

California Norovirus Laboratory Network (NLN)

Report for September 2021 – June 2022

California Department of Public Health
Viral and Rickettsial Disease Laboratory (VRDL)
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INTRODUCTION

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 from September 2021 through June 2022, which covers the entire norovirus season. 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

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, SEPTEMBER 2021-JUNE 2022

As shown in Table 1, from September 2021 through June 2022, the NLN reported 114 gastroenteritis outbreaks to the VRDL. Of the 114 gastroenteritis outbreaks tested by the NLN, 72 (63%) were confirmed as norovirus outbreaks by real-time RT-PCR or other molecular assays. Fifty-nine of the 72 laboratory-confirmed norovirus outbreaks were associated with Genogroup II (GII) viruses (82%) and ten with Genogroup I (GI) viruses (14%). Three laboratory-confirmed norovirus outbreaks reported by the NLN did not have their genogroup identified at the time of reporting.

Forty-one of the 59 (69%) GII outbreaks and 7 of the 10 GI outbreaks (70%) were successfully genotyped (Table 2). Not all norovirus outbreaks are able to be genotyped, as sequencing is occasionally unsuccessful. Santa Clara County reported the most laboratory-confirmed outbreaks with fourteen, followed by Los Angeles County with twelve and Ventura County with seven. (Figure 2 and Table 3). Long-term care facilities accounted for many of the lab-confirmed outbreaks (40 of 72 outbreaks, or 56%) reported by NLN laboratories from September 2021 through June 2022 (Figure 3). The predominant genotype identified was GII.4 Sydney[P16], in 19 of the 59 confirmed norovirus GII outbreaks (32%) and in 40% of all genotyped outbreaks (Table 2). Out of fifteen counties with reported outbreaks that were genotyped, ten counties reported at least one outbreak genotyped as GII.4 Sydney[P16].

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 2022.

NOTEWORTHY NOROVIRUS OUTBREAKS, SEPTEMBER 2021-JUNE 2022

In March 2022, San Mateo County submitted a norovirus positive outbreak from a restaurant for genotyping; the norovirus was characterized as GII.2[P16]. The outbreak was later found to be linked to oysters from British Columbia, Canada. Other norovirus outbreaks throughout California were also found to be linked to oysters from the same harvest location in British Columbia, as the affected oyster lots were distributed to other restaurants in the San Francisco Bay Area and Los Angeles.

Between April 2022 and May 2022, Santa Clara County submitted specimens from 4 norovirus outbreaks at preschools in Santa Clara County with onset dates spanning February 2022 to May 2022. The genotype identified in all 4 preschool outbreaks was GII.4 Sydney[P16].

TESTING OF NOROVIRUS-NEGATIVE OUTBREAKS

Ten norovirus-negative gastroenteritis outbreaks were tested for viral agents from September 2021 through June 2022. Sapovirus was detected in 4 patients from a December 2021 outbreak at a long-term care facility in Solano County. Astrovirus was detected in 3 patients from a food-related February 2022 outbreak in Los Angeles County. Adenovirus type 41 was identified in 3 patients from a February 2022 gastroenteritis outbreak at a preschool in Santa Clara County. One patient tested positive for Adenovirus type 1 in a suspected gastroenteritis outbreak at an elementary school in Santa Clara County during March 2022.

No non-norovirus gastroenteric viruses were detected in patient specimens tested from six of the ten norovirus-negative outbreaks.

