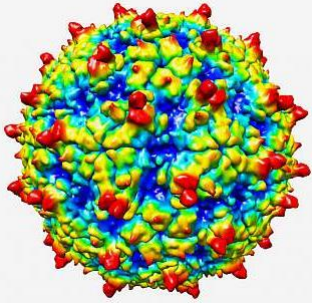




Coronavirus

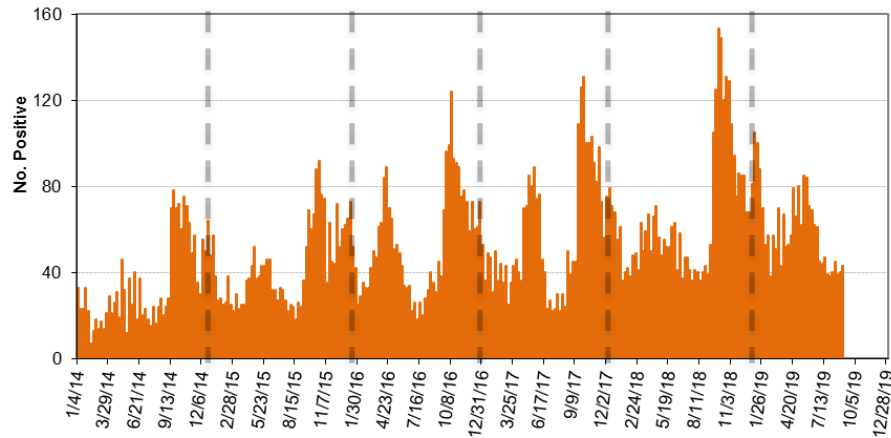
Coronavirus Positive by PCR 2014-2019



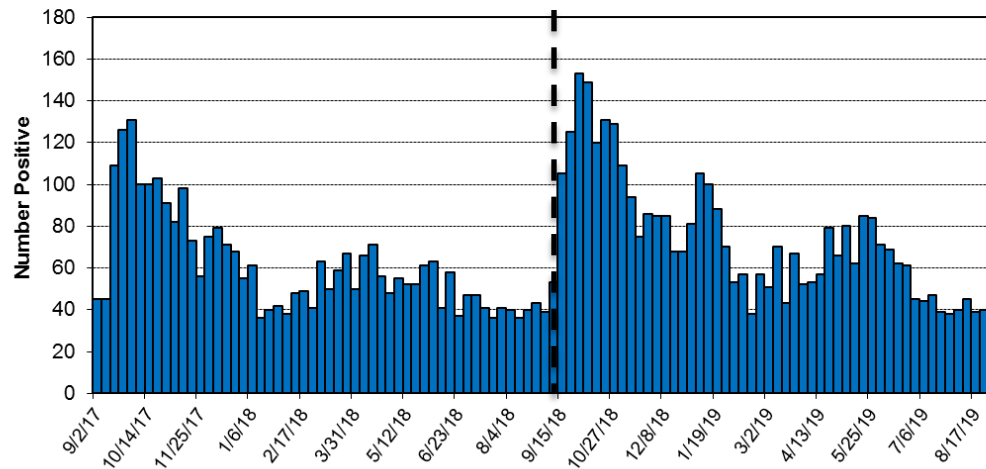


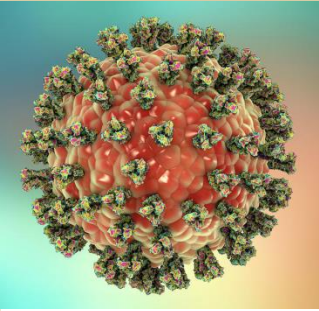
Rhinovirus

Enterovirus/Rhinovirus Positives by PCR



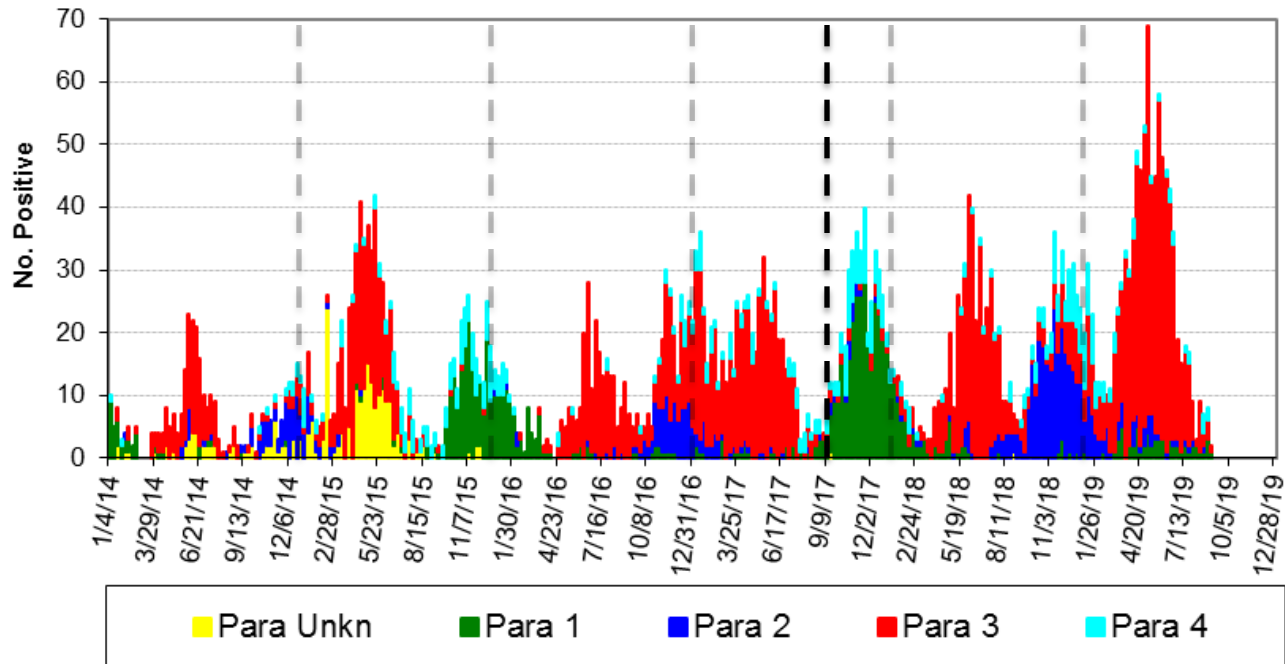
Rhino by PCR Sept 2018 - Aug 2019





Parainfluenza

Parainfluenza by PCR 2014-2019





Laboratory Response Network

Emergency Laboratory Response and Coordination
Select Agent Testing





Clinical Laboratory Role in Public Health

- Critical element in Public Health surveillance
- Report notifiable diseases to local public health
 - Wisconsin Disease Surveillance System (WEDDS)
 - Form 4151
- Support state surveillance
 - Isolates
 - Specimen
 - Data





Benefits of Reporting

- Recognition of outbreaks
- Tracking drug resistance
- Evaluation of vaccine efficacy
- Inform on future vaccines
- Focus resources to areas that need it most
- Trend data
 - Help Doctors diagnose patients
 - Optimize your resources for testing



Reporting

Wisconsin State Laboratory of Hygiene
UNIVERSITY OF WISCONSIN-MADISON

ABOUT WSLH | WSLH SERVICES | **LAB NETWORKS & SURVEILLANCE** | RESEARCH SUPPORT CENTER | NEWS & PUBLICATIONS | PAY YOUR BILL

- Lab Networks & Surveillance
 - Wisconsin Clinical Laboratory Network
 - Training Events
 - Surveillance**
 - Bacteriology Surveillance
 - Mycobacteriology Surveillance
 - Virology Surveillance
 - Gastropathogen Surveillance
 - Wisconsin Mycobacteriology Laboratory Network
 - Communicable Diseases
 - Emergency Response

Surveillance

Subsets of the WCLN laboratories, along with other testing sites, provide testing data, samples, and isolates, to the WSLH for virus surveillance, enteric bacterial surveillance, and mycobacteriology surveillance. The WSLH collates, analyzes and develops graphs of the data. The WSLH also provides reports to mycobacteriology, bacteriology and virology submitters, and summary "bullet-statement" Virus Surveillance Reports to all who request them.

