

# California Norovirus Laboratory Network (NLN) Report for October 2019 through August 2021

California Department of Public Health  
Viral and Rickettsial Disease Laboratory (VRDL)  
Respiratory and Gastroenteric Diseases Section

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## CONTENTS

**INTRODUCTION..... 1**

**NOROVIRUS GENOTYPING NOMENCLATURE ..... 2**

**NOROVIRUS ACTIVITY, OCTOBER 2019 - AUGUST 2021 ..... 2**

**NOTEWORTHY NOROVIRUS OUTBREAKS FROM OCTOBER 2019-AUGUST 2021 2**

**TESTING OF NOROVIRUS-NEGATIVE OUTBREAKS..... 3**

**GLOBAL PEDIATRIC NOROVIRUS SURVEILLANCE NETWORK (NOROSURV).... 10**

**REMINDERS..... 11**

## INTRODUCTION

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This annual NLN report issued by the VRDL is intended to inform NLN member laboratories and California local health departments and partners about circulating and emerging norovirus strains detected from outbreaks of acute viral gastroenteritis tested by the 24 NLN laboratories throughout California. 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.

CaliciNet is a national norovirus outbreak surveillance network of federal, state, and local public health laboratories launched in 2009 by the Centers for Disease Control and Prevention (CDC) to collect information about norovirus strains associated with gastroenteritis outbreaks in the United States. CaliciNet laboratories are certified by CDC

and have the capability to determine the genogroup and genotype of noroviruses by sequence analysis, for source tracing and outbreak investigation support. CaliciNet laboratories in California include the VRDL, Los Angeles County Public Health Laboratory (PHL), and Orange County PHL.

## NOROVIRUS GENOTYPING NOMENCLATURE

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The VRDL performs dual-region typing of the polymerase and capsid genes by sequence analysis. The dual-region typing results are reflected in the strain type name of the virus. To simplify naming strains based on the two regions sequenced, the nomenclature convention for noroviruses has been updated. An example is as follows: the norovirus strain previously designated as “GII.P16-GII.4 Sydney” (Genogroup II Polymerase type 16 and Genogroup II Genotype 4 Sydney Capsid type), is now designated as **GII.4 Sydney[P16]**.

## NOROVIRUS ACTIVITY, OCTOBER 2019 - AUGUST 2021

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As shown in Table 1, from October 2019 through August 2021, the NLN reported 134 suspected norovirus outbreaks to the VRDL. Of the 134 suspected outbreaks, 80 (60%) were confirmed by real-time RT-PCR. Seventy-one outbreaks were associated with Genogroup II (GII) viruses (89%) and seven with Genogroup I (GI) viruses (9%). Two outbreaks did not have their genogroup identified when they were reported. Fifty-nine of the 71 (83%) GII outbreaks and 4 of the 7 GI outbreaks (57%) were successfully genotyped (Table 2). Please note that not all norovirus outbreaks are able to be genotyped, as sequencing is occasionally unsuccessful. Los Angeles County reported the most laboratory-confirmed outbreaks with twenty-three, followed by San Diego County with nine and Orange County with eight. (Figure 1 and Table 3). Long-term care facilities accounted for many of the lab-confirmed outbreaks (52 of 80 outbreaks, or 65%) reported by NLN laboratories from October 2019 through August 2021 (Figure 2). The predominant genotype identified was GII.4 Sydney[P16], in 48 of the 71 confirmed norovirus GII outbreaks (68%) and in 76% of all genotyped outbreaks (Table 2). Eighteen counties across the state had at least one outbreak genotyped as a GII.4 Sydney[P16] outbreak (Figure 3).

Due to the COVID-19 pandemic, few norovirus outbreaks were tested during much of the 2019-2020 season and the 2020-2021 season. However, the NLN member laboratories continued to perform norovirus testing on specimens not associated with outbreaks during this time. There was an increase of reported norovirus positive outbreaks beginning March 2021, and positive outbreaks continued to be reported through June and July 2021 (Figure 4).

## NOTEWORTHY NOROVIRUS OUTBREAKS FROM OCTOBER 2019-AUGUST 2021

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A norovirus outbreak at Yosemite National Park was reported in January 2020, involving over 100 cases. Norovirus GII was identified in three patient specimens, which were

submitted to the VRDL for genotyping as part of the outbreak investigation. The VRDL characterized the virus from three patient specimens as GII.4 Sydney[P16].

