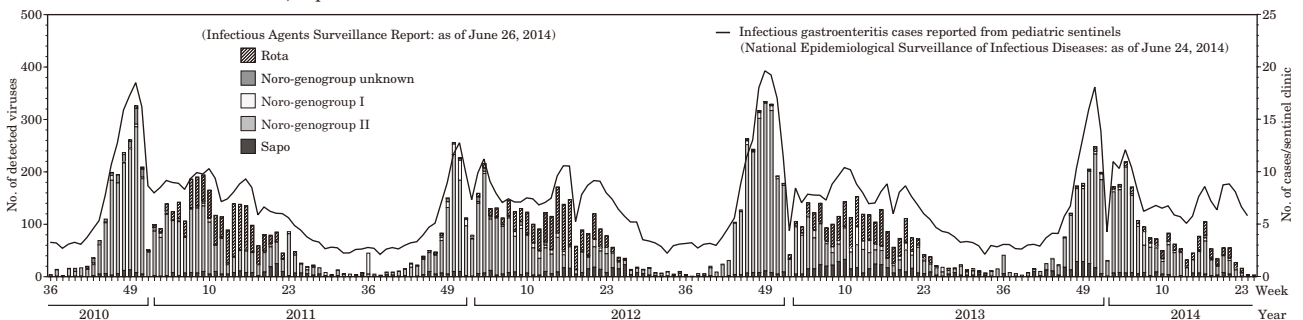


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## &lt;THE TOPIC OF THIS MONTH&gt;

## Epidemiology of Norovirus in Japan, 2010/11-2013/14 seasons

Figure 1. Weekly number of reported cases of infectious gastroenteritis per sentinel clinic and detection of norovirus, rotavirus and sapovirus, 2010/11-2013/14 seasons, Japan



Norovirus (NoV) is an RNA virus with 5 genogroups GI–GV, among which GI and GII cause human infection. GI genogroup contains at least 9 genotypes and GII genogroup is composed of 22 genotypes (see p. 173 of this issue). Persons infected with norovirus shed large quantities of virus in stool and vomit; virus is present in patients' stool for 10–21 days (occasionally for >1 month) after disappearance of clinical signs and symptoms (IASR 31: 319–320, 2010). NoV causes food poisonings. Person-to-person transmission occurs through contact (often via contaminated fingers) or inhalation of droplets of fresh vomit or dried-up vomitus (IASR 28: 84, 2007 & 29:196, 2008).

**1. Notification of infectious gastroenteritis reported under the National Epidemiological Surveillance of Infectious Diseases (NESID) and detection/isolation of NoV:** Infectious gastroenteritis that includes NoV infection is reported from approximately 3,000 pediatric sentinels in Japan (<http://www.nih.go.jp/niid/images/iasr/35/409/de4091.pdf>). Each year, the number of infectious gastroenteritis cases increase towards the end of the calendar year forming a sharp peak at week 49 to 51, with approximately 18 cases reported per sentinel per week; after a temporary decline, NoV activity increases again, forming a broad arch shaped curve, from week 5 to 25 of the next year (Fig. 1; <http://www.nih.go.jp/niid/en/10/2096-weeklygraph/1647-04gastro.html>).

Prefectural and municipal public health institutes (PHIs) report isolation/detection of causative agents of infectious gastroenteritis, including NoV, to NESID using a case-based reporting form (IASR 31: 75–76, 2010). Among the reported pathogens, NoV is the most commonly reported, followed by rotavirus and sapovirus. NoV is dominant from November/December and continues to be reported through May, although rotavirus becomes more common from February (Fig. 1) (IASR 35: 63–64, 2014).

Among pathogens reported to NESID as causative agents of sporadic cases of infectious gastroenteritis, NoV occupies about one third of the pathogens detected from children 3 years old or younger (Fig. 2). With increase in age, the proportion of NoV increases.

NoV detected during the 2010/11–2013/14 seasons was mostly of GII type (Fig. 1 & <https://nesid3g.mhlw.go.jp/Byogentai/Pdf/data11e.pdf>). Among NoVs detected from infectious gastroenteritis patients 0–15 years of age, GII/4 was dominant in the 2006/07–2009/10 seasons but GII/3 became the most frequent (50%) in the 2010/11 season (Table 1 in p. 163 of this issue & IASR 31: 312–314, 2010). Since the 2011/12 season, GII/4 once again became more dominant, and made up nearly 80% of the NoV detected during the 2012/13 season; many of the outbreaks during this season were due to the GII/4 variant (Sydney 2012) (see p. 165, 167, 168 & 169 of this issue and IASR 33: 333–334 & 334–335, 2012), which was epidemic abroad (IASR 34: 45–49, 2013).

