Norovirus Laboratory Network (NLN)
Laboratory Testing Guidance for the 2017-2018 Norovirus Season

- **Request for CalREDIE IDs**
- **NEW VRDL SUBMITTAL FORM!!**
- **2016-2017 Norovirus season summary**
- **Norovirus Surveillance Meeting: Richmond 11/3/17!!**

For this norovirus season:

1. VRDL requests a minimum of **TWO positive stool samples per outbreak** to be sent to us for norovirus genotyping; **more than 2 is preferred**. In cases where stool samples are depleted or not available, nucleic acid extracts may be submitted.
2. VRDL will supply, upon request, norovirus real-time reverse transcription polymerase chain reaction (RT-PCR) reagents (such as primers and probe and controls), technical support, and testing/genotyping result. Please contact Chao Pan for more information at CPan@cdph.ca.gov.
3. Protocols are available from VRDL for: 1) nucleic acid extraction with MS2 phage as an internal extraction control; and, 2) real-time PCR using the ABI 7500 Fast Instrument with the Invitrogen PCR kit. Please contact Chao Pan for more information at CPan@cdph.ca.gov.
4. We are seeking your assistance in collecting and providing CalREDIE identifiers whenever possible, and NORS (National Outbreak Reporting System) ID if available. These identifiers allow the outbreaks to be monitored both at the state and national level, giving us additional abilities to track outbreaks and request additional samples or information.

Recommendations for NLN testing:

For the 2017-18 season, VRDL recommends that NLN laboratories:

1. Perform norovirus PCR and forward two or more norovirus positive stools per outbreak to VRDL for strain typing.
2. Report all results, including total number of cases tested, to CDPH on a weekly basis. For questions about reporting, please contact Alice Chen at Alice.Chen@cdph.ca.gov, or 510-307-8630.
3. Submit norovirus NEGATIVE outbreak stool specimens (defined as no norovirus detected in **three or more samples**) for further testing at VRDL for rotavirus, sapovirus, astrovirus, and adenovirus by PCR.
4. **NEW SUBMITTAL FORM**: VRDL now requires the VRDL General Purpose Laboratory Submittal Form for all specimens submitted to VRDL. Complete a General Purpose Laboratory Submittal Form for each specimen. If specimens are from a PCR-confirmed outbreak please indicate whether the result is “GI”, “GII” or mixture of “GI+GII” and include CT values. Please include a Gastroenteritis Outbreak Information Summary Form with the individual VRDL Submission forms. All of these forms can be found at the VRDL submittal forms web page under the Gastroenteritis section: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/VRDL_Specimen_Submittal_Forms.aspx

