



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport



SARS-CoV-2 re-infection in The Nethe

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Acknowledgements

Medical Microbiology Labs

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Municipal Health Services

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..and several others

RIVM LCI

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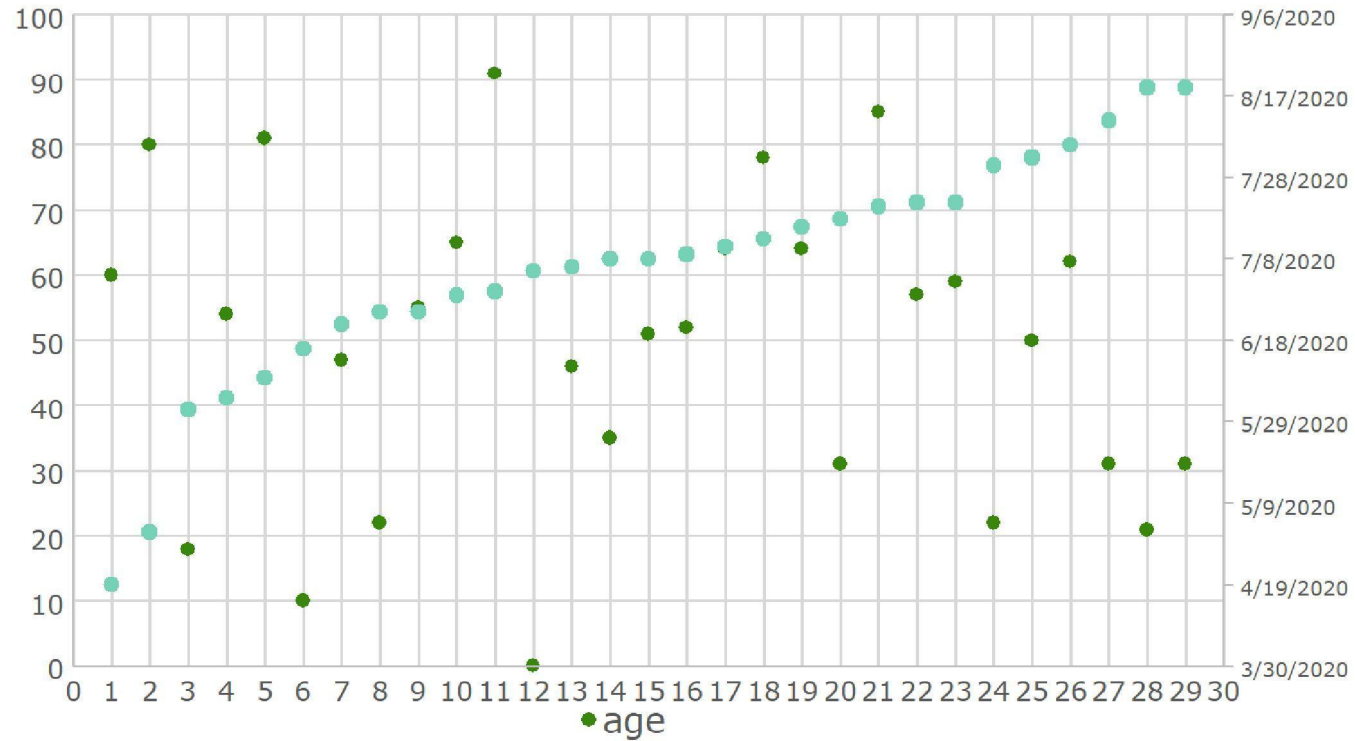
..and several others