**2. NoV detected from outbreak cases:** Information of pathogen detection in food poisonings, complaints attributed to foods, as well as outbreaks of gastroenteritis due to person-to-person transmission are reported from PHIs as outbreak events.

(Continued on page 162')

(THE TOPIC OF THIS MONTH-Continued)

Figure 2. Distribution of viruses and bacteria detected from sporadic infectious gastroenteritis, by age, 2011-2014

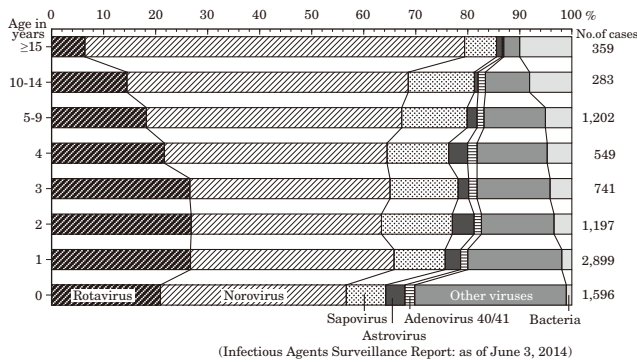
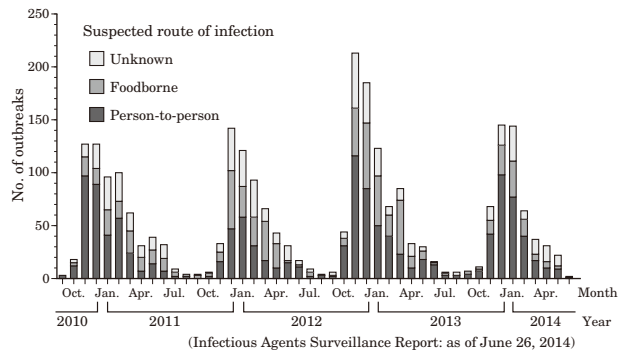


Figure 3. Number of reported norovirus outbreaks by suspected route of infection, September 2010- June 2014, Japan



During the 2010/11-2013/14 seasons, 517-815 outbreaks were reported annually (Table 2 in p.163 of this issue). November and December were high seasons (Fig. 3). Among outbreaks with known genotype information, GII/3 was the most common during the 2010/11 season, while GII/4 became dominant since the 2011/12 season.

For the 2010/11-2013/14 seasons, foods were responsible for 700 outbreaks, person-to-person for 1,256 and 593 outbreaks were of unknown cause. The place most frequently suspected as the source of infection was nursery schools, followed by restaurants, nursing homes for the elderly, and primary schools. Person-to-person transmission was frequent in nursery and primary schools and nursing homes for the elderly. Foodborne infection was most frequently attributed to restaurants (Table 2 in p. 163 of this issue).

During the 2010/11 season, foods were suspected in 141 of the 648 outbreaks. Person-to-person transmission was most common and suspected for 355 outbreaks, accounting for more than half of the outbreaks; frequently suspected locations were nursery schools, restaurants and primary schools. GII/3 was frequently found in nursery and primary schools while nursing homes for the elderly was more associated with GII/4.

For the 2011/12-2013/14 seasons, person-to-person transmission was suspected for 212, 394, and 295 outbreaks in each respective season. During the 2012/13 season, nursing homes for the elderly were suspected for 141 outbreaks. GII/4 was dominant and responsible for 500 outbreaks; among them, 176 and 86 outbreaks occurred in nursing homes for the elderly and nursery schools, respectively, where person-to-person transmission is suspected as the main route of infection. There were 59 outbreaks associated with restaurants.

**3. Statistics of Food Poisoning:** Statistics for food poisoning managed by the Ministry of Health, Labour and Welfare (MHLW) contains data on NoV-related events (IASR 32: 352-353, 2011, <http://idsc.nih.gov/iasr/32/382/tpc382.html>). The number of NoV-related events was 293 (8,086 patients) in 2010/11, 317 (10,969 patients) in 2011/12, 437 (19,709 patients) in 2012/13, and 228 (8,903 patients) in 2013/14 (as of June 2, 2014). In the 2012/13 season, the number of patients per outbreak exceeded 500 in three events (2,035, 1,442 and 526, respectively). In the 2013/14 season, there was a large-scale outbreak involving 8,027 persons, causing food poisoning in 1,271 persons (see p. 164 of this issue).

During the 2010/11-2013/14 seasons, the most frequent number of patients per event was 17-32 (327 events) followed by 9-16 (310 events) and 33-64 (226 events). The place most frequently suspected as the source infection was restaurants (906 events), followed by hotels (111 events) and caterers (85 events).

**4. Preventive measures and challenges:** In order to improve and promote prevention of norovirus infection, MHLW issues a public notice every season (in November 20, 2013 for the 2013/14 season) ([http://www.mhlw.go.jp/topics/syokuchu/dl/131120\\_1.pdf](http://www.mhlw.go.jp/topics/syokuchu/dl/131120_1.pdf)). For NoV prevention, attention should be paid to trends in infectious gastroenteritis and NoV detection information.