In March 2021, Ventura County submitted a norovirus positive outbreak from a nursing home for genotyping; the norovirus was characterized as Genogroup IX genotype 1 (GIX.1, previously classified as Genogroup II genotype 15), a rare genogroup/genotype. The current real time PCR GII primers and probes provided to the NLN should be able to detect Genogroup IX.

In April 2021, a norovirus outbreak at a hospital was reported by Sacramento County involving staff and patients from different wards. Twelve samples were submitted to the VRDL for genotyping as part of the outbreak investigation. Outbreak specimens were identified as GII.4 Sydney[P16]. Phylogenetic analysis showed 10 patients belonged in the same cluster, while two were not part of the cluster, corroborating the epidemiologic investigation.

## **TESTING OF NOROVIRUS-NEGATIVE OUTBREAKS**

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Fifteen norovirus-negative outbreaks were tested from October 2019 through August 2021. Astrovirus type 5 (HAstV-5) was identified in 3 patients from a November 2019 gastroenteritis outbreak at a university in Los Angeles County.

We encourage our NLN partners to submit a minimum of 3 patient specimens from norovirus-negative outbreaks to the VRDL to test for non-norovirus viral gastroenteric pathogens, including rotavirus, sapovirus, astrovirus, and gastroenteric adenoviruses 40 and 41.

**Table 1: Norovirus Outbreak (OB) Testing Reported by the NLN  
October 2019 – August 2021**

Month	Outbreaks Tested	Positive Outbreaks	Total Specimens	Positive Specimens	GI OB	GII OB
October 2019	9	6	48	26	0	6
November 2019	31	18	146	69	1	17
December 2019	9	6	49	22	0	6
January 2020	15	10	103	45	1	9
February 2020	3	2	44	10	0	2
March 2020	3	2	21	7	1	1
April 2020	1	0	12	0	0	0
May 2020	0	0	13	0	0	0
June 2020	2	0	25	0	0	0
July 2020	1	0	10	0	0	0
August 2020	0	0	11	0	0	0
September 2020	4	0	54	0	0	0
October 2020	2	0	19	1	0	0
November 2020	1	0	12	0	0	0
December 2020	1	1	10	2	0	1
January 2021	0	0	9	0	0	0
February 2021	1	0	16	1	0	0
March 2021	4	4	21	14	0	4
April 2021	8	3	46	21	0	3
May 2021	10	8	74	33	0	8
June 2021	17	12*	109	48	2	9
July 2021	8	5*	46	19	1	3
August 2021	4	3	49	12	1	2
<b>Totals</b>	<b>134</b>	<b>80</b>	<b>947</b>	<b>330</b>	<b>7</b>	<b>71</b>

\* Includes outbreak that did not have its genogroup identified when reported by the NLN

