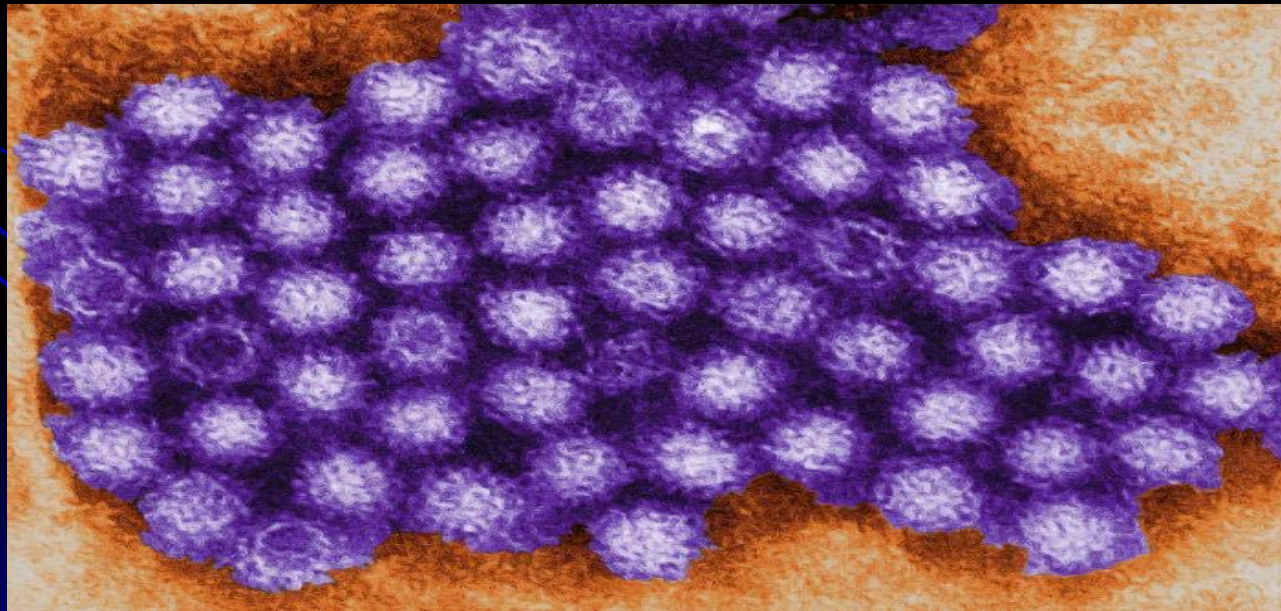
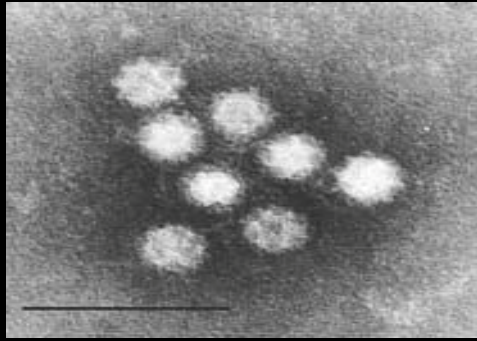


Norovirus and Norovirus-Like Illness (NLI) in Michigan

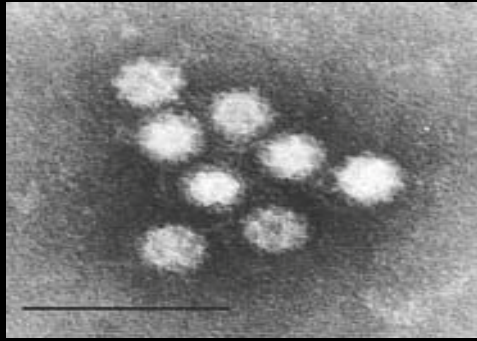
Jennifer C. Beggs, MPH
Michigan Department of Health and Human Services
Communicable Disease Division





Norovirus

- **Incubation: 12–48 hours (median 33–36 hours)**
- **Duration: 12–60 hours**
- **Symptoms: diarrhea, vomiting, nausea, abdominal cramping, low grade fever**
- **Survival on surfaces:**
 - **40°F, >60 days**
 - **68°F (room temp), 21-28 days**
 - **98.6°F, less than 1 day**



Norovirus

- **Viral shedding: up to 2–3 weeks (peaks at 4 days)**
- **10^{10} viral particles per gram of feces**
- **Infectious dose: 18–1,000 virus particles**
 - **Less than 20 virions (virus particles) can be infectious**
 - **Virions can stick together like Velcro and form a clump (usually containing 20–30 virions)**
- **Short-term immunity: <6–12 months**

Disease Burden Estimates per Year, United States

- **21 million cases**
 - **1.7 million outpatient visits**
 - **414,000 ED visits**
 - **71,000 hospitalizations**
 - **800 deaths**
- 

Required Outbreak Reporting: Public Health

- **R 325.173** Details the reporting requirements for health care providers, health care facilities, and clinical laboratories
- **R 325.174** Gives local and state public health officials the authority to investigate possible cases of illness
- **www.michigan.gov/orr**

Disease Reporting

- “...report any unusual occurrence, outbreak, or epidemic of any disease or condition including healthcare-associated infections.”
- Report within 24 hours of outbreak detection
- Report to LHD or MDCH
- Any information pertinent to the outbreak should be reported
 - E.g., Number ill, onset, incubation, duration, organism, control measures

2017 REPORTABLE DISEASES IN MICHIGAN – BY PATHOGEN

A Guide for Physicians, Health Care Providers and Laboratories

Report the following conditions to the Michigan Disease Surveillance System (MDSS) or local health department (see reverse) within 24 hours (unless otherwise noted) if the agent is identified by clinical or laboratory diagnosis.

Report the unusual occurrence, outbreak or epidemic of any disease or condition, including healthcare-associated infections.