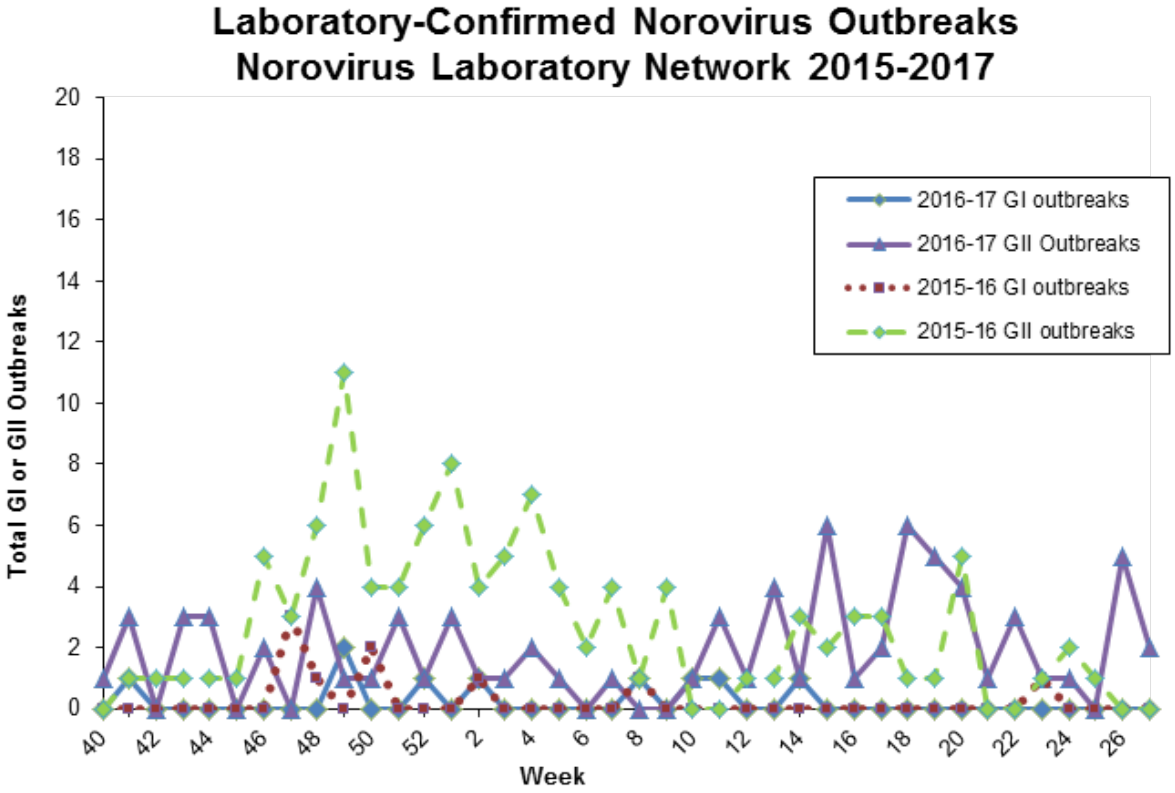
5. Please refer to the “ACUTE VIRAL GASTROENTERITIS LABORATORY TESTING” guidance sheet for further instructions.

Please note: an outbreak is defined as two or more positive specimens. If your lab only tests one specimen, this does not qualify as testing an outbreak.

NOROVIRUS LAB TESTING PERFORMED BY NLN AND UPDATES

Currently the NLN consists of 24 local public health laboratories and the VRDL, all with norovirus real time PCR testing capability. The 24 local public health laboratories are Alameda, Contra Costa, Fresno, Humboldt, City of Long Beach, Los Angeles, Monterey, Napa-Solano-Yolo-Marin, Orange, Placer, Riverside, Sacramento, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Shasta, Sonoma, Stanislaus, Tulare, and Ventura.

During the 2016-2017 norovirus season (November to May) the NLN reported 112 suspected norovirus outbreaks, of which 67 (60%) were confirmed by real-time PCR testing (positive outbreaks), compared to 108 PCR-confirmed outbreaks out of 159 suspected outbreaks (70%) during the 2015-2016 season. Outbreaks were overwhelmingly caused by Genogroup II (GII) viruses (59 out of 67, 88%). Overall, about 41% (284/695) of specimens were norovirus positive, compared to 57% of specimens in the 2015-16 season. The 2015-16 norovirus activity followed the typical winter peak, while the 2016-17 season had a late peak in the spring.



The table below includes the month of June in order to reflect the late-season surge of suspected norovirus outbreaks reported in school settings in May and June. Including October and June outbreaks, the NLN reported a total 145 suspected norovirus outbreaks, of which 85 (59%) were confirmed by real-time PCR testing (positive outbreaks).

	Total Outbreaks	Positive Outbreaks	Total Specimens	Positive Specimens	GI OB	GII OB
October	11	8	44	21	1	7
November	18	9	144	49	0	9
December	16	9	101	44	3	6
January	13	8	66	36	1	7
February	5	3	38	12	1	2
March	13	7	77	29	2	5
April	23	15	119	51	1	14
May	24	16	150	63	0	16
June	22	10	152	45	0	10
Total	**145**	**85**	**891**	**350**	**9**	**76**

Reporting from NLN Labs: Number of GI Outbreaks Tested (October 2016 to July 2017)

PH Lab	# of suspected OBs tested	# of Noro OB confirmed
Alameda	4	1
Contra Costa	5	3
El Dorado (closed May 2017)	0	0
Fresno	0	0
Humboldt	0	0
Long Beach, City of	2	1
Los Angeles	38	14
Monterey	2	2
Napa-Solano-Yolo-Marin	4	3
Orange	6	6
Placer	0	0
Riverside	2	0
Sacramento	9	6
San Bernardino	1	0
San Diego	12	5
San Joaquin	10	6
San Luis Obispo	4	2
San Mateo	2	2
Santa Barbara	6	5
Santa Clara	6	4
Shasta	1	1
Sonoma	1	1
Stanislaus	0	0
Tulare	11	8

