California Norovirus Laboratory Network (NLN)

Triannual Report
2017-2018 Norovirus Season
February 2018 through May 2018

Published by: **California Department of Public Health,**
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Respiratory and Gastroenteric Diseases Section
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INTRODUCTION

This is the second triannual report issued by the VRDL to inform NLN member laboratories and California local health departments and partners about current norovirus relevant topics, particularly about circulating and emerging strains detected from California outbreaks of acute viral gastroenteritis tested by NLN labs. In addition to norovirus, this report includes information about norovirus-negative gastroenteritis outbreaks characterized by the VRDL, including rotavirus, sapovirus, astrovirus, and gastroenteric adenoviruses 40 and 41. Outbreaks in this report are defined as being two or more cases of acute gastroenteritis linked by time, person, and place. Laboratory-confirmed outbreaks are those in which a gastroenteric viral agent has been detected by a laboratory method (e.g., PCR) from two or more outbreak patient specimens.

NOROVIRUS GENOTYPING NOMENCLATURE

Currently, the naming of norovirus genotypes is based on typing of region B of the polymerase gene and region C of the capsid gene. For example, the current most commonly detected strain, **GII.P16-GII.4 Sydney**, is so named because the genetic sequence of polymerase region B corresponds to the genogroup II, polymerase type 16 strain (GII.P16) while the sequence of capsid region C matches that of genogroup II genotype 4 Sydney (GII.4 Sydney). Thus, the name **GII.P16-GII.4 Sydney** reveals that this virus is a recombinant between a norovirus with the GII.P16 polymerase and the GII.4 Sydney capsid genes.

NOROVIRUS ACTIVITY -- FEBRUARY THROUGH MAY 2018

From February through May 2018, the NLN reported 46 suspected norovirus outbreaks to VRDL. Of the 46 suspected outbreaks, 37 (80%) were laboratory-confirmed by real-time RT-PCR (Table 1). Contra Costa County and Sacramento County reported the most confirmed outbreaks with five each, followed by Orange County with four (Table 2, Figure 1). As shown in

Table 1, outbreaks were overwhelmingly associated with Genogroup II (GII) viruses (35/37, 95%) compared with Genogroup I (GI) viruses (2/37, 5%). Of the 35 GII outbreaks reported by the NLN, 23 (66%) outbreaks were genotyped with the predominant genotype identified as **GII.P16-GII.4 Sydney** (17/23, 74%) as shown in Table 3.

Last season, from February through May 2017, the NLN reported 72 suspected outbreaks, of which 42 (58%) outbreaks were confirmed by real-time RT-PCR. The most commonly detected genotype was **GII.P16-GII.2,** identified in 19 (50%) of 38 outbreaks genotyped by VRDL. Norovirus GII.P16-GII.2 was associated with several large outbreaks at schools throughout California during May 2017 (Figure 2).

NOROVIRUS GENOTYPING AND CALICINET

The VRDL is a CaliciNet-certified laboratory and submits all norovirus outbreak sequences to the CaliciNet database at the U.S. Centers for Disease Control and Prevention (CDC). From February through May 2018, the VRDL submitted specimens from 22 different norovirus outbreaks to CaliciNet/CDC. In addition to the VRDL, two other NLN members, Los Angeles County Public Health Laboratory and Orange County Public Health Laboratory, are CaliciNet-certified laboratories, and each independently submits norovirus sequences to CaliciNet/CDC. The CaliciNet/CDC database allows for norovirus sequences to be compared and queried in real-time for situational awareness of strains associated with outbreaks, and facilitates a rapid response for investigation, prevention, and control of norovirus outbreaks.

OUTBREAKS AT LONG-TERM CARE FACILITIES

Long-term care facilities (LTCFs) are settings at which it is easier to recognize cases and outbreaks of acute gastroenteritis, and thus specimens are more easily obtained by LTCF staff for laboratory confirmation of suspect norovirus outbreaks than in other settings (such as schools or restaurants). Therefore, it is not unexpected that the majority (30/37, 81%) of norovirus outbreaks reported by NLN labs from February through May 2018 occurred at LTCFs. Due to more available specimens, more outbreaks at LTCFs were genotyped than for any other setting (19/25 [76%] genotyped norovirus OBs originated from LTCFs, as shown in Figure 3).

