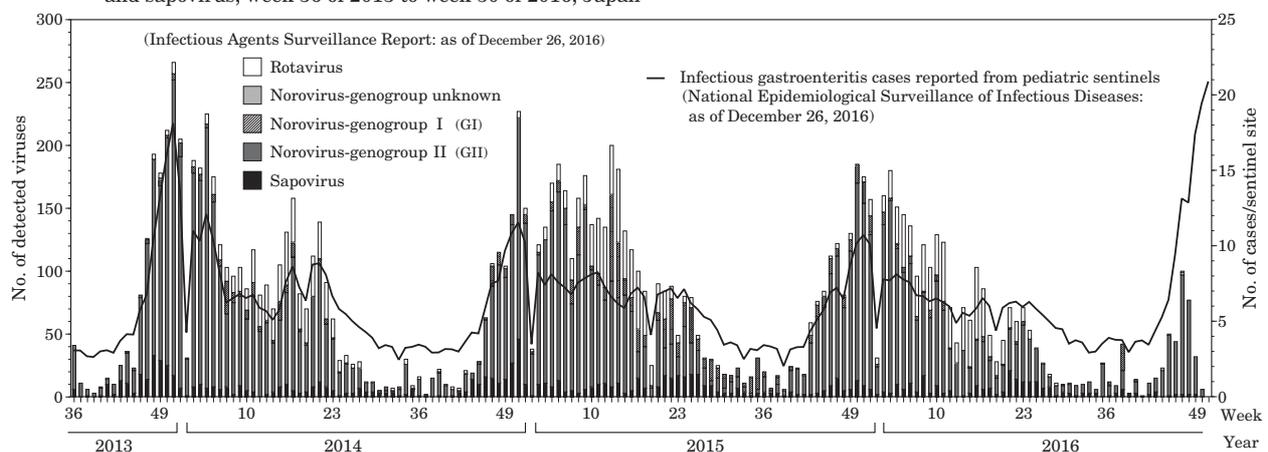


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### <THE TOPIC OF THIS MONTH> Norovirus trends in Japan, 2015/16 season

Figure 1. Weekly number of reported cases of infectious gastroenteritis per sentinel site and detection of norovirus, rotavirus and sapovirus, week 36 of 2013 to week 50 of 2016, Japan



Norovirus (NoV) is a single stranded RNA virus. It is classified into genogroups GI–GVII, and human infection is primarily associated with GI and GII. Since the 2015/16 season, a new coding system based on the nucleotide sequence of the *VP1* region has been used replacing the previous one, which was based on the nucleotide sequence of the capsid N/S region (see the comparison table; <http://www.nih.go.jp/niid/images/iasr/rapid/graph/Vol.36/graph/pt4274a.gif>).

NoV is transmitted orally through consumption of contaminated foods or person-to-person contact via contaminated hands. The main symptoms are nausea, vomiting, diarrhea and abdominal pain. Among infants or the elderly, vomiting and diarrhea due to infection may lead to fatigue and dehydration and require hydration therapy.

The incubation period is 24–48 hours. Patients shed large quantity of the virus in stool and vomitus during and after the symptomatic period and may continue shedding the virus one month or more after disappearance of symptoms (IASR 31: 319–320, 2010). Infection has also been known to occur from breathing in contaminated vomitus that has dried up (IASR 28: 84, 2007 & 29: 196, 2008). Gastroenteritis and food poisoning due to NoV occur throughout the year with a peak in winter (Fig 1 & Fig. 4 in p. 3). As no effective vaccines are currently available, patients are treated symptomatically.

#### Notifications of infectious gastroenteritis reported under the National Epidemiological Surveillance of Infectious Diseases (NESID) system and detection of NoV

Cases of infectious gastroenteritis, caused by many infectious agents including NoV, are reported from approximately 3,000 pediatric sentinel sites in Japan (see <http://www.nih.go.jp/niid/images/iasr/35/409/de4091.pdf> for the notification criteria). Usually, infectious gastroenteritis activity peaks during weeks 49 to 52 (10–20 cases/sentinel/week), and gradually declines from week 5 to 25 of the following year (Fig. 1; <http://www.nih.go.jp/niid/en/10/2096-weeklygraph/1647-04gastro.html>).