Ventura	4	3
VRDL (for Butte, Lake, Merced, San Francisco, Santa Cruz)	15	12

Norovirus outbreak settings (Nov 2016 to May 2017)

The majority of outbreak samples submitted for testing of suspect Norovirus outbreaks in California originate from long-term care facilities (38 out of 67 outbreaks, 57%). Roughly 16% of outbreaks were foodborne (11 out of 67 outbreaks) and 15% were from school settings (10 out of 67 outbreaks). In spring 2017, northern and central California saw an increase in school outbreaks; 6 of the 10 school-related outbreaks were reported in the second week of May to the beginning of June.

***NEW* Norovirus Genotyping and CaliciNet**

Norovirus PCR positive outbreaks are further characterized at VRDL using sequence analysis of the polymerase (region B) and capsid (region C). The dual region type is now standard nomenclature for typing, for example GII.P16-GII.4 Sydney (Genotype P16 polymerase with GII.4 Sydney capsid).

VRDL submits the sequences to the CaliciNet national electronic surveillance database at CDC. Similar to PulseNet, CaliciNet allows the norovirus sequences to be compared and queried in real time, which allows for more rapid response for investigation, prevention and control of norovirus outbreaks.

Emerging Noroviruses: GII.4 Sydney 2015 and GII.2

In November 2015, VRDL began to detect a GII.4 “untypeable” strain, which has now been characterized as a GII.4 Sydney recombinant containing the Genotype P16 polymerase within the GII.4 Sydney virus backbone and is now named GII.P16-GII.4 Sydney. This GII.4 Sydney variant virus accounted for the majority of norovirus outbreaks in California in 2016-17.

In November 2016, VRDL identified a novel GII.2 virus (“GII.P16-GII.2”). This genotype was associated with several large school outbreaks in the spring of 2017 from the Bay Area, the Central Valley, and Sacramento/Yolo region. School and healthcare providers should report suspect norovirus outbreaks to their local health officials, who can provide guidance on specimen collection and submission. Local health departments may forward specimens to VRDL for norovirus testing and/or typing.

Unexplained Viral Diarrhea (UVD) Project and Increase in Rotavirus activity

VRDL serves as one of the three Unexplained Viral Diarrhea (UVD) national reference testing centers for CDC. In this capacity, VRDL tests samples from norovirus PCR negative gastroenteritis outbreaks for rotavirus, sapovirus, astrovirus, and enteric adenovirus using real time PCR. Virus positive samples are sequenced and typed and then submitted to CaliciNet.

Since March 2017, VRDL has detected higher than usual rotavirus activity (6 confirmed outbreaks between March and August). Please submit any norovirus negative outbreak samples to VRDL for further testing. We are also interested in receiving virus positive samples from gastroenteritis outbreaks tested by commercial multiplex assays (Luminex/Nanosphere or BioFire FilmArray) for genotyping. For questions about Unexplained Viral Diarrhea Project (UVD) at VRDL, please contact Chao Pan at CPan@cdph.ca.gov or 510 307-8548.

Request to Enhance Norovirus Outbreak Surveillance and Testing

VRDL is seeking your assistance to enhance laboratory surveillance of norovirus. VRDL can perform norovirus PCR testing if your laboratory lacks the resources. Please work with your epidemiologists and health officers to promote laboratory investigation.

****MEETING NOTICE****

California Norovirus Laboratory Network Surveillance Meeting
Richmond, CA, Nov 3, 2017

CDPH, CDC and APHL are sponsoring a one-day meeting to bring together professionals from the laboratory, epidemiology/infection control, and environmental health to explore ways to enhance norovirus outbreak surveillance and testing. Travel and lodging expenses will be provided by APHL/CDC. Please contact Chao Pan at CPan@cdph.ca.gov or Alice Chen at Alice.Chen@cdph.ca.gov if you have any questions.