VENTURA COUNTY SAPOVIRUS OUTBREAK -- APRIL 2018

Norovirus-negative gastroenteritis outbreaks may be further tested by VRDL for four other gastroenteric viruses: rotavirus, astrovirus, sapovirus, and gastroenteric adenoviruses. In total, from February through May 2018, VRDL received a total of 14 specimens from 5 norovirus-negative OBs from Fresno County (1), San Joaquin County (1), Ventura County (2), and Yolo County (1). VRDL detected sapovirus by real-time RT-PCR in specimens from three patients involved in one of the norovirus-negative OBs submitted by Ventura County Public Health Laboratory. This sapovirus OB occurred in April 2018 at a local sporting event. All three specimens were genotyped as sapovirus genogroup I genotype 2 (GI.2), with identical sequences in the VP1 capsid region (strongly indicating that the three cases were linked). We encourage our NLN partners to submit norovirus-negative outbreaks to VRDL for further testing.

Table 1: Norovirus Testing Reported by the NLN, February—May 2018

Month Reported	Total Outbreaks	Lab-Confirmed Outbreaks	Total Outbreak Specimens	Positive Outbreak Specimens	Genogroup I Outbreaks	Genogroup II Outbreaks
February	17	17	66	48	0	17
March	9	8	55	49	1	7
April	12	8	67	31	1	7
May	8	4	33	12	0	4
Total	**46**	**37**	**221**	**140**	**2**	**35**

Table 2: Reporting from NLN Labs: Number of Norovirus Outbreaks (OBs) Tested, February—May 2018

Public Health NLN Lab	Total Suspect Norovirus OBs Reported by NLN	Total Laboratory-Confirmed Norovirus OBs
Alameda	2	2
Contra Costa	6	5
Fresno	0	0
Humboldt	0	0
Long Beach	0	0
Los Angeles	5	3
Monterey	1	1
Napa-Solano-Yolo-Marin	1	1
Orange	4	4
Riverside	2	2
Sacramento	6	5
San Bernardino	0	0
San Diego	2	1
San Joaquin	1	0
San Luis Obispo	1	0
San Mateo	2	2
Santa Barbara	2	2
Santa Clara	1	1
Shasta	3	3
Sonoma	0	0
Stanislaus	0	0
Tulare	3	3
Ventura	3	1
VRDL (for Nevada Co.)	1	1
Total	**46**	**37**

Table 3: Norovirus Genotypes from Reported Norovirus Outbreaks, February—May 2018

Genogroup I Genotypes	**Number of OBs**
GI.P4-GI.4	1
GI.P6-GI.6	1
Total	**2**
Genogroup II Genotypes	**Number of OBs**
GII.Pe-GII.4 Sydney *(originally 2012 GII.4 Sydney)*	2
GII.Pg-GII.1	2
GII.P7-GII.7	1
GII.P16-GII.2	1
GII.P16-GII.4 Sydney *(aka "GII.4 Sydney 2015", currently the predominant circulating norovirus variant [Figures 3 and 4])*	17
Total	**23**

Figure 1: **Number of Laboratory-Confirmed Norovirus Outbreaks Identified by Local Health Jurisdiction, February—May 2018**

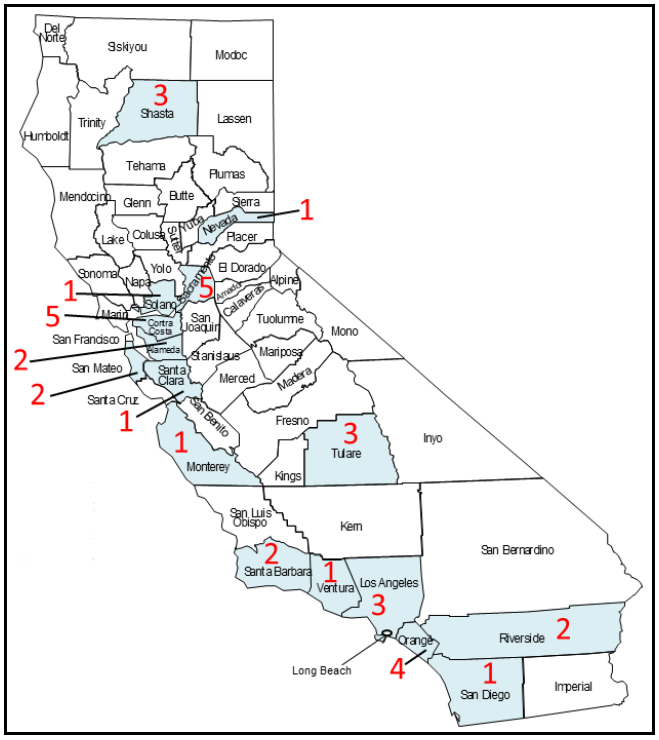


Figure 2: Laboratory-Confirmed Norovirus Outbreaks Reported by the NLN, February—May 2018