Anaplasma phagocytophilum (Anaplasmosis)	Measles virus (Measles/Rubeola)
Arboviral encephalitides, neuro- and non-neuroinvasive: Chikungunya, Eastern Equine, Jamestown Canyon, La Crosse, Powassan, St. Louis, West Nile, Western Equine, Zika (6)	Meningitis: bacterial, viral, fungal, parasitic, and amebic
Babesia microti (Babesiosis)	Mumps virus
Bacillus anthracis (Anthrax) (4)	Mycobacterium leprae (Leprosy or Hansen's Disease)
Blastomyces dermatitidis (Blastomycosis)	Mycobacterium tuberculosis complex (Tuberculosis); report all preliminary and final TB NAAT, TB genetic probe, chromatographic or other rapid test results (5)
Bordetella pertussis (Pertussis)	Neisseria meningitidis, sterile sites (Meningococcal Disease) (5)
Borrelia burgdorferi (Lyme Disease)	Neisseria gonorrhoeae (Gonorrhea) (3, 6)
Brucella species (Brucellosis) (4)	Orthopox viruses (Including Smallpox, Monkeypox) (4)
Burkholderia mallei (Glanders) (4)	Plasmodium species (Malaria)
Burkholderia pseudomallei (Melioidosis) (4)	Poliovirus
Campylobacter species (Campylobacteriosis)	Prion disease (Including CID)
Chlamydia trachomatis (Trachoma, Genital infections, LGV) (3, 6)	Rabies virus (4)
Chlamydia psittaci (Psittacosis)	Rheumatic fever (1)
Clostridium botulinum (Botulism) (4)	Rickettsia species (Spotted Fever)
Clostridium tetani (Tetanus)	Rubella virus (6)
Coronaviruses (SARS, MERS-CoV) (5)	Salmonella species (Salmonellosis) (5)
Corynebacterium diphtheriae (Diphtheria) (5)	Salmonella typhi (Typhoid Fever) (5)
Coxsackievirus (Q Fever) (4)	Shigella species (Shigellosis) (5)
Cryptosporidium species (Cryptosporidiosis)	Staphylococcus aureus (MRSA), outbreaks only
Cyclospora species (Cyclosporiasis)	Staphylococcus aureus Toxic Shock Syndrome (1)
Dengue virus (Dengue Fever)	Staphylococcus aureus, vancomycin intermediate/ resistant (VISA) (5)/VRSA (4)
Ehrlichia species (Ehrlichiosis)	Streptococcus pneumoniae, sterile sites
Encephalitis, viral or unspecified	Streptococcus pyogenes, group A, sterile sites, including Streptococcal Toxic Shock Syndrome (STSS)
Escherichia coli, O157:H7 and all other Shiga toxin positive serotypes (including HUS) (5)	Treponema pallidum (Syphilis) (6)
Francisella tularensis (Tularemia) (4)	Trichinella spiralis (Trichinellosis)
Giardia species (Giardiasis)	Varicella-zoster virus (Chickenpox) (6)
Guillain-Barre Syndrome (1)	Vibrio cholera (Cholera) (4)
Haemophilus ducreyi (Chancroid)	Vibriosis (Non-cholera species) (5)
Haemophilus influenzae, sterile sites only; submit isolates for serotyping for patients <15 years of age (5)	Yellow fever virus
Hantavirus	Yersinia enterocolitica (Yersiniosis)
Hemorrhagic Fever Viruses (4)	Yersinia pestis (Plague) (4)
Hepatitis, viral: Hepatitis A virus (Anti-HAV IgM)	
Hepatitis B virus (HBsAg, HBeAg, anti-HBc IgM, HBV NAAT, HBV genotype; report all HBsAg and anti-HBs (positive, negative, indeterminate) for children ≤ 5 years of age) (6)	
Hepatitis C virus (Anti-HCV, HCV NAAT, HCV genotype, Antigen) (6)	
Hepatitis D virus (HDsAg, anti-HDV IgM)	
Hepatitis E virus (Anti-HEV IgM)	
Histoplasma capsulatum (Histoplasmosis)	
HIV [tests including: reactive immunoassays (e.g., Ab/Ag, TD1/TD2, WB, EIA, IA), detection tests (e.g., VL, NAAT, p24, genotypes), CD4 counts/ percents; and all tests related to perinatal exposures] (2,4,6)	
Influenza virus (weekly aggregate counts)	
Pediatric mortality, report individual cases	
Novel influenza viruses, report individual cases (5, 6)	
Kawasaki Disease (1)	
Legionella species (Legionellosis) (5)	
Leptospira species (Leptospirosis)	
Listeria monocytogenes (Listeriosis) (5, 6)	

LEGEND

- (1) Reporting within 3 days is required.
 - (2) Reporting within 7 days is required.
 - (3) Sexually transmitted infection for which expedited partner therapy is authorized. See www.michigan.gov/hivstf for details.
 - (4) A laboratory shall immediately submit **suspect or confirmed** isolates, subcultures, or specimens from the patient being tested to the MDHHS Lansing laboratory.
 - (5) Isolate requested. *Enteric*: If not available from non-culture based testing, the positive broth and/or stool in transport medium must be submitted to the MDHHS Lansing laboratory.
Respiratory: Submitting specimens is recommended, but not required if the isolate is unavailable.
 - (6) Report pregnancy status, if available.
- Blue Bold Text** = Category A bioterrorism agent, notify the MDHHS Laboratory immediately: (517) 335-8063

This reporting is expressly allowed under HIPAA and required by Michigan Public Act 368 of 1978, 333.5111
MDHHS maintains, reviews, and revises this list at least annually, for the most recent version please refer to: www.michigan.gov/cd/info
Michigan Department of Health and Human Services • Bureau of Laboratories • Bureau of Epidemiology and Population Health

REV. 01/2017

Disinfection

- **Virus is viable up to 7 days on inanimate objects**
- **Must remove visible contaminants of vomitus and diarrhea prior to disinfection**
- **Use dilute bleach (inexpensive and effective)**
- **Alternatives:**
 - **EPA-registered disinfectants**
 - **Accelerated Hydrogen Peroxide**
 - **Glutaraldehyde (0.5%)**
 - **Iodine (0.8%)**
 - **Lysol® or Pinesol® (2–4x manufacturer's recommended concentration)**