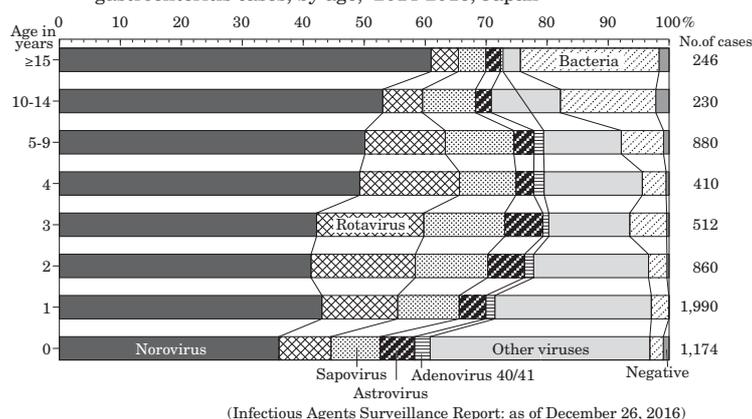
Prefectural and municipal public health institutes (PHIs) conduct laboratory testing of infectious gastroenteritis, based on stool specimens sent from approximately 10% of the pediatric sentinel sites and also from those collected from outbreaks. Detected pathogenic agents are reported to NESID using the case-based pathogenic agent report form or the outbreak summary report form. Among the gastroenteritis-associated viruses reported, NoV was the most common, followed by rotavirus and sapovirus. NoV peaked in November/December when overall infectious gastroenteritis peaks, while detections of rotavirus increased in February and thereafter (Fig. 1) (IASR 35: 63–64, 2014). Among pathogens detected from sporadic infectious gastroenteritis cases, NoV occupied ~40% of the pathogens detected from patients aged ≤4 years and ~60% of those detected from patients aged ≥15 years, though the number of cases in this latter age group were few (Fig. 2 in p. 3).

PHIs conduct genotyping of NoV. For the 2015/16 season, similar to previous seasons, NoV GII was the majority with only a

(Continued on page 2)

(THE TOPIC OF THIS MONTH-Continued)

Figure 2. Distribution of viruses and bacteria detected from sporadic infectious gastroenteritis cases, by age, 2014-2016, Japan



few NoV GI (Fig. 1 in p. 1). Among a total of 1,545 NoV detected from infectious gastroenteritis patients aged  $\leq 15$  years, GII.4, GII.3 and GII.17 occupied 31%, 15% and 5%, respectively (38% were not genotyped) (Table 1 in p. 3). During the 2015/16 season, expansion of genotype GII.17, a new genotype similar to GII.P17-GII.17 Kawasaki 308, was observed (see pp. 4, 5 & 6 of this issue) (IASR 36: 91-92, 2015 & 36: 175-178, 2015 & 37: 182-183, 2016). The genotype of NoV has been known to vary depending on season and age group (Fig. 3 in p. 3) (see p. 10 of this issue).

NoV outbreaks were reported via the outbreak summary report and included such events as “food poisoning”, “food-related health complaint”, “person-to-person transmission” and “gastroenteritis outbreak of unknown infection source” (IASR 36: 26-27, 2015). The number of NoV outbreaks increased from October to November and continued until the following spring (Fig. 4 in p. 3). During the 2015/16 season, 425 such outbreaks were reported (575 outbreaks in the 2014/15 season). Among them, 108 (25%) were suspected to be foodborne, and 242 (57%) person-to-person transmission-related. Suspected places of infection were, in descending order, nursery school, restaurant, primary school and nursing home for the elderly. NoV GII.4 was associated with 121 outbreaks (28%) and GII.17 with 112 outbreaks (26%) (Table 2 in p. 3).

#### Food poisoning statistics managed by MHLW

Ministry of Health, Labour and Welfare (MHLW) maintains food poisoning statistics ([http://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou\\_iryuu/shokuhin/syokuchu/04.html](http://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryuu/shokuhin/syokuchu/04.html); IASR 32: 352-353, 2011). During the 2014/15 season, there were 471 NoV-related food poisoning events with 14,112 patients; during the 2015/16 season, there were 280 such events with 8,093 patients (as of December 1, 2016). The 2014/15 season experienced a large food poisoning outbreak that resulted in 576 patients. During these two seasons, 560 outbreaks occurred in restaurants (75%), 59 in hotels (8%) and 48 through catering service (6%).