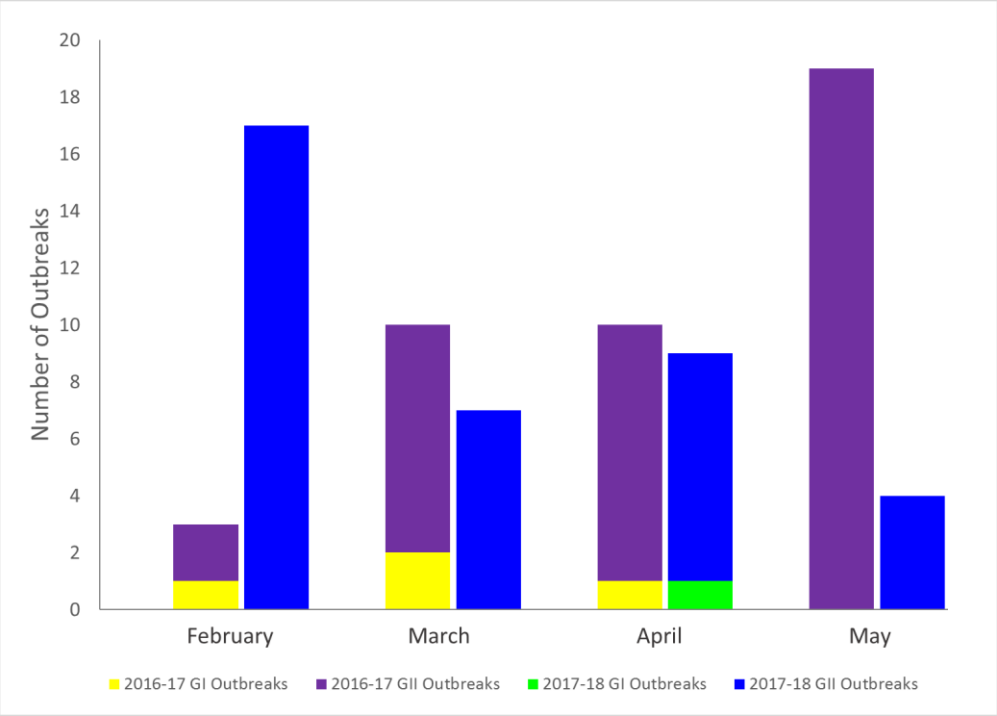


Figure 3: Norovirus Genotypes by Setting for Outbreaks (OBs) Tested by the NLN February—May 2018 (N=25)