Disinfection Concentrations

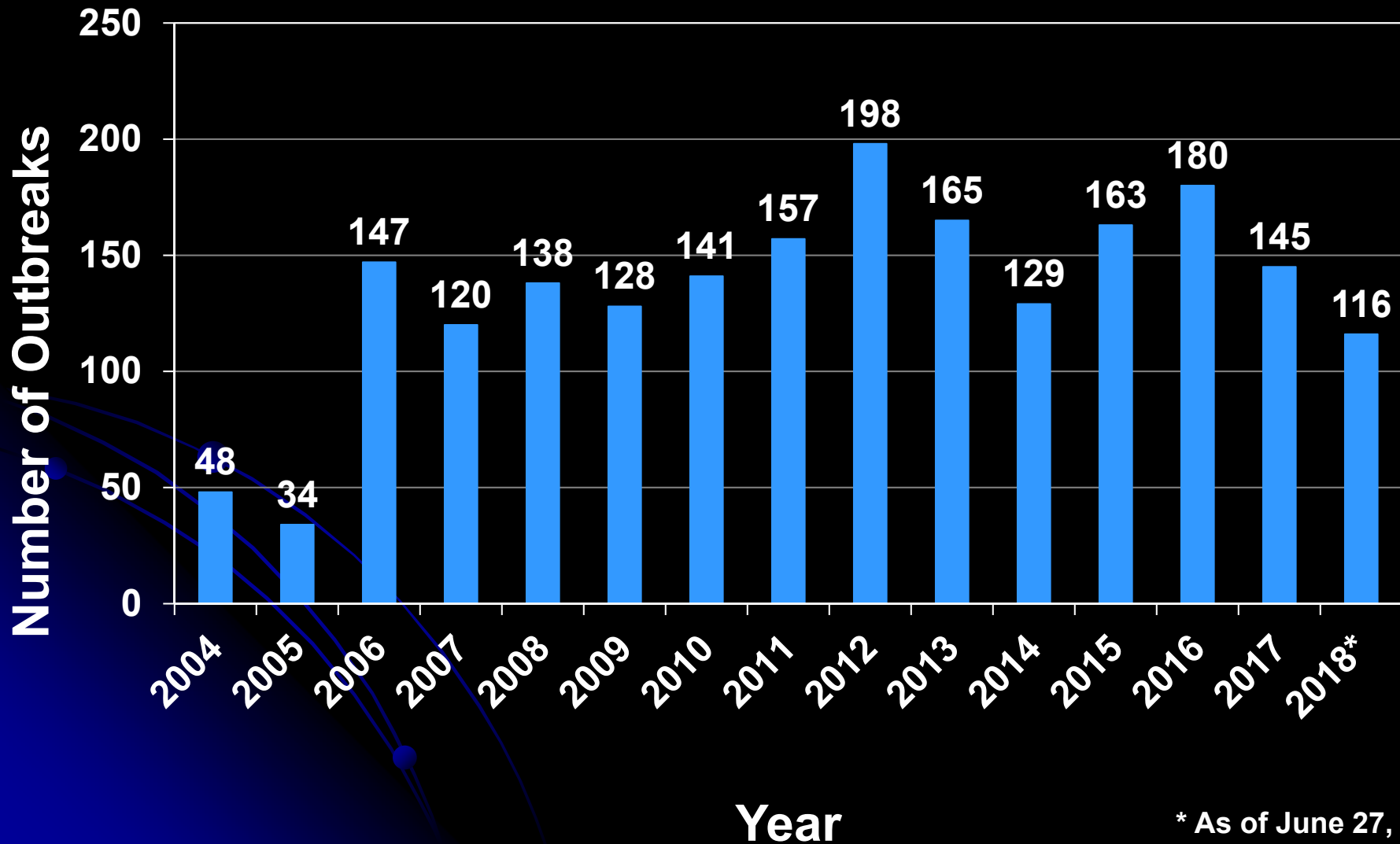
- **Stainless steel, food/mouth items, toys**
 - 200ppm
 - 1 tablespoon of bleach to 1 gallon of water
- **Non-porous surfaces, tile floors, counter-tops, sinks, toilets**
 - 1000ppm
 - 1/3 cup bleach to 1 gallon of water
- **Porous surfaces, wooden floors**
 - 5000ppm
 - 1 and 1/2 cup bleach to 1 gallon water

Norovirus-Like Illness (NLI) Outbreak Definition

Gastrointestinal illness (GI) clusters are defined as NLI outbreaks when:

- **Cases present with signs and symptoms consistent with norovirus infection**
- **Are not laboratory confirmed as norovirus**
- **For facilities (e.g., hospitals, schools, daycares, prisons), GI activity is above normal baseline**