**Table 2: Norovirus Genotypes Identified\* from Reported Norovirus Outbreaks  
October 2019 – August 2021 (N = 63)**

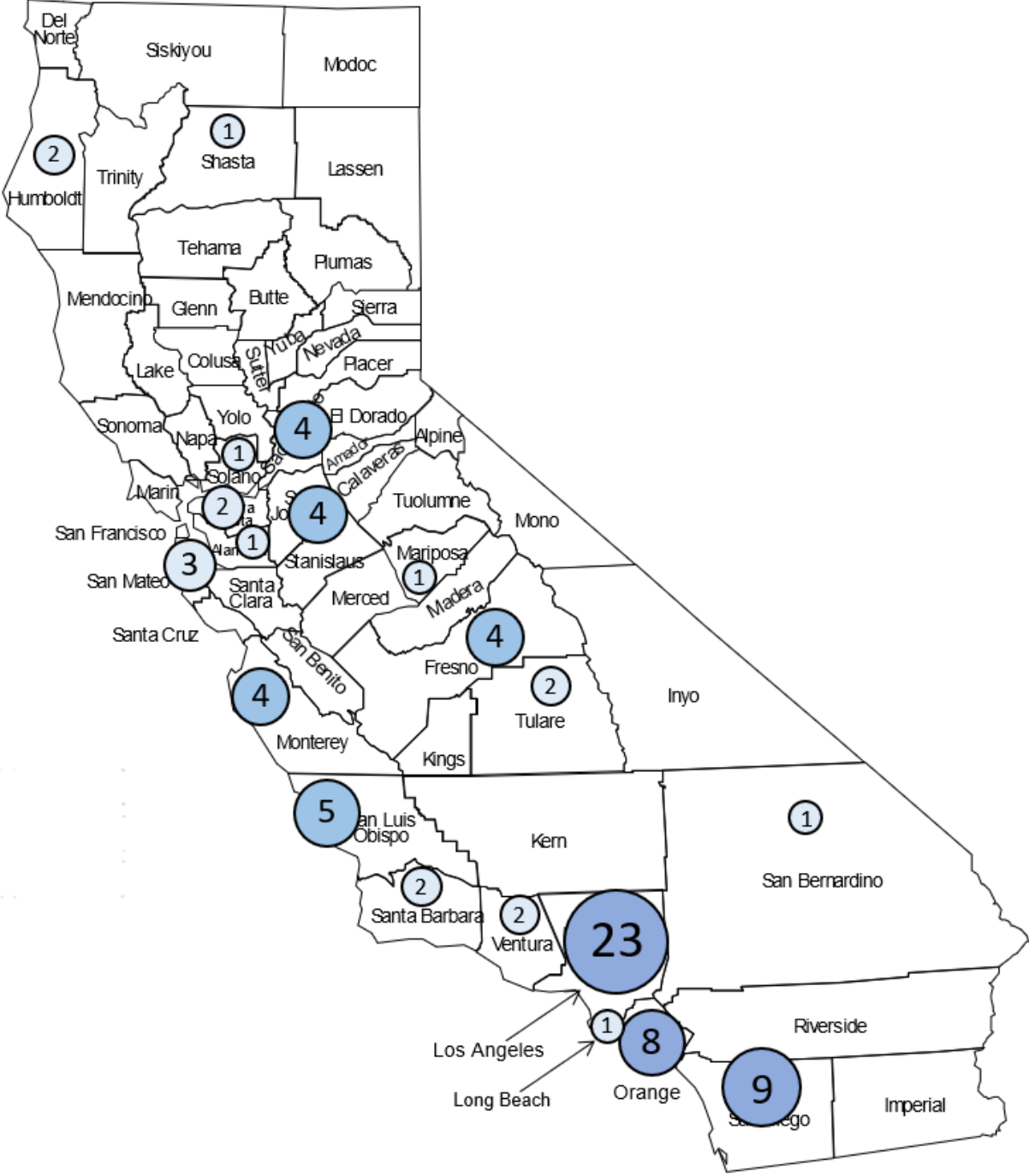
<b>Norovirus Genotypes</b>	<b>Number of OBs</b>
GI.1[P1]	1
GI.3[P13]	1
GI.4[P4]	1
GI.5[P4]	1
GII.2[P16]	1
GII.3[P12]	2
GII.4 Sydney[P16]	48
GII.4 Sydney[P4 New Orleans]	1
GII.4 Untypeable[P16]	2
GII.6[P7]	1
GII.8[P8]	1
GII.17B[P17]	2
GIX.1[P15]	1
<b>Total</b>	<b>63</b>

\*Please note that not all outbreaks can be genotyped. Genotyping results were obtained by the VRDL (36 outbreaks genotyped), Los Angeles County PHL (15 outbreaks genotyped), Orange County PHL (6 outbreaks genotyped), and San Diego County PHL (5 outbreaks genotyped).

**Table 3: Laboratory-Confirmed Norovirus Outbreaks Reported by the NLN  
October 2019—August 2021**

<b>Public Health NLN Lab</b>	<b>Total Suspected Norovirus OBs Reported by NLN</b>	<b>Total Laboratory-Confirmed Norovirus OBs</b>
Alameda	4	1
Butte	0	0
Contra Costa	2	2
Humboldt	2	2
Long Beach	2	1
Los Angeles	43	23
Monterey	5	4
Napa-Solano-Yolo-Marin	3	1
Orange	10	8
Riverside	0	0
Sacramento	7	4
San Bernardino	1	1
San Diego	16	9
San Francisco	1	0
San Joaquin	5	4
San Luis Obispo	7	5
San Mateo	3	3
Santa Barbara	4	2
Santa Clara	4	0
Shasta	1	1
Sonoma	0	0
Tulare (including Fresno Co.)	8	6
Ventura	2	1
VRDL (for Mariposa & Ventura Co.)	4	2
<b>Total</b>	<b>134</b>	<b>80</b>