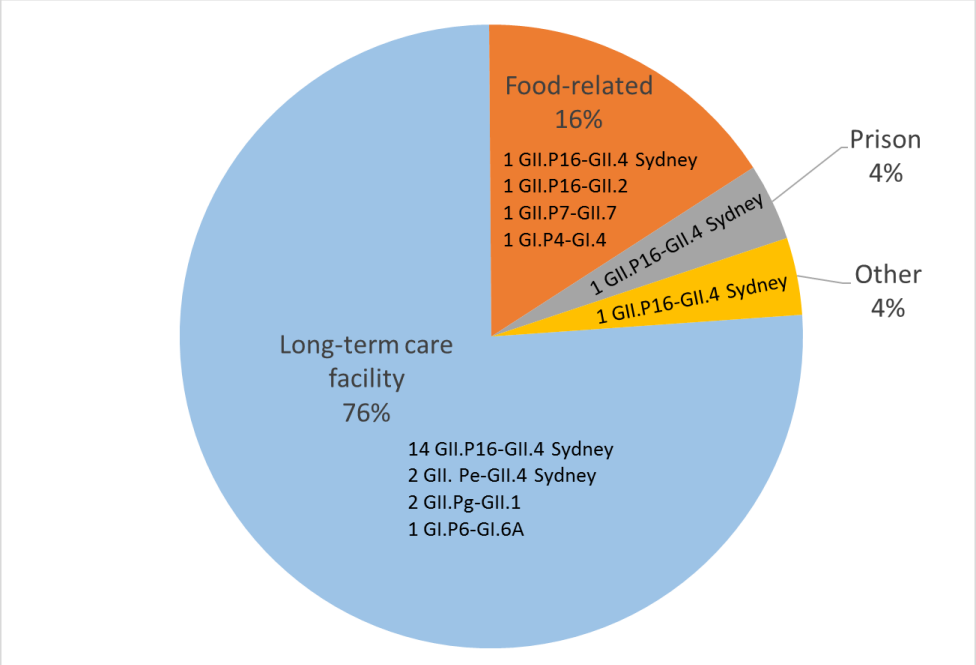
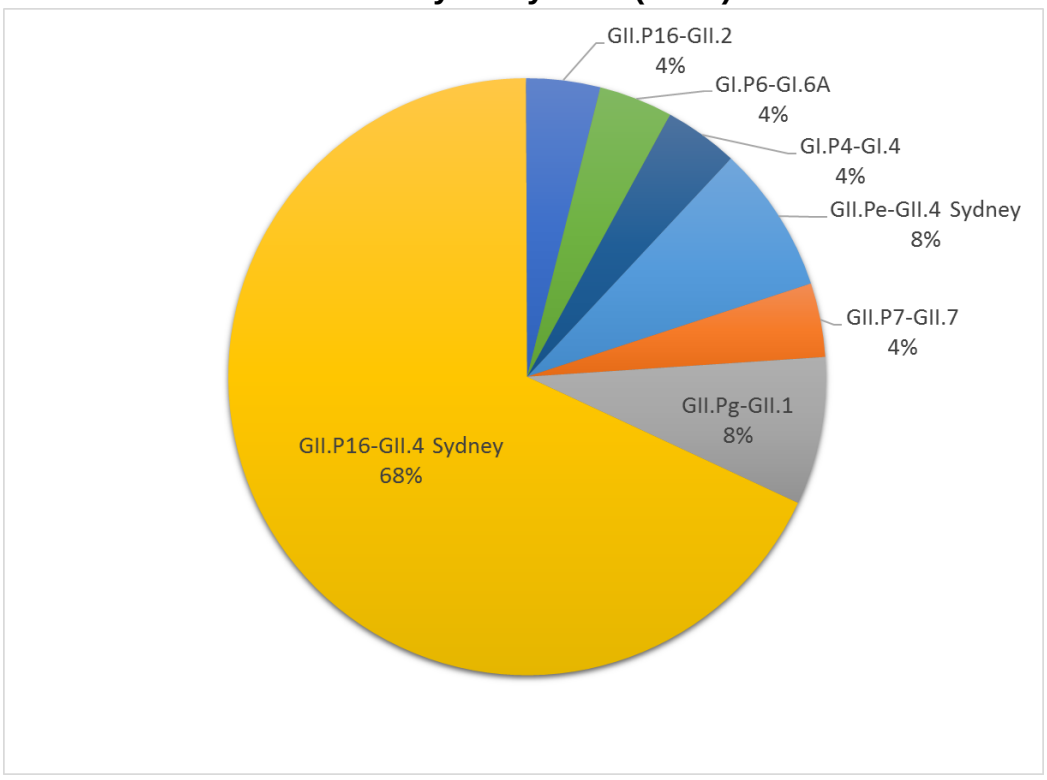


Figure 4: Norovirus Genotypes for Outbreaks (OBs) Tested by the NLN February—May 2018 (N=25)



REMINDERS

1. Please send a minimum of **TWO positive stool specimens and their nucleic acid extracts per outbreak** to VRDL for norovirus genotyping; **more than TWO is preferred**. Please submit one specimen and its corresponding nucleic acid extract per patient.
2. Please submit norovirus-negative outbreak specimens (defined as at least three norovirus-negative specimens) to VRDL for further testing.
3. Please provide CalREDIE identifiers whenever possible. VRDL will provide, upon request, real-time RT-PCR primers and probe and controls.
4. VRDL requires the **VRDL General Purpose Laboratory Submittal Form** for all specimens. Please include a Gastroenteritis Outbreak Information Summary Form with the individual VRDL Submission forms. Please refer to the "NOROVIRUS TESTING QUICK SHEET" on the VRDL's website for further instructions. All necessary VRDL forms can be found at:

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/VRDL_Specimen_Submittal_Forms.aspx

5. VRDL can perform norovirus PCR testing if your laboratory lacks the resources. Please work with your environmental health colleagues, epidemiologists, and health officers to promote laboratory investigation of suspect acute viral gastroenteritis outbreaks.
6. Please contact Chao Pan if you require technical support: Chao-Yang.Pan@cdph.ca.gov
7. Please send your jurisdiction's weekly NLN report to Alice Chen at: Alice.Chen@cdph.ca.gov

The next California NLN Triannual Report

will be published in November 2018.