NLI Outbreaks per Year, Michigan 2004–2018*



* As of June 27, 2018

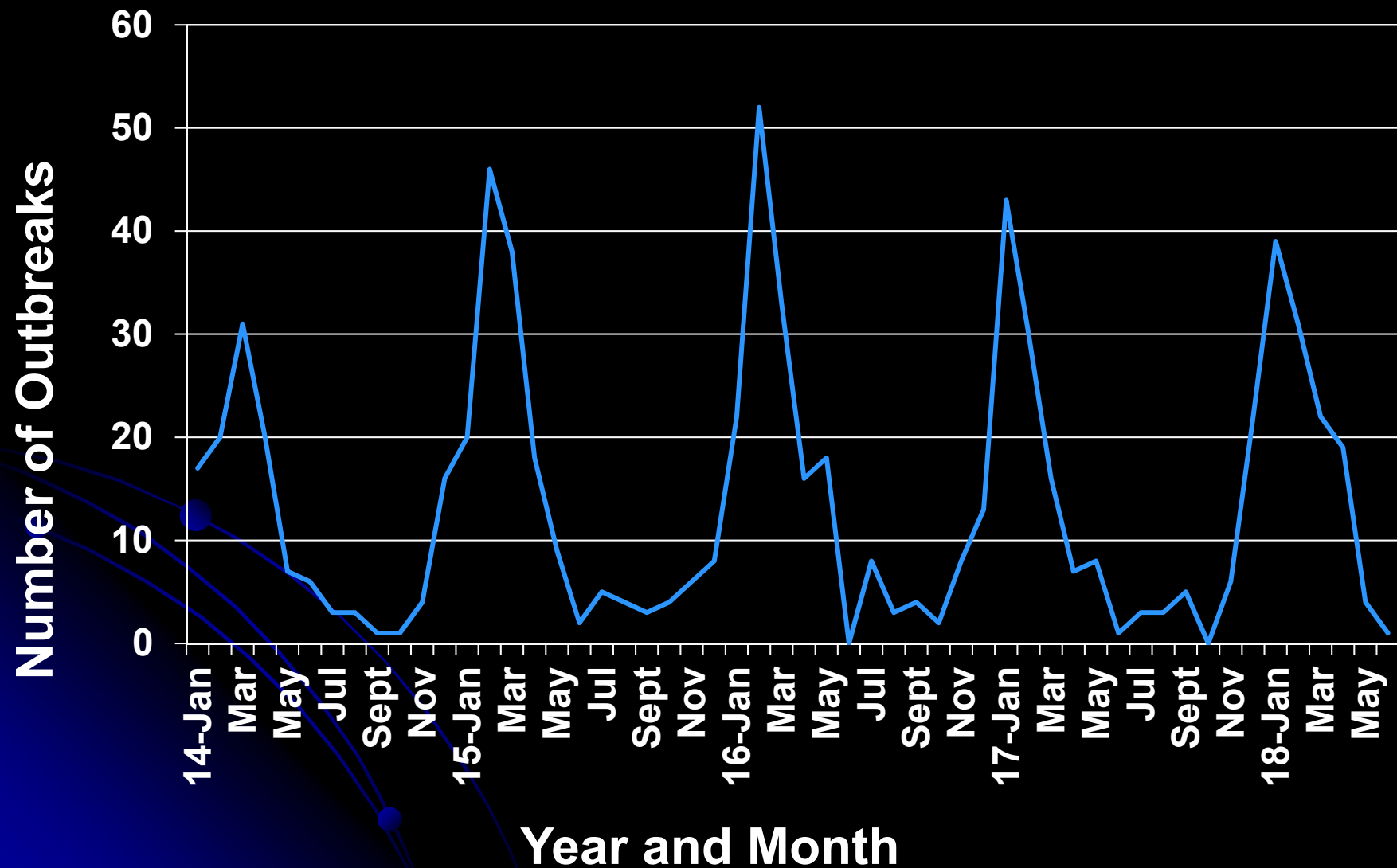
NLI Outbreaks and Case Counts¹, Michigan 2013–2018*

Year	Total Outbreaks	Cases
2013	165	4,846
2014	129	3,292
2015	163	3,820
2016	180	3,924
2017	145	4,543
2018*	116	1,761