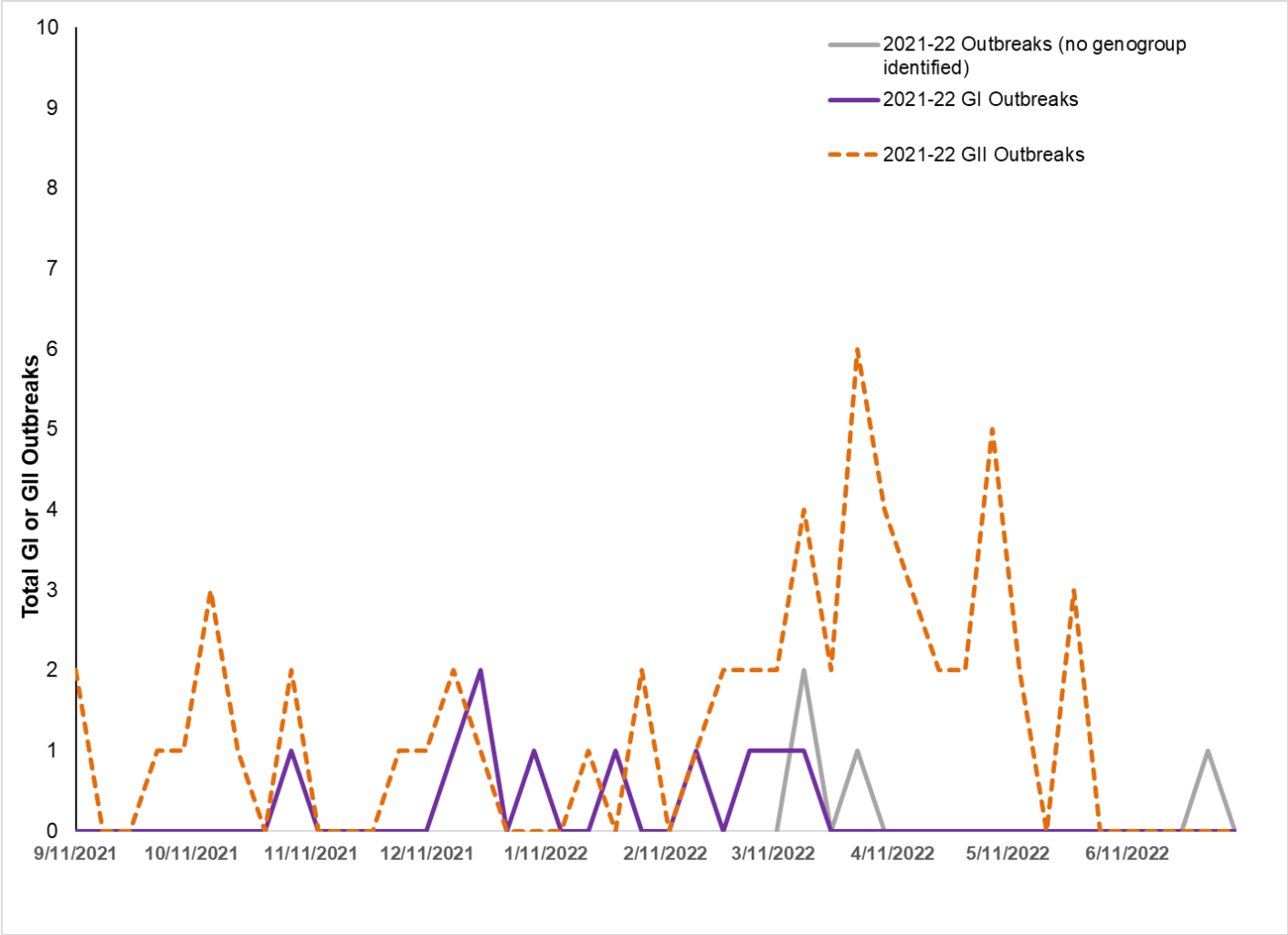
We encourage our NLN partners to submit a minimum of 3 patient specimens from norovirus-negative outbreaks to the VRDL to test for non-norovirus viral gastroenteric pathogens, including rotavirus, sapovirus, astrovirus, and gastroenteric adenoviruses 40 and 41.

**Table 1: Norovirus Outbreak (OB) Testing Reported by the NLN
September 2021 – June 2022**

Month	Outbreaks Tested	Positive Outbreaks*	Total Specimens	Positive Specimens	GI OB	GII OB	OB Genotype not identified
September 2021	4	3	32	11	0	3	0
October 2021	9	5	46	18	0	5	0
November 2021	4	3	38	15	1	2	0
December 2021	10	8	60	30	3	5	0
January 2022	3	3	24	8	2	1	0
February 2022	13	6	106	35	1	5	0
March 2022	30	22	114	75	3	17	2
April 2022	17	11	101	51	0	11	0
May 2022	16	10	110	42	0	10	0
June 2022	8	1	63	12	0	0	1
Totals	114	72	694	297	10	59	3

* Includes outbreaks that did not have genogroup identified when reported by the NLN

Figure 1: Laboratory-Confirmed Norovirus Outbreaks Reported by the Norovirus Laboratory Network, September 2021 – June 2022



**Table 2: Norovirus Genotypes Identified* from Reported Norovirus Outbreaks
September 2021 – June 2022 (N = 48)**

Norovirus Genotypes	Number of OBs
GI.3[P3]	1
GI.4[P4]	3
GI.5[P4]	2
GI.7[P7]	1
GII.2[P16]	3
GII.3[P12]	2
GII.4 Sydney[P16]	19
GII.4 Untypeable[P16]	13
GII.6[P7]	1
GII.12[P16]	1
GII.17[P17]	1
GII.17[P31]	1
Total	48