Infection control including hand washing, proper clothing and use of gloves in food handling areas and other standard hygienic measures should be implemented (IASR 33: 137-138 & 334-335, 2012). Health condition of food handlers should be monitored and maintained through implementation of regular health checks (IASR 34: 265-266, 2013). These measures should be maintained throughout the year as NoV activity is continuous. For rapidly identifying the cause of food poisoning and for preventing further spread, standardized methods for detecting virus from foods need to be established.

Development of NoV vaccine is identified as a high priority for the MHLW's master plan for immunization (MHLW, notification number 121, 2014; see [http://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou\\_iryuu/kenkou/kekaku-kansenshou/kihonteki\\_keikaku/index.html](http://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryuu/kenkou/kekaku-kansenshou/kihonteki_keikaku/index.html)). Effective vaccine development requires comprehensive information, such as pathogen information obtained through NESID, knowledge on antigen variability and mutation/evolution of the major antigen determinant gene(s) (see p. 170 of this issue), and computational prediction of virus evolution (see p. 171 of this issue).

*The statistics in this report are based on 1) the data concerning patients and laboratory findings obtained by the National Epidemiological Surveillance of Infectious Diseases undertaken in compliance with the Law Concerning the Prevention of Infectious Diseases and Medical Care for Patients of Infections, and 2) other data covering various aspects of infectious diseases. The prefectural and municipal health centers and public health institutes (PHIs), the Department of Food Safety, the Ministry of Health, Labour and Welfare, and quarantine stations, have provided the above data.*

(特集つづき)

表1. 小児の感染性胃腸炎患者 (0~15歳) からのノロウイルス検出状況, 2010/11~2013/14シーズン

Table 1. Norovirus detection from children 0-15 years of age with infectious gastroenteritis in Japan, 2010/11-2013/14 seasons

検出病原体 Virus	検体採取シーズン* Season*				合計
	2010/11	2011/12	2012/13	2013/14	
Norovirus genogroup unknown	164	83	16	17	280
Norovirus genogroup I	33	122	161	64	380
Norovirus genogroup II	2,118	1,481	1,756	1,491	6,846
Sapovirus genogroup unknown	159	161	245	174	739
Sapovirus genogroup I	65	104	106	67	342
Sapovirus genogroup II	36	50	28	27	141
Sapovirus genogroup III	-	2	1	-	3
Sapovirus genogroup IV	1	2	10	2	15
Sapovirus genogroup V	6	1	-	1	8
Norovirusの遺伝子型(再掲) Genotype of Norovirus					
Norovirus GI not typed	23	54	96	49	222
Norovirus GI/1	-	4	-	-	4
Norovirus GI/2	-	1	1	6	8
Norovirus GI/3	2	1	-	-	3
Norovirus GI/4	-	32	16	3	51
Norovirus GI/6	1	12	38	3	54
Norovirus GI/7	4	2	2	-	8
Norovirus GI/8	1	3	2	-	6
Norovirus GI/9	1	-	-	-	1
Norovirus GI/11	-	-	2	1	3
Norovirus GI/12	-	2	3	1	6
Norovirus GI/13	1	-	1	-	2
Norovirus GI/14	-	11	-	1	12
Norovirus GII not typed	1,281	968	1,043	1,027	4,319
Norovirus GII/1	-	1	-	-	1
Norovirus GII/2	110	57	53	20	240
Norovirus GII/3	453	25	18	56	552
Norovirus GII/4	187	305	558	217	1,267
Norovirus GII/6	4	21	19	116	160
Norovirus GII/7	5	4	8	4	21
Norovirus GII/11	-	-	1	-	1
Norovirus GII/12	20	21	1	-	42
Norovirus GII/13	58	77	50	38	223
Norovirus GII/14	-	2	3	11	16
Norovirus GII/17	-	-	-	2	2
Norovirus GII/others	-	-	2	-	2

\*9月~翌年8月 \*Detection from specimens collected during September through August in the following year

病原体個票での報告(病原微生物検出情報:2014年6月11日現在報告数)  
(Infectious Agents Surveillance Report: Data based on the reports of individual case of pathogen detection, as of June 11, 2014)