¹ Case counts based on initial report

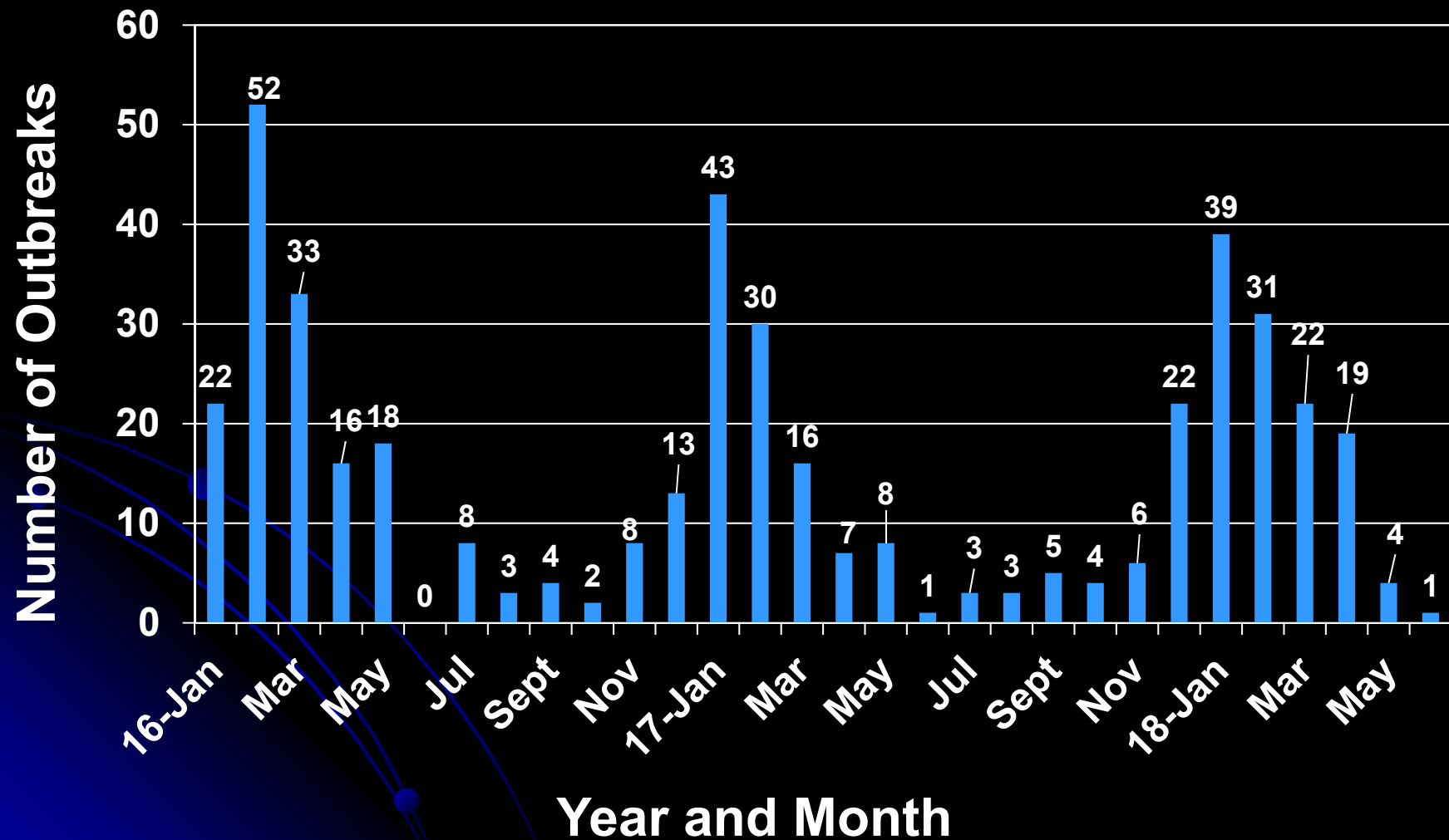
* As of June 27, 2018

NLI Outbreaks by Onset Date per Month, Michigan Jan 2014–June 2018*



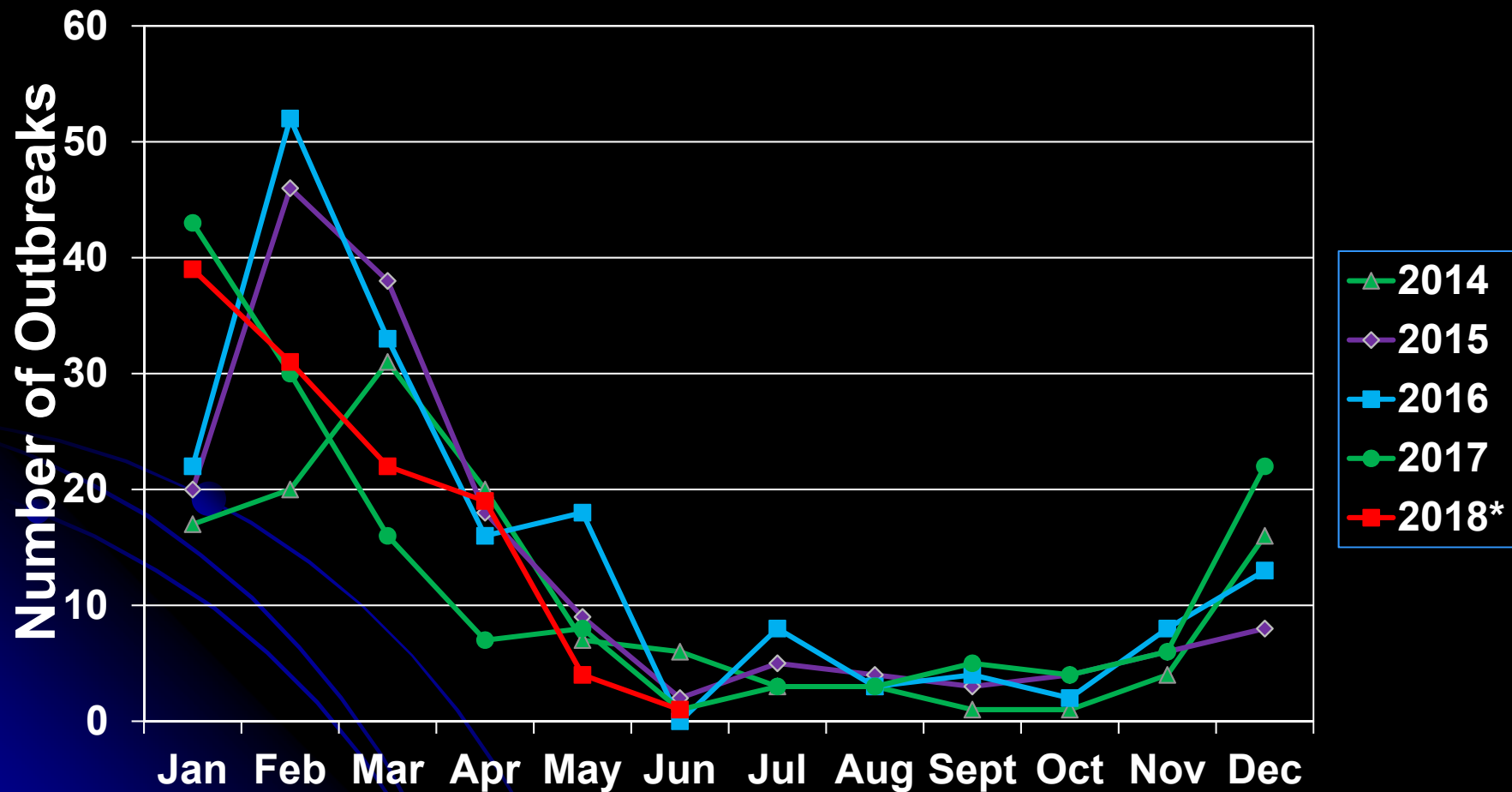
* As of June 27, 2018

NLI Outbreaks by Onset Date per Month, Michigan Jan 2016–June 2018*