The Laboratory Surveillance Reports web page provides access to the current laboratory-based surveillance reports and graphs that are generated as a testing reports provided by Wisconsin laboratories and other test sites. The graphs include both current and historical graphs and, in some cases, both statewide and regional data. Descriptions of Wisconsin's laboratory-based surveillance programs are also available on this web page.

Reporting Your Results

Click Here to Report Wisconsin Test Data >

Click Here to Access Web-based Laboratory Reporting (WLR) Of Reportable Disease >

For more information regarding reportable diseases, please see the following:

- Wisconsin Department of Health Services (DHS) Disease Reporting
- DHS Reportable Disease Statute, Chapter 145
- DHS Chapter 145 Appendix A, List of Reportable Diseases and Conditions

<http://www.slh.wisc.edu/wcln-surveillance/surveillance/>

<http://www.surveygizmo.com/s3/389222/Wisconsin-Laboratory-Surveillance-Reporting>



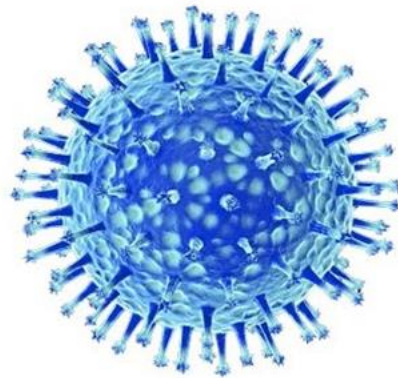
Reporting

- **It is no longer necessary for you to report to the National Respiratory and Enteric Virus Surveillance System (NREVSS). The WSLH is now reporting this data to NREVSS directly for all labs.**
- **If you have questions or problems** reporting test data by either the web-based system or the fax system, please email us at WCLN@mail.slh.wisc.edu or call Mary Wedig at 608-224-4274.



Wisconsin State
Laboratory of Hygiene
UNIVERSITY OF WISCONSIN-MADISON

Laboratory-Based Surveillance Plan 2019-2020



Information, Forms and
Instructions



Resources

CDC

- <https://www.cdc.gov/pneumococcal/surveillance.html>
- <https://www.cdc.gov/widgets/diseaseandconditions/data-maps.html?deliveryName=DM6448>
- <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt01-dip.html>
- <https://wwwn.cdc.gov/narmsnow/>
- <https://www.cdc.gov/mmwr/volumes/65/rr/rr6502a1.htm>

DHS

- <https://www.dhs.wisconsin.gov/publications/p01792-9-2019.pdf>

WSLH

- <http://www.slh.wisc.edu/wcln-surveillance/surveillance/>



Thank You!