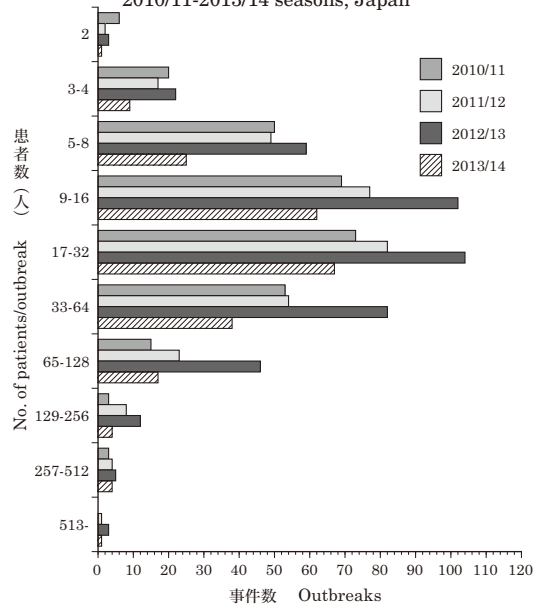
表2. ノロウイルス感染集団発生事例の推定感染場所と推定感染経路, 2010/11~2013/14シーズン

Table 2. Norovirus outbreak settings, 2010/11-2013/14 seasons, Japan

推定感染場所 Suspected place of infection	シーズン Season***	合計 Total	感染経路 Route of infection		GIIの主な遺伝子型 Major genotype of GII													
			食品 Food	人→人 P-to-P	2010/11シーズン					2011/12-2013/14シーズン								
					不明 ND	II/2	II/3	II/4	II/6	II/12	II/13	II/2	II/3	II/4	II/6	II/12	II/13	
家庭 Home	13 17 5 1	36	16	13	7	1	-	4	-	-	1	-	-	4	-	-	-	
飲食店 Restaurant	102 125 130 48	405	326	12	67	5	5	14	-	3	2	5	1	59	3	6	6	
宴会場 Banquet	11 16 10 18	55	38	8	9	-	-	2	-	-	-	1	-	9	1	1	-	
ホテル・旅館* Hotel	28 22 25 8	83	55	7	21	3	2	3	1	-	2	-	-	18	1	1	1	
福祉・介護施設 Welfare facility	25 17 37 19	98	2	82	14	1	2	5	-	2	1	2	-	34	2	1	1	
老人ホーム** Nursing home for the elderly	63 94 141 61	359	7	308	44	2	1	41	-	-	-	2	-	176	-	-	-	
病院 Hospital	9 10 14 8	41	4	29	8	-	-	7	-	-	-	1	-	16	-	-	-	
小学校 Primary school	88 40 66 45	239	2	189	48	17	21	1	-	2	7	16	1	21	20	9	8	
中学校 Junior high school	- 3 6 3	12	4	5	3	-	-	-	-	-	-	-	-	7	-	-	-	
高校 High school	3 3 1 3	10	1	7	2	-	1	1	-	-	-	1	-	3	-	-	-	
大学 University/college	3 - 1 -	4	1	2	1	-	1	1	-	-	-	-	-	1	-	-	-	
保育所 Nursery school	171 80 89 112	452	6	399	47	12	57	31	-	1	13	13	8	86	24	13	14	
幼稚園 Kindergarten	21 15 25 17	78	5	59	14	2	10	-	-	-	2	5	-	20	2	4	7	
事業所 Workplace	4 5 13 3	25	24	-	1	-	-	1	-	-	-	-	-	5	-	-	-	
宿舎・寮 Dormitory	5 4 5 2	16	7	5	4	-	-	1	-	-	-	1	-	1	-	-	-	
国内ツアー Domestic tour	1 1 4 -	6	5	1	-	-	-	-	-	-	-	-	-	2	-	-	-	
その他 Others	12 20 20 14	66	26	21	19	1	-	4	-	2	1	4	-	20	2	2	3	
不明・記載無し Unknown	89 97 223 155	564	171	109	284	-	1	-	-	1	1	3	-	18	6	1	1	
合計 Total	648 569 815 517	2,549	700	1,256	593	44	101	116	1	11	30	54	10	500	61	38	41	
食品媒介の疑い Foodborne	141 194 256 109	700																
人→人伝播の疑い Person-to-person	355 212 394 295	1,256																
不明 Not determined	152 163 165 113	593																

\*宴会場を除く, \*\*介護施設を含む, \*\*\*各シーズンは当年9月~翌年8月 Norovirus outbreaks during September through August in the following year  
地方衛生研究所からの「集団発生病原体票」による事例報告数(病原微生物検出情報:2014年6月9日現在報告数)  
(Infectious Agents Surveillance Report: Data based on the reports of outbreak summary as of June 9, 2014 from PHIs)

図4. 患者数規模別ノロウイルス食中毒事件数, 2010/11~2013/14シーズン  
Figure 4. Outbreak scale of norovirus food poisoning, 2010/11-2013/14 seasons, Japan



食中毒統計, 2014年は速報値 (2014年6月2日現在報告数)  
(Statistics of Food Poisoning in Japan, Ministry of Health, Labour and Welfare: Data for 2014 is based on the provisional reports received before June 2, 2014)