*Please note that not all outbreaks can be genotyped. Genotyping results were obtained by the VRDL (40 outbreaks genotyped), Los Angeles County PHL (4 outbreaks genotyped) and Orange County PHL (4 outbreaks genotyped)

**Table 3: Gastroenteritis Outbreaks and Laboratory-Confirmed Norovirus Outbreaks Reported by the NLN
September 2021 – June 2022**

Public Health NLN Lab	Total Gastroenteritis OBs Reported by NLN	Gastroenteritis OBs Laboratory-Confirmed as Norovirus OBs
Alameda	1	1
Butte	4	4
Contra Costa	11	5
Humboldt	0	0
Long Beach	5	2
Los Angeles	30	12
Monterey	0	0
Napa-Solano-Yolo-Marin	1	1
Orange	7	6
Riverside	4	3
Sacramento	2	1
San Bernardino	0	0
San Diego	4	4
San Francisco	1	1
San Joaquin	3	3
San Luis Obispo	3	2
San Mateo	2	2
Santa Barbara	0	0
Santa Clara	21	14
Shasta	1	1
Sonoma	1	1
Tulare	0	0
Ventura	11	7
VRDL (for Imperial, San Diego Co.)	2	2
Total	114	72

Figure 2: Number of Laboratory-Confirmed Norovirus Outbreaks by County, September 2021 — June 2022 (N = 72)

