9.3 Rotavirus

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9.3.1 Key points

- The number of rotavirus detections in 2019 was slightly lower than in 2018. In 2020 up to May, fewer rotavirus detections have been reported compared to the same period in 2019. A marked reduction in the number of rotavirus detections has been observed as of March 2020, i.e. following implementation of Dutch COVID-19 response measures.
- G9P8 and G3P8 were the most prevalent genotypes in 2019.
- The Ministry of Health, Welfare and Sport has decided to cancel the implementation of rotavirus vaccination for high-risk groups in the National Immunisation Programme. In the RIVAR study, lower vaccine-effectiveness estimates were unexpectedly found for high-risk infants. The Ministry requested a new recommendation from the Dutch Health Council.

9.3.2 Tables and figures

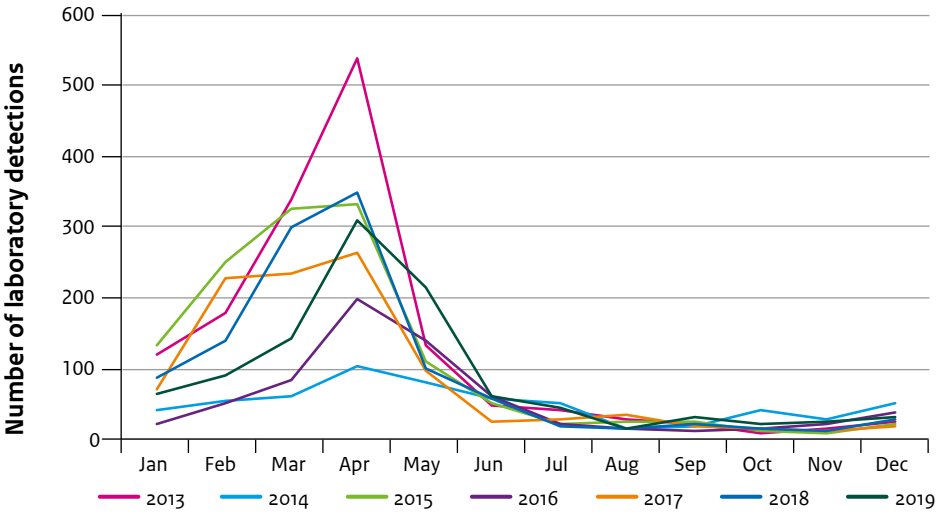

Figure 9.3.1 Number of reported laboratory detections per month in the Netherlands, 2013-2019

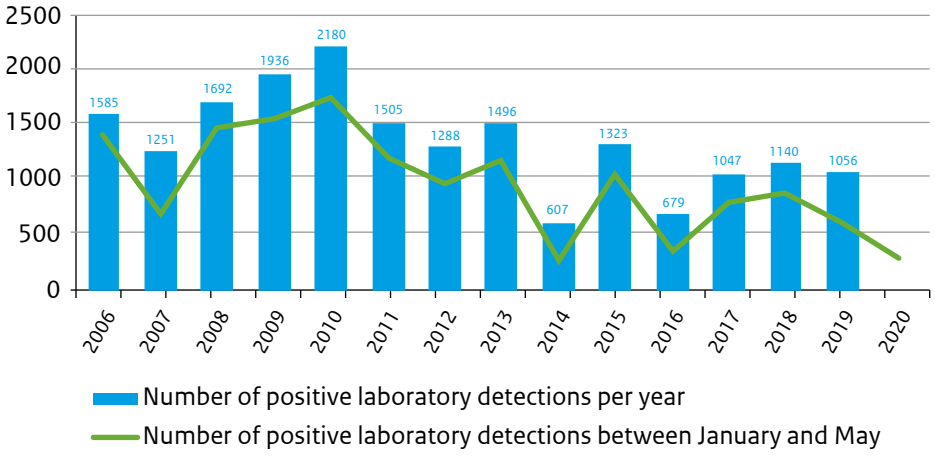

Figure 9.3.2 Number of reported laboratory rotavirus detections per year and between January and May in the Netherlands, 2006-2020