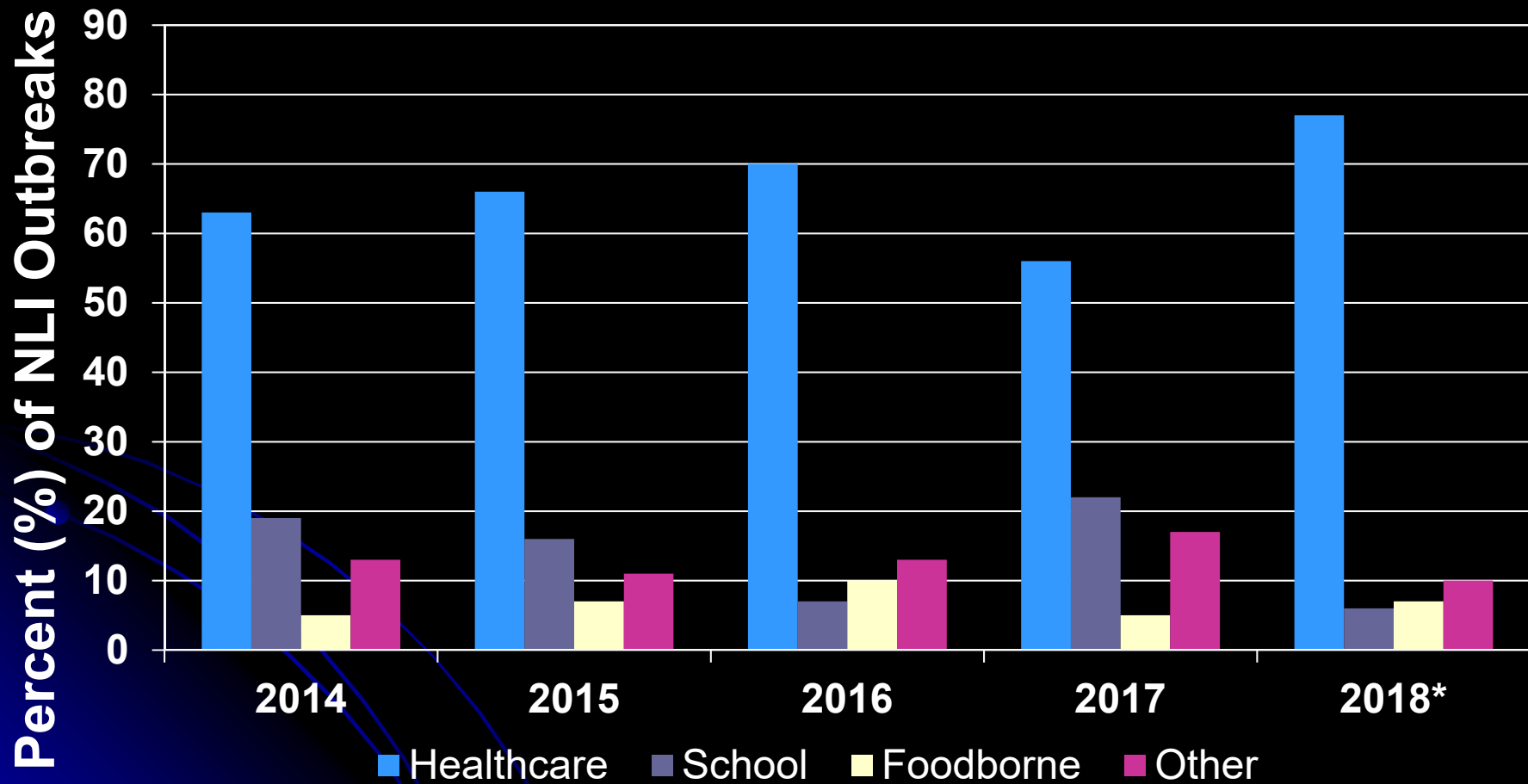
* As of June 27, 2018

NLI Outbreaks by Onset Date per Month, Michigan 2014–2018*



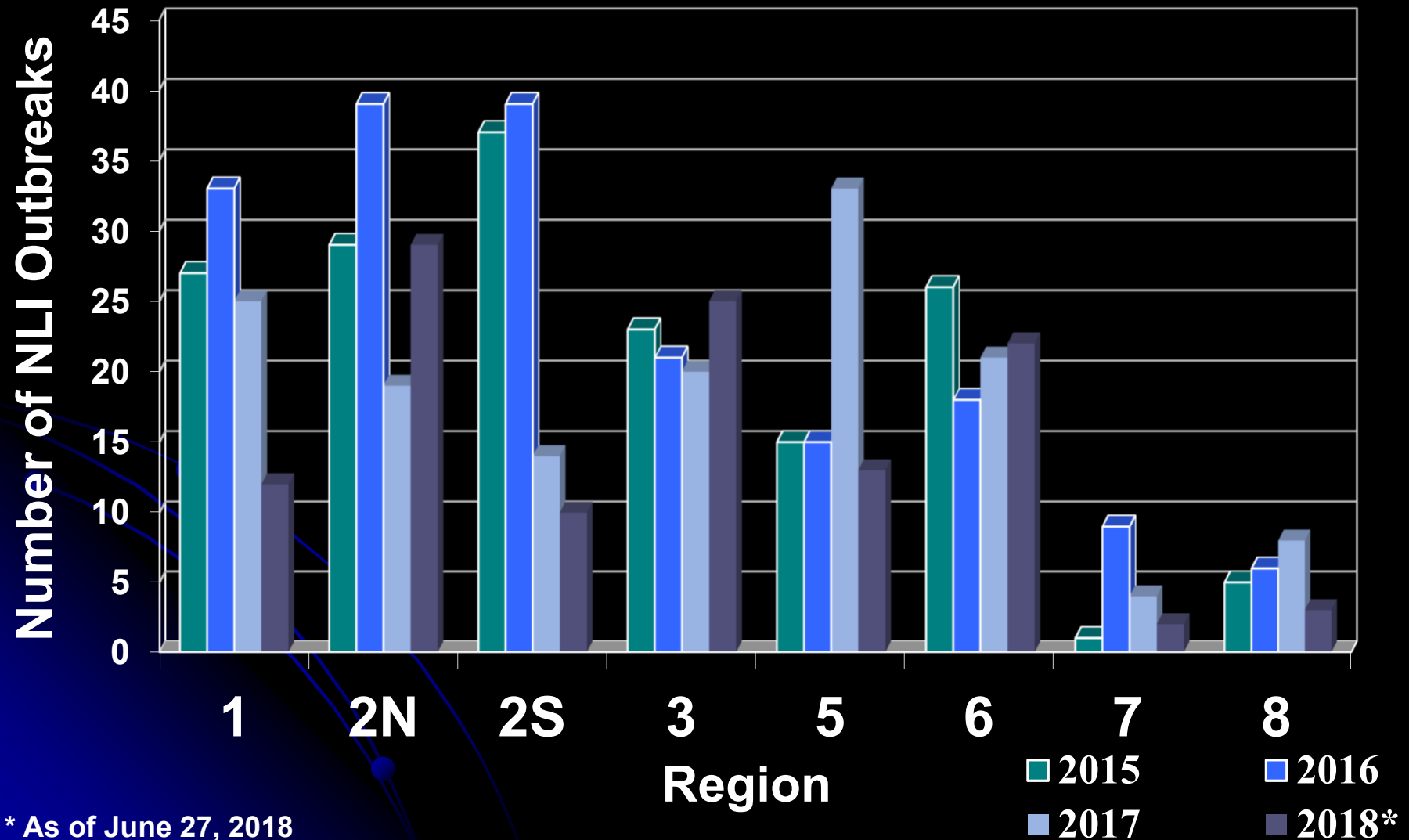
* As of June 27, 2018

Percentage of NLI Associated Settings, Michigan 2014–2018*



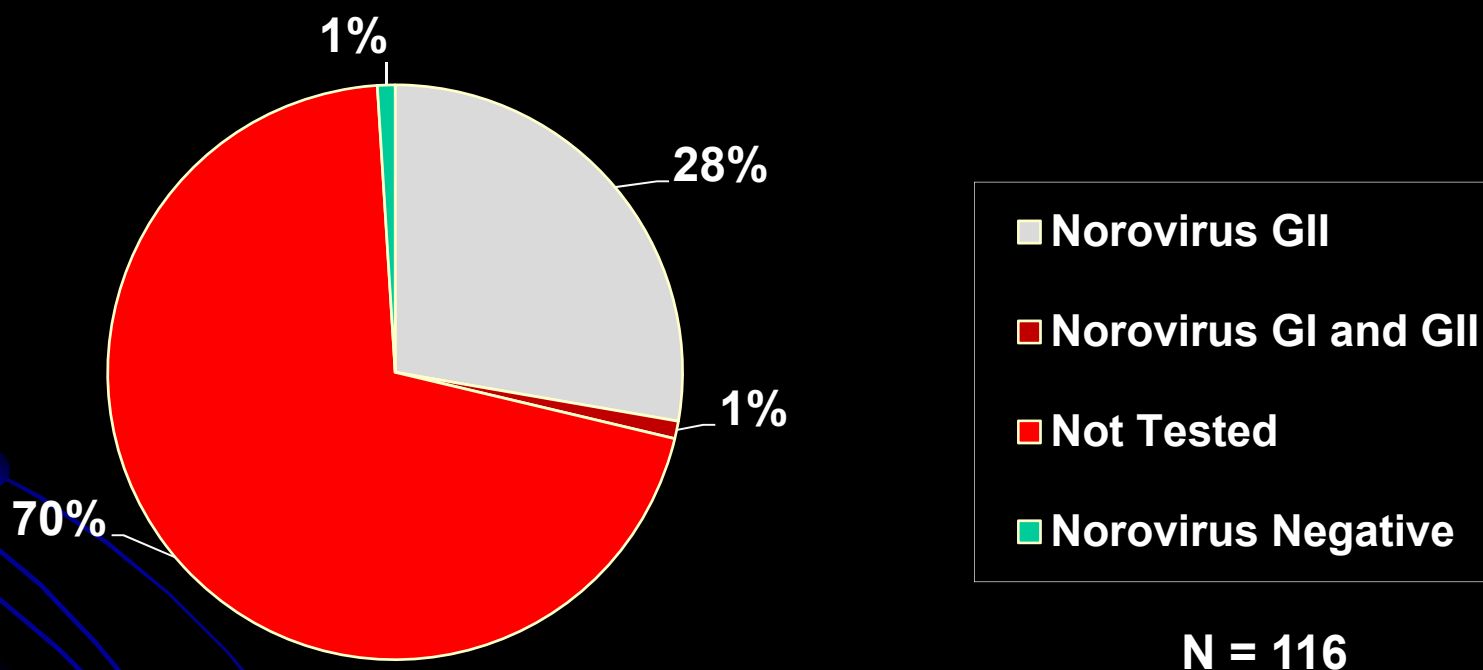
* As of June 27, 2018