RIVM IDS IIV

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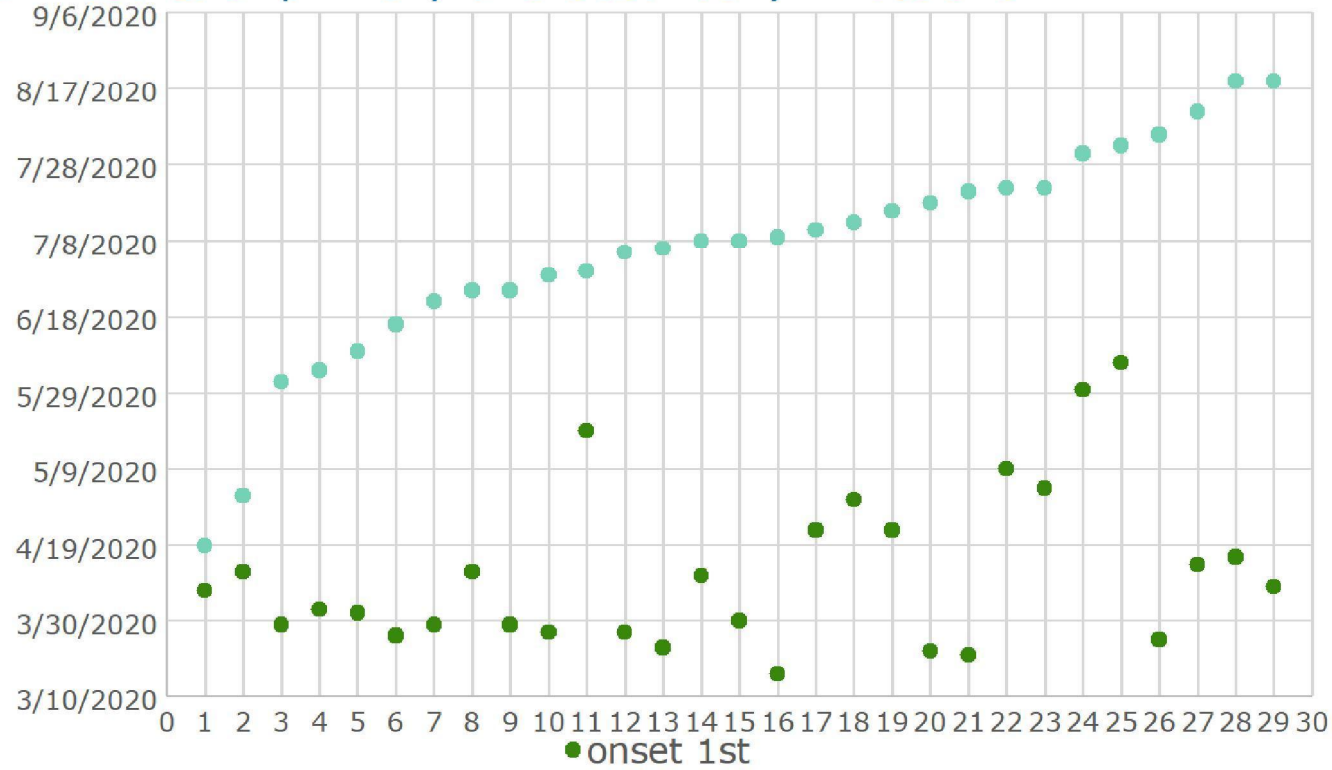