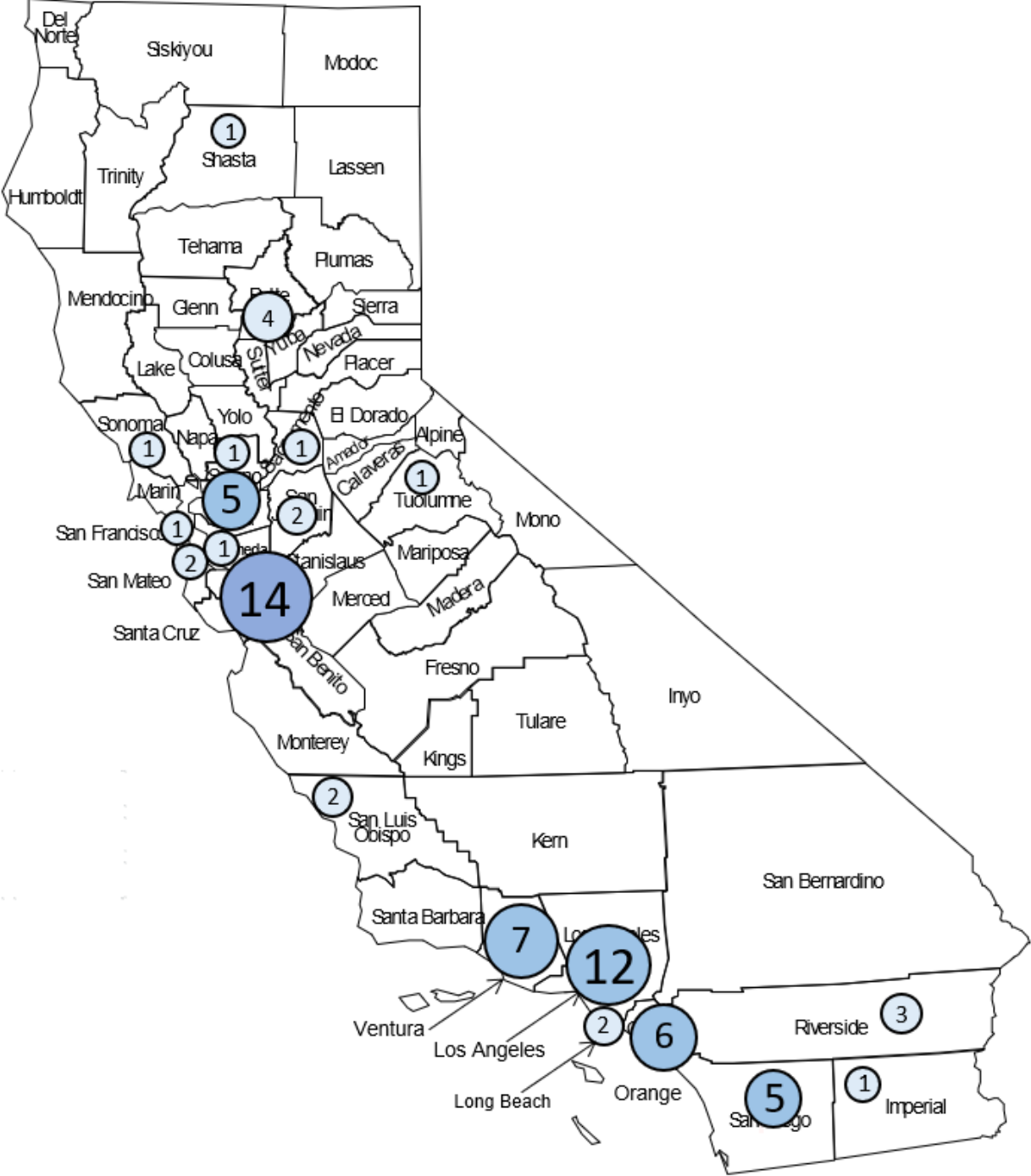


Figure 3: Norovirus Genotypes by Setting for Outbreaks (OBs) Tested by the NLN September 2021 — June 2022 (N=72)