#### Preventive measures and challenges

For preventing food poisoning and infection, information regarding gastroenteritis trends and laboratory information of NoV are indispensable. Every year, MHLW issues a notice, “On enhancing preventive measures to be taken against norovirus during gastroenteritis season”. For the 2016/17 season, MHLW published on November 22, 2016 (<http://www.mhlw.go.jp/file/06-Seisakujouhou-11130500-Shokuhinanzendu/0000143835.pdf>) and again on December 21, 2016 ([http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou\\_iryuu/shokuhin/syokuchu/dl/161222-01.pdf](http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou_iryuu/shokuhin/syokuchu/dl/161222-01.pdf)).

As NoV detections and NoV outbreaks occur throughout the year (Fig. 1 in p. 1 & Fig. 4 in p. 3), continuous management of hygiene measures are necessary. To prevent contamination of foods by food handlers, hand washing, proper clothing and use of gloves and other standard hygiene measures should be implemented at food handling sites (IASR 33: 137-138 & 334-335, 2012). Health condition of food handlers should be strictly monitored by means of periodic health checks (IASR 34: 265-266, 2013). For the early detection of the source of a food poisoning event and implementation of control measures, MHLW issues a notice “On prevention and investigation of norovirus-associated food poisoning incidents” Sei-Shoku-Kan: no. 1124 (1), November 24, 2016; <http://www.mhlw.go.jp/file/06-Seisakujouhou-11130500-Shokuhinanzendu/0000143826.pdf>.

The MHLW’s master plan identified the development of a NoV vaccine as a high priority (MHLW, notification number 121, 2014; see [http://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou\\_iryuu/kenkou/kekkaku-kansenshou/kihonteki\\_keikaku/index.html](http://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryuu/kenkou/kekkaku-kansenshou/kihonteki_keikaku/index.html)). For the development of effective vaccines, pathogen information obtained through NESID is essential.

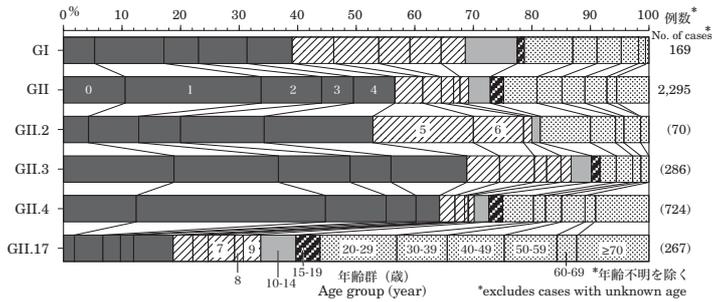
#### Rapid report (“Flash report”) of gastroenteritis viruses for the 2016/17 season (as of December 26, 2016):

Among the 209 NoV detections from pediatric gastroenteritis cases so far reported, the majority was NoV GII, including 43 cases of GII.2 and 21 cases of GII.6 (Table 1 in p. 3). Relative to the previous season, there was a remarkable increase in detections of GII.2 (see pp. 17, 18 & 19 of this issue). Among 157 outbreaks reported based on the outbreak summary report, 74 (47%) were associated with NoV GII.2 (Table 2 & Fig. 4 in p. 3). Common suspected place of infection was nursery school, primary school and preschool. NoV detection data can be found at <http://www.nih.gov/nid/en/iasr-noro-e.html>.

*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) (THE TOPIC OF THIS MONTH-Continued)

図3. ノロウイルスGI, GIIおよびGII.2, GII.3, GII.4, GII.17検出例の年齢分布, 2015/16シーズン  
Figure 3. Age distribution of cases with detection of norovirus by genogroup and predominant genotype, 2015/16 season, Japan



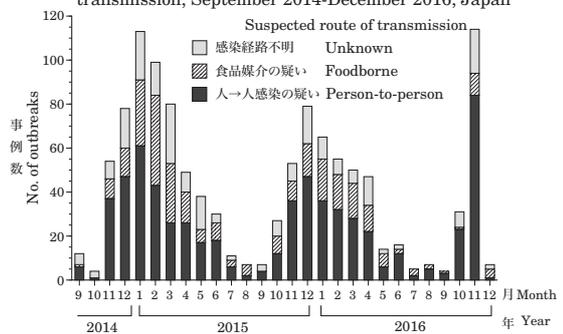
病原体個票での報告 (病原微生物検出情報: 2016年12月26日現在報告数)  
(Infectious Agents Surveillance Report: Data based on case-based pathogenic agent reports, as of December 26, 2016)

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  
2015/16~2016/17シーズン  
Table 1. Number of norovirus detections from children 0-15 years of age with gastroenteritis in Japan, 2015/16-2016/17 seasons