**Figure 1: Number of Laboratory-Confirmed Norovirus Outbreaks by County, October 2019 — August 2021 (N = 80)**



**Figure 2: Norovirus Genotypes by Setting for Outbreaks (OBs) Tested by the NLN  
October 2019 — August 2021 (N=80)**

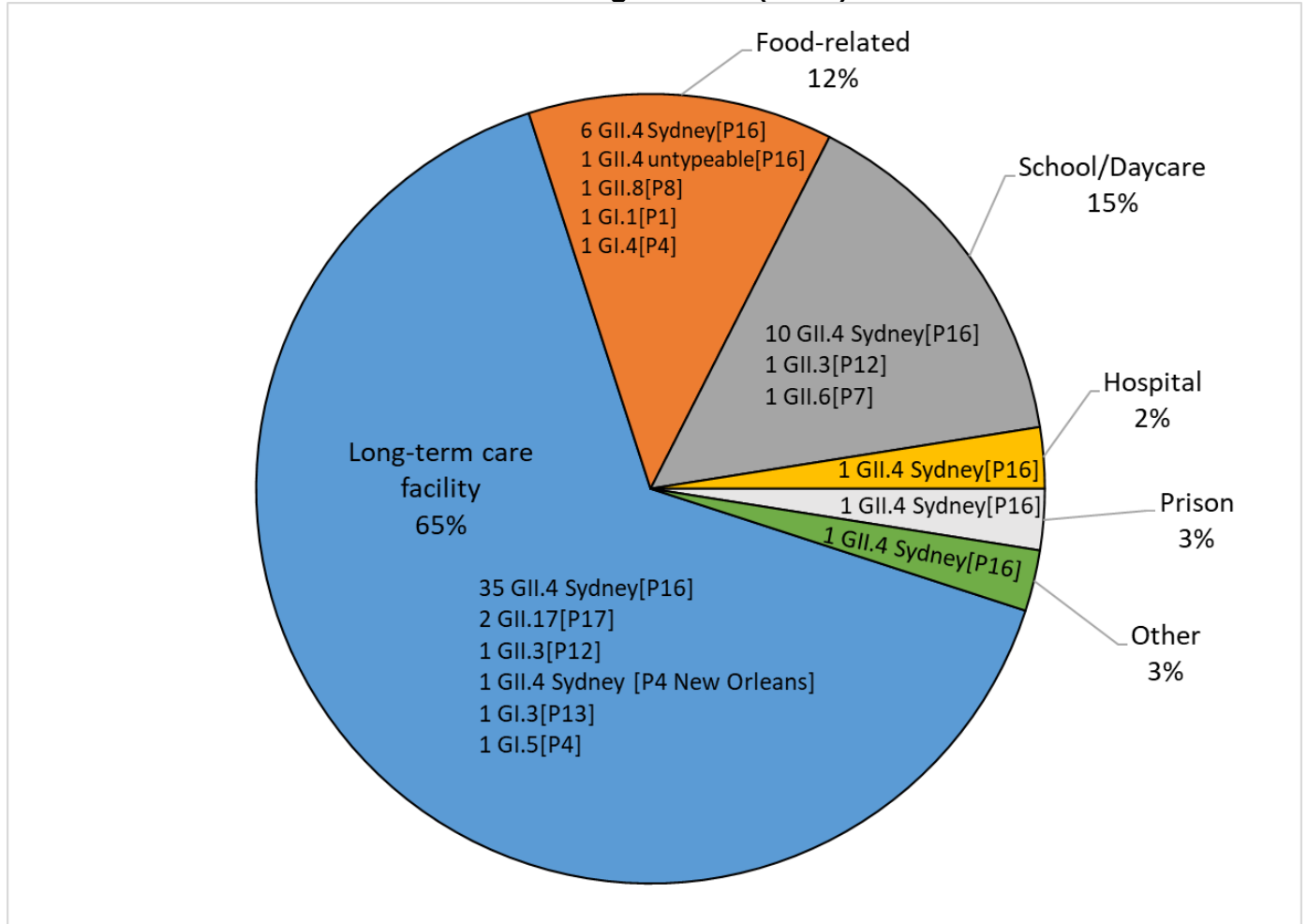




Figure 3: Norovirus Genotypes Identified\* from Reported Norovirus Outbreaks by County, October 2019 – August 2021