Age and sex of participants



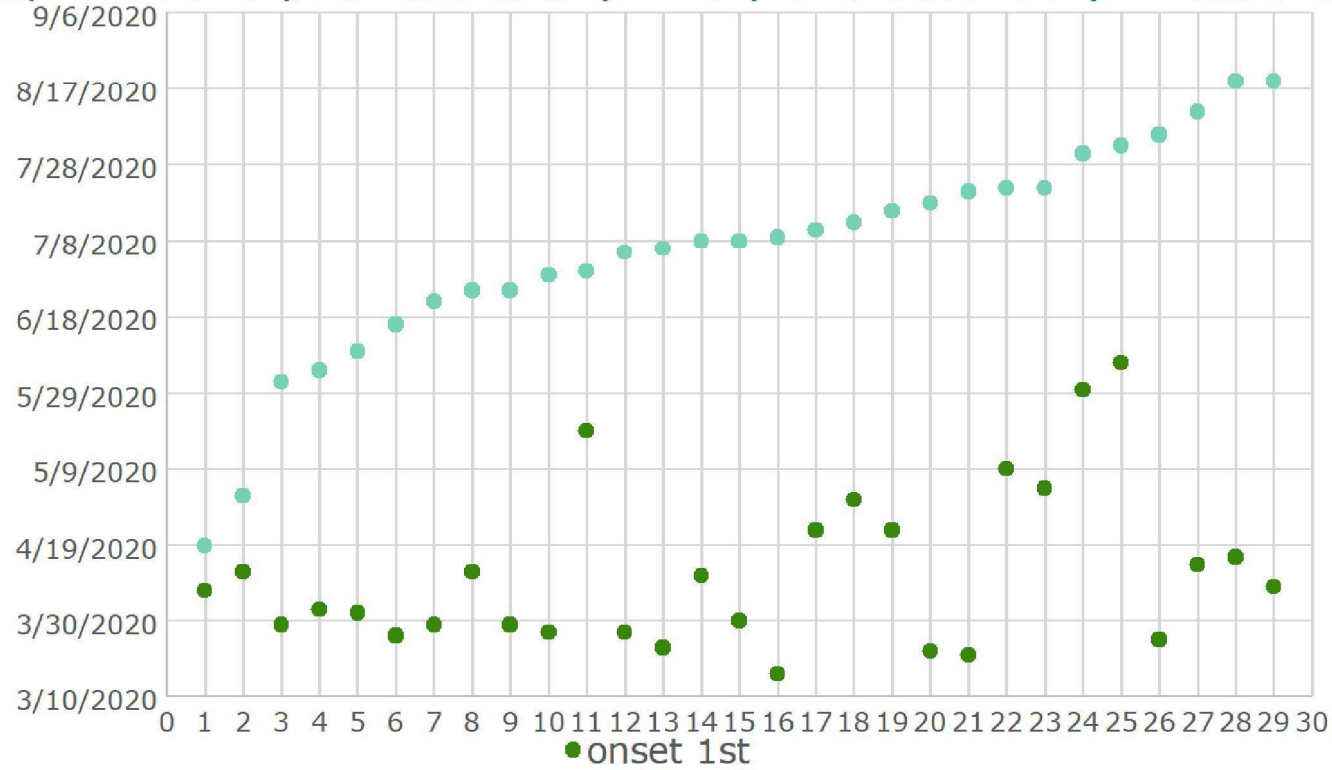


PCR results of primary and secondary infections





Sequence analysis results of primary and secondary infections





Molecular evidence of re-infection; 7 cases

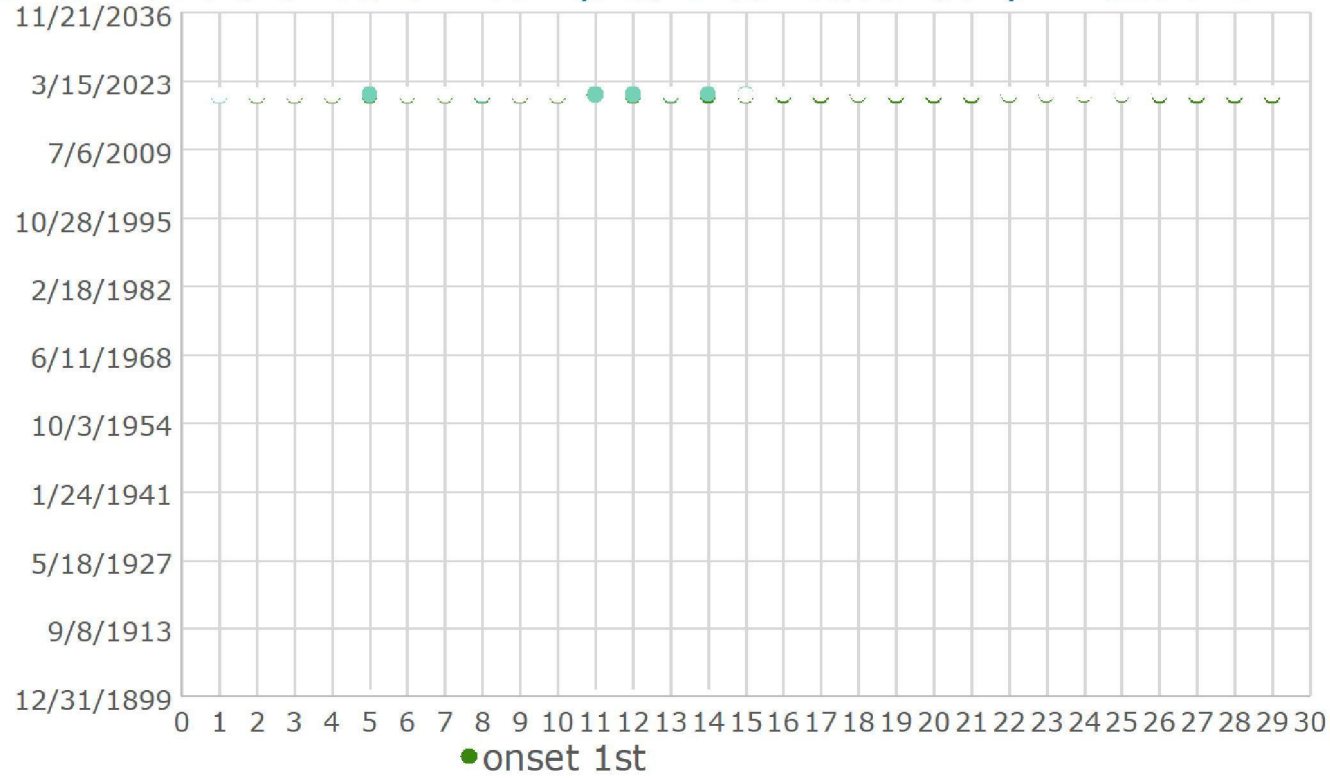
PCR 1 st date	Ct 1 st	Seq type 1 st	PCR 2 nd date	Ct 2 nd	Seq type 2 nd	days between PCR 1 st and PCR 2 nd
14/04/20	26	B.1.1	26/04/20	26	B.1.1.1	12