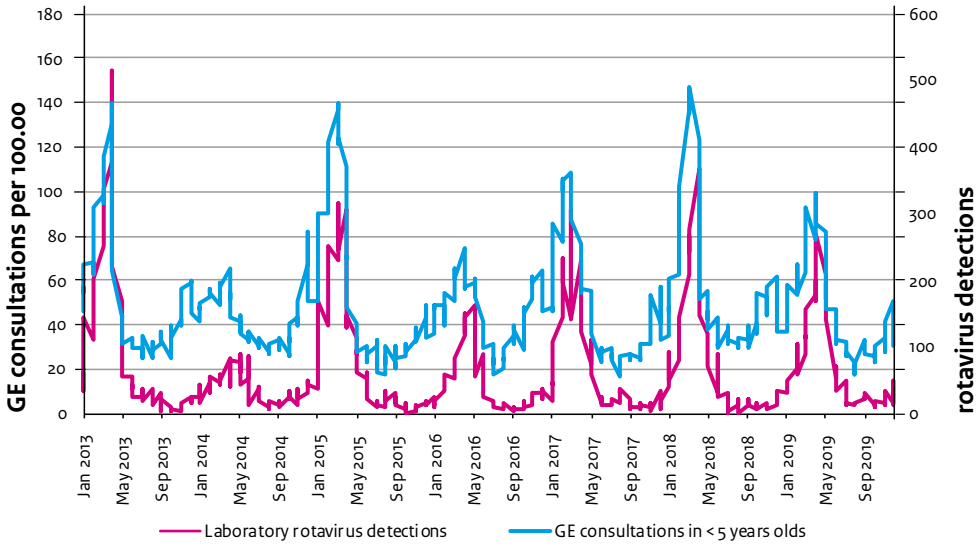

Figure 9.3.3 Overall number of rotavirus laboratory detections and general practice all-cause gastroenteritis consultations in children under 5 years old per week, the Netherlands, 2013-2019

Table 9.3.1 Number of rotavirus samples typed per year and identified genotypes, the Netherlands, 2013-2019

Type	2013	2014	2015	2016	2017	2018	2019	Total
G12P8	1	6	2	0	1	2	1	13
G1P8	**83**	20	25	9	23	7	12	179
G2P4	41	29	34	12	12	6	13	147
G3P8	51	7	14	23	**38**	56	**40**	229
G4P8	35	12	**137**	3	23	3	0	213
G9P8	23	**49**	32	**59**	20	**60**	38	281
G9P4	1	0	1	0	8	29	24	63
Other	52	16	27	12	42	16	17	182
Total	**287**	**139**	**272**	**118**	**167**	**179**	**145**	**1307**

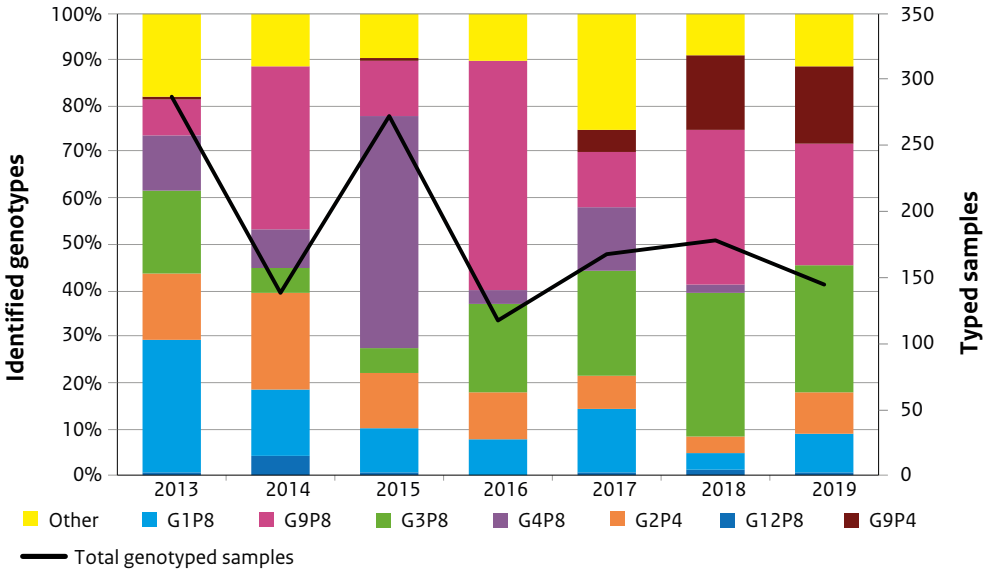

Figure 9.3.4 Absolute number of rotavirus samples genotyped per year and the proportions of identified genotypes, the Netherlands, 2013-2019

9.3.3 Epidemiology

Rotavirus infections are not notifiable in the Netherlands so data sources other than those for notifiable diseases were used, namely the weekly virology report and the Nivel Primary Care Database.

9.3.3.1 Weekly virology report

In 2019, 1,056 rotavirus cases were notified, slightly less than in 2018 (n=1,140) (Figure 9.3.2). Most rotavirus laboratory detections were reported between February and May (72%), with a peak in the last week of April (81 rotavirus laboratory detections) (Figure 9.3.1). Data from 2020 up to May show more than half of the rotavirus cases compared to the same period in 2019 (2019 n=610; 2020 n=284) (Figure 9.3.2). The difference in number of rotavirus detections is due mainly to a sharp decline in April 2020 (2020 n=13; 2019 n= 311). This decline in rotavirus detections is most likely due mainly to the preventative measures implemented during the COVID-19 pandemic, such as the school closure and increased handwashing [1].

The remarkably low seasons in 2014 (n=607 detections) and 2016 (n=679 detections) led to the hypothesis of a shift in the rotavirus seasonal pattern to a biennial pattern. However, the rotavirus seasons in 2017, 2018 and 2019 contradict this hypothesis (Figure 9.3.2).