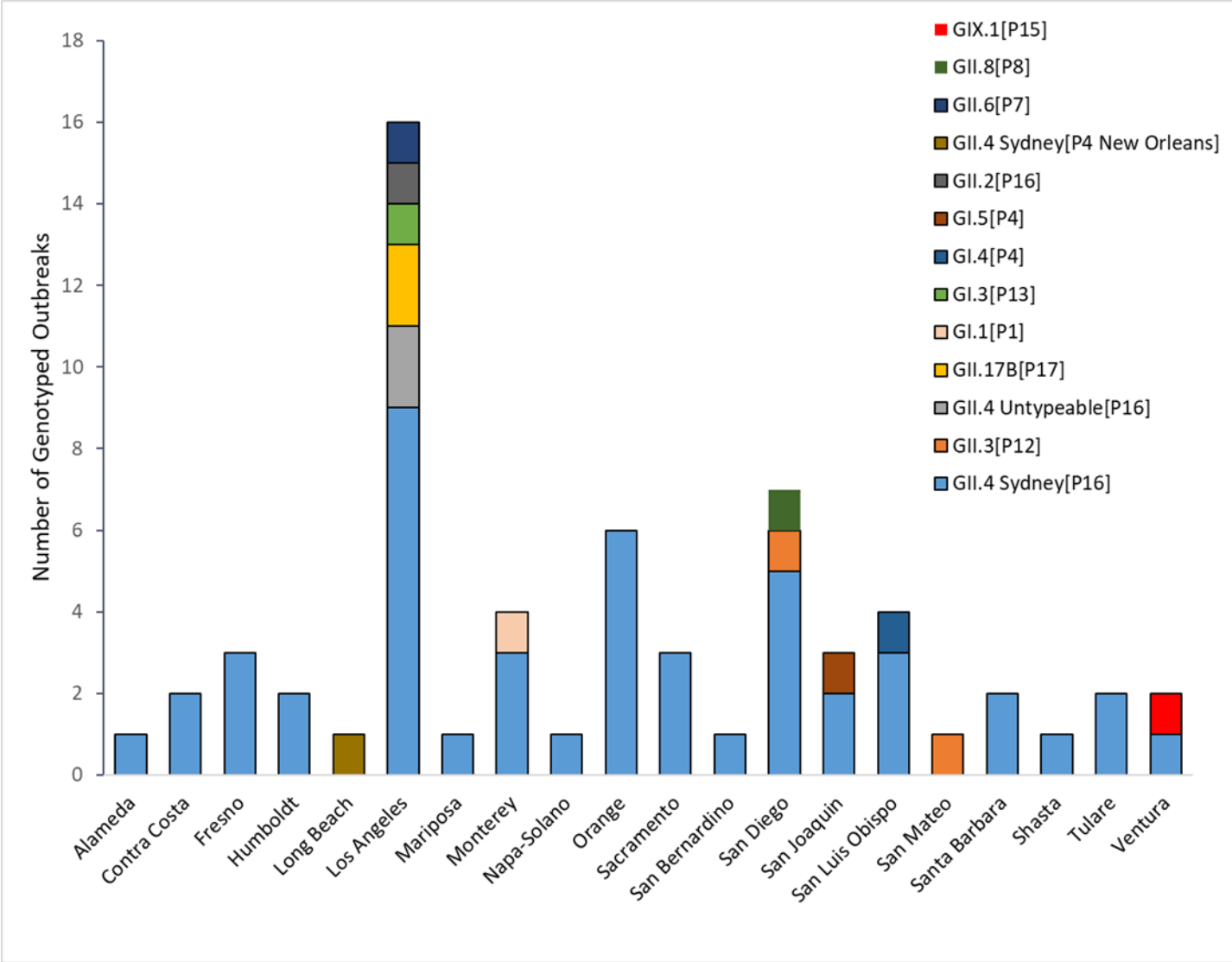
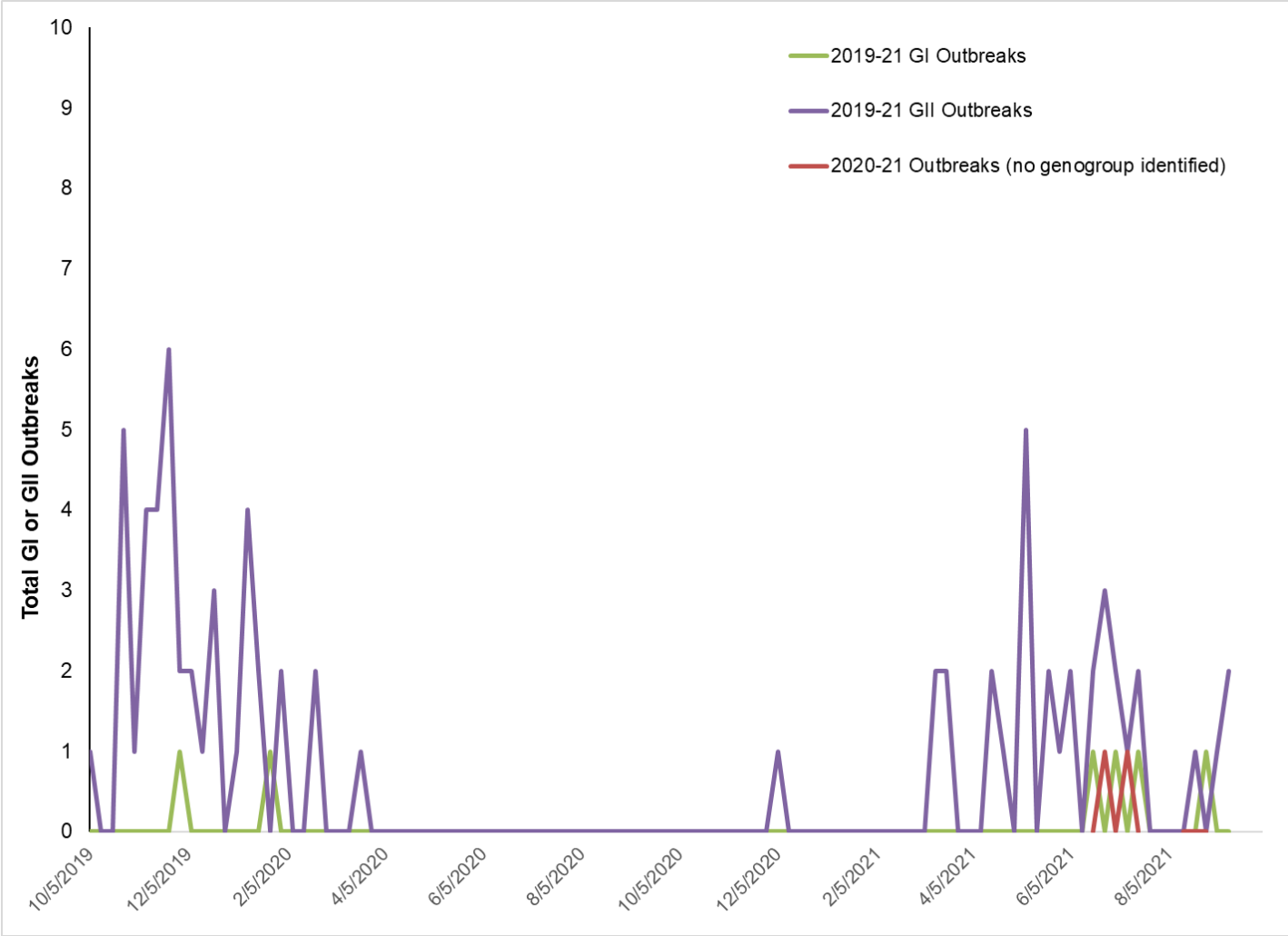