12/04/20	15	B.1.78	05/05/20	27	B.2	23
02/04/20	23	B.1.1	09/06/20	31	B.1.1	68
27/03/20	29	B.1.1.47	05/07/20	30	B.1.1	100
15/04/20	31	B.3	10/07/20	30	B.1	87
02/04/20	23	B.1.22	11/07/20	34	B.1.1.47	99
24/04/20	26	B.1.22	14/07/20	20	B.3	81

A dynamic nomenclature proposal for SARS-CoV-2 to assist genomic epidemiology

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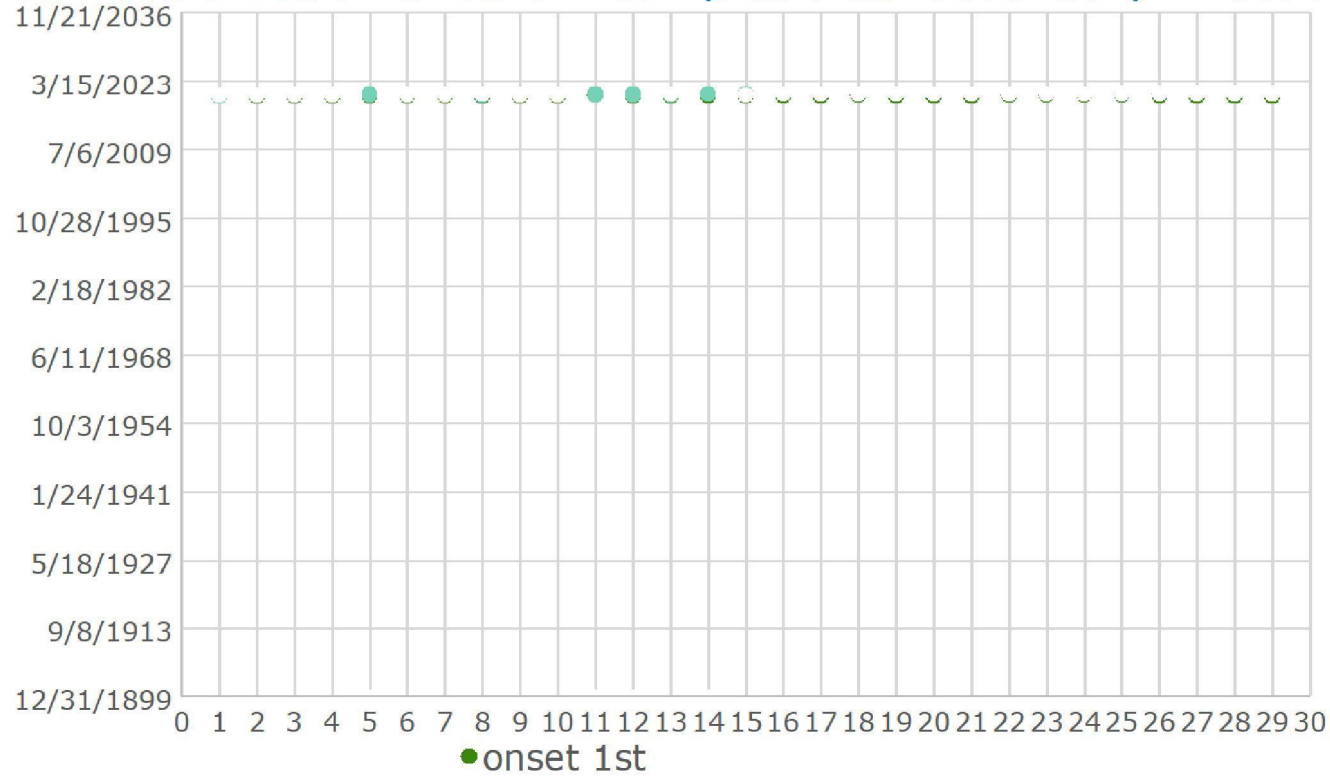