NLI Outbreaks by Region, Michigan 2015–2018*



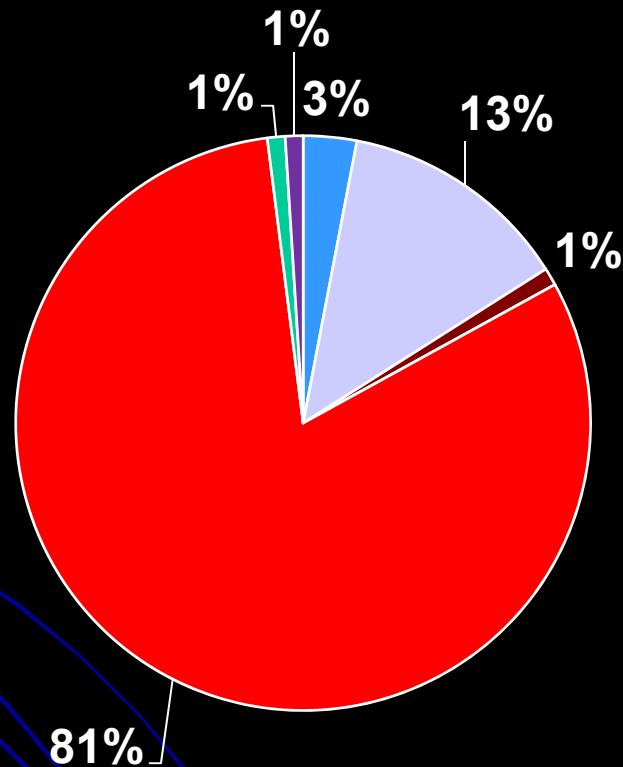
* As of June 27, 2018

Percentage of PCR Confirmed Norovirus Outbreaks, Michigan 2018*



* As of June 27, 2018

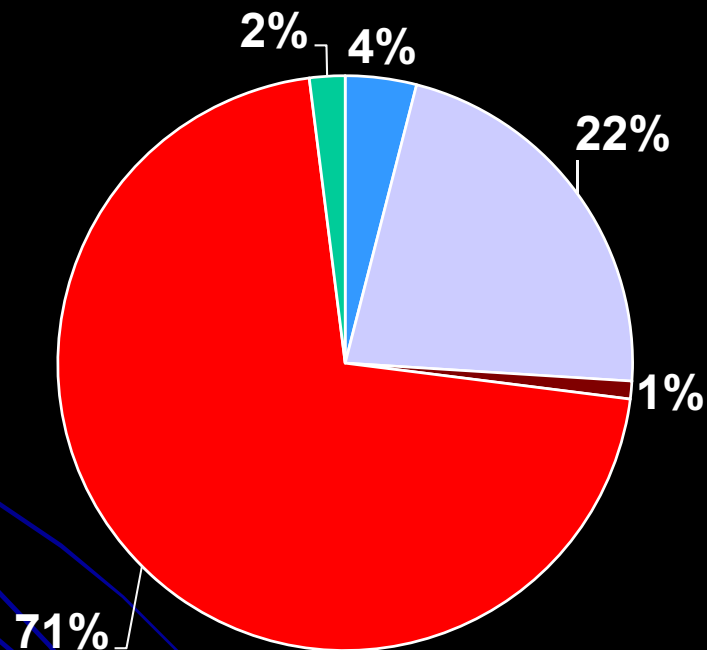
Percentage of PCR Confirmed Norovirus Outbreaks, Michigan 2017