9.3.3.2 Nivel

The Nivel Primary Care Database provided data on all-cause gastroenteritis (GE) in children under the age of 5 years consulting the general practitioner [2].

In 2019, 8,102 all-cause GE consultations were reported per 100,000 children younger than 5 years of age (on average 164 per 100,000 per week) (Figure 9.3.3). This is fewer consultations compared to 2018 (n=9,838 per 100,000). Consultations in 2019 were more frequent between January and mid-July with a peak in mid-April (330 per 100,000 children per week). In this period of the year, 5,580 consultations per 100,000 children were registered, which is less than the number of consultations registered in the same period in 2018 (n=6,430 per 100,000).

9.3.4 Pathogen

The IDS/RIVM receives faecal samples from the Working Group Clinical Virology laboratories for rotavirus genotyping throughout the year. The results are given per calendar year and are shown in Table 9.3.1. and Figure 9.3.4.
In 2019, 145 out of 166 received samples (87%) could be typed (Table 9.3.1). Almost half of the typed samples (62/145) were identified as rotavirus G9, which comprises the genotypes G9P8 and G9P4. The most prevalent genotypes were G9P8 and G3P8, which accounted for, 26% (38/145) and 28% (40/145) of the typed samples, respectively (Figure 9.3.4).

Since the COVID-19 control measures were implemented around mid-March 2020, only 1 sample has been received up to May. From January to mid-March, 36 samples were received, 5 of which were not typeable, and about half of the samples were identified as rotavirus G9.

9.3.5 Research

9.3.5.1 RIVAR study

Between May 2016 and November 2017, the RIVAR study (Risk-Group Infant Vaccination Against Rotavirus) offered rotavirus vaccination to high-risk infants (i.e. infants with severe congenital pathology, prematurity and/or low birth weight) born in one of the thirteen participating Dutch hospitals. This project was a pilot study on the feasibility and effectiveness of rotavirus vaccination in high-risk infants. Of the infants eligible for rotavirus vaccination, 49% (726/1,482) were vaccinated. Survival probabilities for severe rotavirus AGE for vaccinated and unvaccinated infants between 2 and 18 months of age did not differ between the groups [3]. Vaccine effectiveness for severe rotavirus acute gastroenteritis (AGE) in the high-risk infants was lower than expected, namely 30% (95% confidence interval, -40%–65%) compared with previously reported 68% to 98% in healthy infants [4]. The RIVAR study showed no reduction in all-cause severe AGE between vaccinated and unvaccinated high-risk infants.

9.3.6 Cost-effectiveness

Kotsopoulis et al. assessed the financial consequences of rotavirus vaccination for families, employers and authorities in the Netherlands [5]. A Social Accounting Matrix (SAM) framework was developed, reflecting the distribution of income and spending at equilibrium affected by rotavirus disease among all those concerned for one year. The total financial cost difference at equilibrium between presence and absence of rotavirus vaccination was +€26,758 million over one year as a net economic surplus. The cost of vaccination (€19,194 million) by the government was offset by the increase in tax revenue (€14,561 million) and reduced spending on healthcare treatment (€7,998 million). The manufacturers pay corporate taxes on the revenue from sold goods. Moreover, vaccination prevents parental absenteeism, which is associated with increased productivity, higher wages, more spending, increased tax revenue, and reduced healthcare costs. This study was funded by GSK.

9.3.7 (Inter)national developments

In April 2020, the Ministry of Health, Welfare and Sport decided to delay the implementation of the rotavirus vaccination in the National Immunisation Programme due the unexpectedly lower estimates of vaccine effectiveness found in the RIVAR study for high-risk infants [6]. The Ministry will submit a new request for advice on rotavirus vaccination to the Health Council.

As of April 2020, 107 countries worldwide have introduced rotavirus vaccination in their national immunisation programmes. In addition, 4 countries have either phased or sub-national introductions. Of 10 countries with the highest numbers of rotavirus-related deaths, 7 introduced rotavirus vaccination (Afghanistan, Angola, Ethiopia, India, Kenya, Niger, and Pakistan) [7]. Four World Health Organisation (WHO) prequalified rotavirus vaccines are available, namely ROTASILL, ROTAVAC, Rotarix, and RotaTeq [8]. Only Rotarix and RotaTeq are licensed for use in Europe [10]. A systematic literature review on the global impact of rotavirus vaccination on diarrhoea hospitalisations and deaths among children <5 years old analysed published data from

2006-2019, with at least 12 months of data before and after rotavirus vaccine introduction [10]. The review showed a median reduction of 46%–74% in rotavirus hospitalisations, 23%–47% in AGE hospitalisations, and 28%–46% in AGE mortality. The decline was higher in countries with low child mortality, among younger age groups, and in countries with higher rotavirus vaccination coverage.

9.3.8 Literature

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