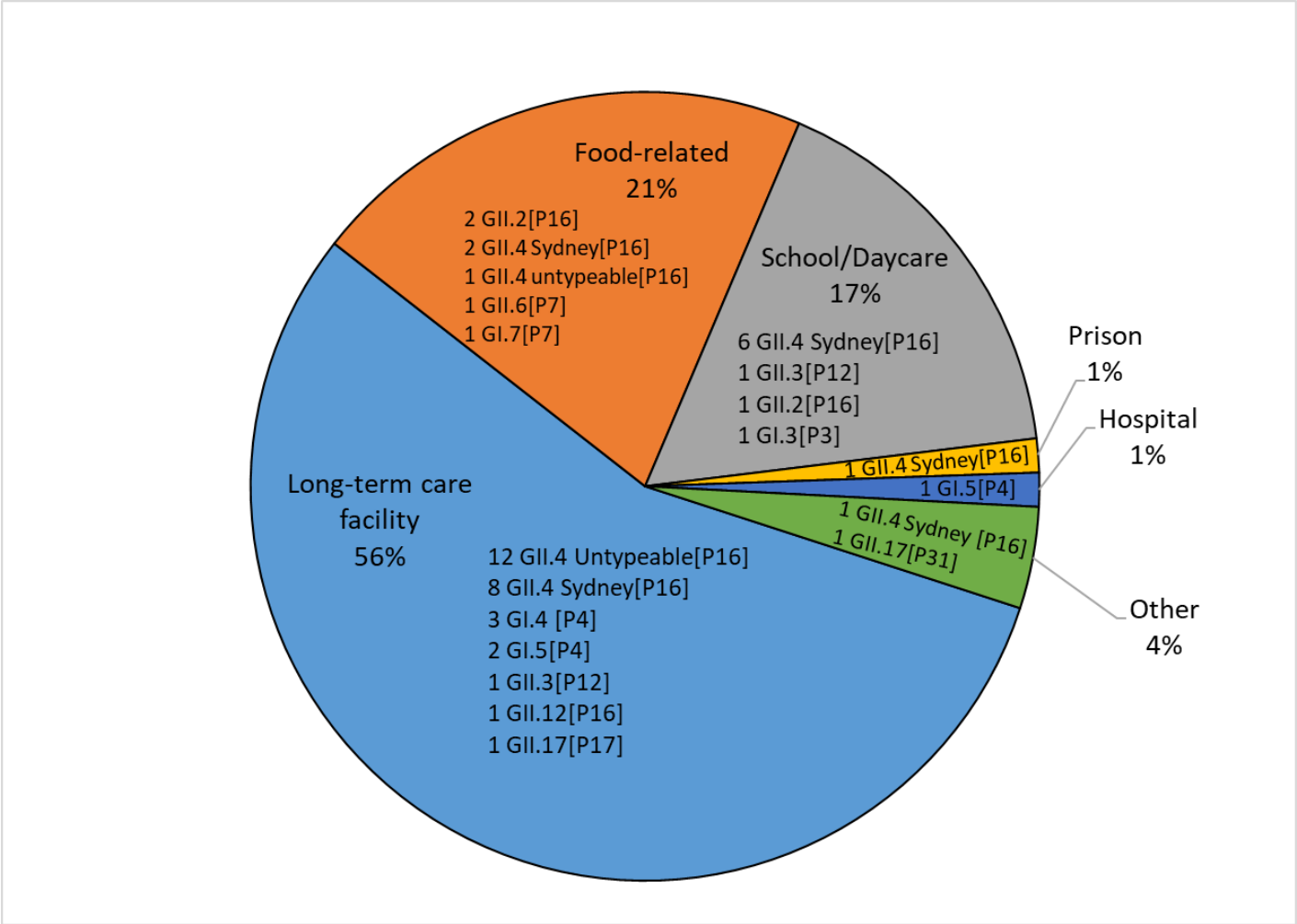
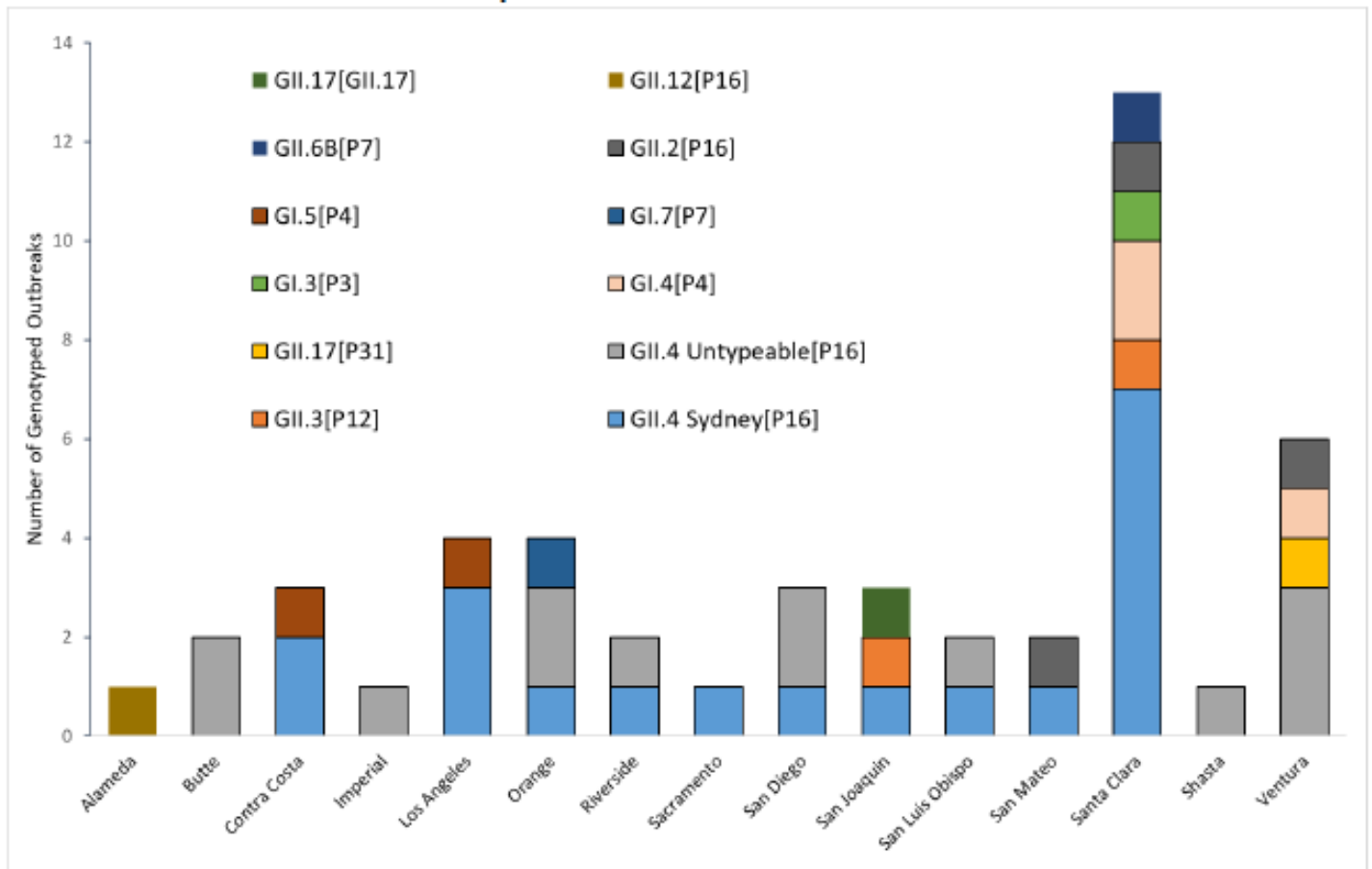


Figure 4: Norovirus Genotypes Identified* from Reported Norovirus Outbreaks by County, September 2021—June 2022



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

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) 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).