Figure 4: Laboratory-Confirmed Norovirus Outbreaks Reported by the Norovirus Laboratory Network, October 2019 – August 2021



## GLOBAL PEDIATRIC NOROVIRUS SURVEILLANCE NETWORK (NOROSURV)

The Global Pediatric Norovirus Surveillance Network (NoroSurv) is a partnership between the US Centers for Disease Control and Prevention (CDC) and State Public Health laboratories, including the California Department of Public Health Viral and Rickettsial Disease Laboratory (CDPH/VRDL), to enhance norovirus surveillance in children 5 years old and younger. If there is a facility in your jurisdiction that routinely tests for norovirus in pediatric patients, please consider approaching them to request norovirus positive specimens from children ages 5 years old and younger, to be sent to the local public health laboratory and then forwarded to VRDL for genotyping.

## REMINDERS

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1. Please send a minimum of **TWO positive stool specimens, preferably more than two, and their nucleic acid extracts per outbreak** to VRDL (or local health jurisdiction CaliciNet laboratory, if applicable) for norovirus genotyping. Please submit one specimen and its corresponding nucleic acid extract per patient when possible.
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.
4. The 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, including the Gastroenteritis Outbreak Summary Form, can be found at the [VRDL Specimen Submittal Forms website](#).
5. The VRDL will 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. The VRDL will provide, upon request, real-time RT-PCR primers, probe and controls for norovirus PCR. Please contact Chao Pan ([Chao-Yang.Pan@cdph.ca.gov](mailto:Chao-Yang.Pan@cdph.ca.gov)) for more information or if you require technical support.
7. Please send your jurisdiction’s weekly NLN report or questions about specimen submissions to Alice Chen ([Alice.Chen@cdph.ca.gov](mailto:Alice.Chen@cdph.ca.gov)).