検出病原体	検体採取シーズン*		合計
	2015/16	2016/17	
Virus			
Norovirus genogroup unknown	1	6	7
Norovirus genogroup I	105	20	125
Norovirus genogroup II	1,439	183	1,622
Sapovirus genogroup unknown	130	12	142
Sapovirus genogroup I	65	8	73
Sapovirus genogroup II	42	2	44
Sapovirus genogroup IV	13	-	13
Sapovirus genogroup V	1	-	1
Norovirusの遺伝子型(再掲) Genotype of Norovirus			
Norovirus GI not typed	42	19	61
Norovirus GI.2	15	1	16
Norovirus GI.3	38	-	38
Norovirus GI.4	4	-	4
Norovirus GI.5	4	-	4
Norovirus GI.6	2	-	2
Norovirus GII not typed	588	95	683
Norovirus GII.1	1	-	1
Norovirus GII.2	37	43	80
Norovirus GII.3	233	5	238
Norovirus GII.4	474	16	490
Norovirus GII.6	23	21	44
Norovirus GII.7	2	1	3
Norovirus GII.13	2	-	2
Norovirus GII.17	79	2	81

\*9月~翌年8月  
\*Specimens collected during September through August of the following year  
病原体個票での報告 (病原微生物検出情報: 2016年12月26日現在報告数)  
(Infectious Agents Surveillance Report: Data based on case-based pathogenic agent reports, as of December 26, 2016)

図4. 推定感染経路別ノロウイルス感染集団発生の月別推移,  
2014年9月~2016年12月  
Figure 4. Number of reported norovirus outbreaks by suspected route of transmission, September 2014-December 2016, Japan



集団発生病原体票での報告 (病原微生物検出情報: 2016年12月26日現在報告数)  
(Infectious Agents Surveillance Report: Data based on outbreak summary reports, as of December 26, 2016)

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, 2015/16~2016/17シーズン  
Table 2. Reported norovirus outbreaks by suspected location of infection and route of transmission, 2015/16-2016/17 seasons, Japan

推定感染場所	Suspected place of infection	シーズン		合計	感染経路			各シーズンのGIIの主な遺伝子型													
		Season***			Route of transmission			Predominant genotype of GII, by season													
		2015/16	2016/17		食品	人→人	不明	2015/16					2016/17								
家庭	Home	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
飲食店	Restaurant	43	7	50	45	1	4	-	-	2	7	-	-	18	2	-	1	-	-	-	-
宴会場	Banquet room	8	1	9	6	-	3	-	-	1	3	-	-	-	-	-	1	-	-	-	-
ホテル・旅館*	Hotel	13	-	13	10	2	1	-	-	1	6	-	-	3	-	-	-	-	-	-	-
福祉・養護施設	Welfare facility	16	2	18	1	15	2	-	-	9	-	-	6	1	-	-	-	-	-	-	-
高齢者施設**	Nursing home for the elderly	33	3	36	2	30	4	-	-	12	-	-	10	1	-	-	-	-	-	-	-
病院	Hospital	1	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
小学校	Primary school	37	18	55	-	45	10	-	-	3	4	-	-	7	9	-	1	-	-	-	-
中学校	Junior high school	1	1	2	-	2	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
高校	High school	2	-	2	1	1	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-
保育所	Nursery school	90	63	153	1	141	11	1	5	17	31	3	-	7	23	1	1	3	-	-	-
幼稚園	Kindergarten	8	20	28	-	21	7	-	-	2	3	-	-	1	7	-	-	-	-	-	-
事業所	Workplace	2	-	2	1	-	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-
宿舎・寮	Dormitory	3	-	3	-	2	1	-	-	-	1	1	-	1	-	-	-	-	-	-	-
国内ツアー	Domestic tour	-	1	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
その他	Others	4	2	6	2	3	1	-	-	-	1	1	1	-	1	-	-	-	-	-	-
不明・記載無し	Unknown	163	39	202	54	88	60	-	2	11	41	2	-	55	28	-	1	3	-	-	-
合計	Total	425	157	582	124	353	105	1	7	37	121	7	1	112	74	1	5	6	-	-	-
食品媒介の疑い	Foodborne (Food)	108	16	124																	
人→人伝播の疑い	Person-to-person (P-to-P)	242	111	353																	
不明	Not determined (ND)	75	30	105																	

\*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 NoV outbreaks reported during September through August of 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: 2016年12月26日現在報告数)  
(Infectious Agents Surveillance Report: Data based on outbreak summary reports from PHIs, as of December 26, 2016)