- Norovirus GI
- Norovirus GII
- Norovirus GI and GII
- Not Tested
- Norovirus Negative
- Astrovirus

N = 145

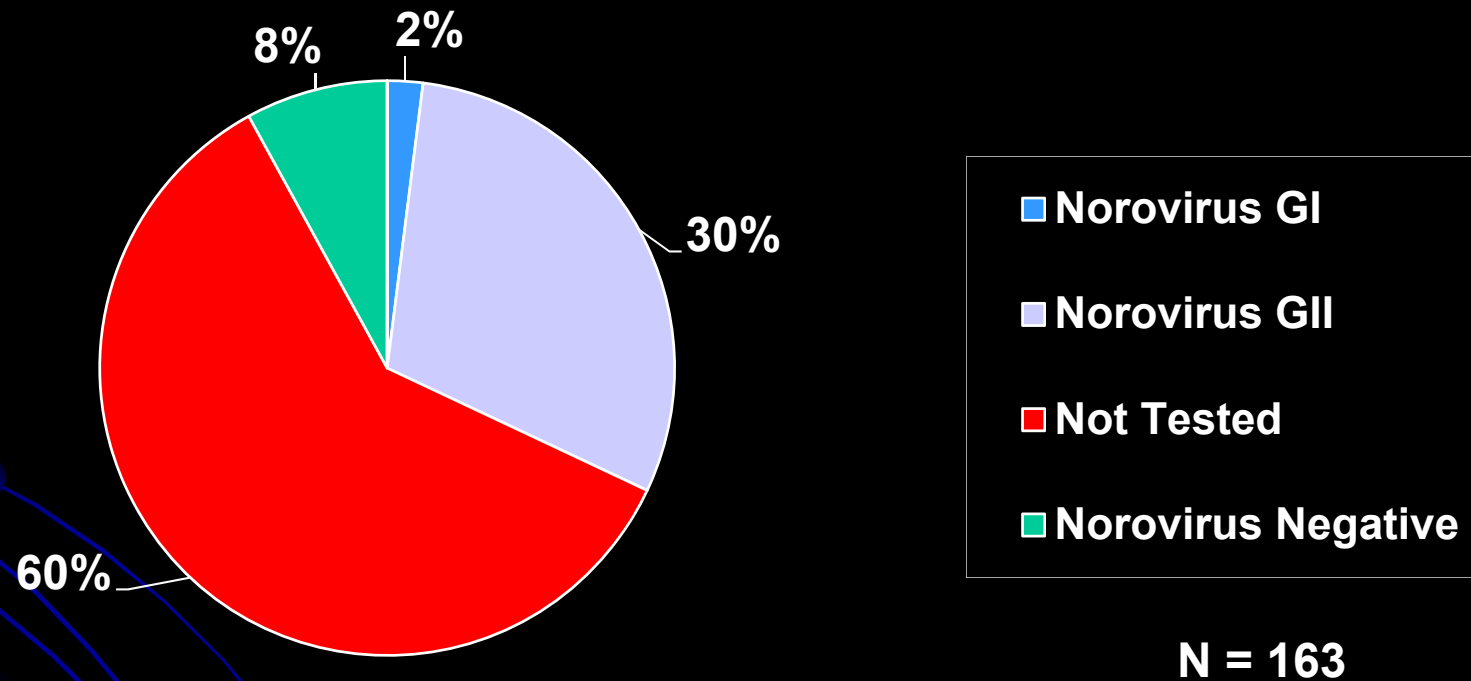
Percentage of PCR Confirmed Norovirus Outbreaks, Michigan 2016



- Norovirus GI
- Norovirus GII
- Norovirus GI and GII
- Not Tested
- Norovirus Negative

N = 180

Percentage of PCR Confirmed Norovirus Outbreaks, Michigan 2015



NLI Outbreak Laboratory Results, Michigan 2015–2018*

Result:	2015 Count	2016 Count	2017 Count	2018* Count
Norovirus GI and GII	0	1	1	1
Norovirus GI	4	7	5	0
Norovirus GII	48	41	19	32
Sapo/Astro Virus¹	0	0	1	0
Norovirus Negative	13	5	2	1
Pending	0	0	0	0
Not Tested	98	126	117	82
Total	163	180	145	116

¹Outbreaks that test negative for norovirus are then tested for astrovirus and sapovirus.

* As of June 27, 2018

Sequences Identified, Michigan 2016-2018*

2018*

- GII.1
- GII.2
- GII.3
- GII.4 New Orleans
- GII.4 Sydney
- GII.4 untypeable
- GII.6
- GII.7

2017

- GI.1
- GI.6
- GI.7
- GII.1
- GII.2
- GII.4 New Orleans
- GII.4 Sydney
- GII.4 untypeable

2016

- GI.3b
- GI.5
- GI.6
- GII.3
- GII.4 Sydney
- GII.4 untypeable
- GII.7

* As of June 27, 2018

Norovirus Resources

www.michigan.gov/cdinfo

- **General Norovirus Fact Sheet**
- **Guidelines for Environmental Cleaning and Disinfection of Norovirus**
- **Guidelines for the Control of a Suspected or Confirmed Outbreak of Viral Gastroenteritis in a Nursing Home**
- **Norovirus Investigations in Long Term Care Facilities: Things to Consider**

Questions

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