Wantai ratio's of serum samples after secondary infections



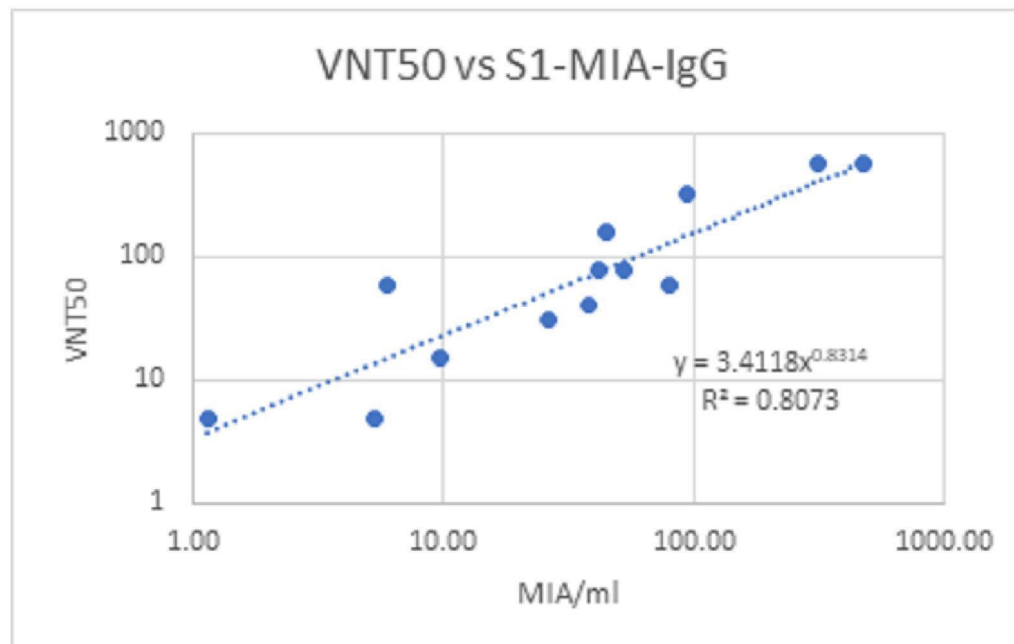


Virus neutralization of serum samples after secondary infections





Serological response after re-infection Multiplex Immunoassay (MIA, Luminex)





Serological evidence of re-infection; part 1

days between onset 1 and onset 2	days between onset 2 and serum collection	Wantai ratio	VNT50	IgG (GMC) S1	IgG (GMC) RBD	Ai% S1	Ai% RBD
12	9	24.38	480	2575.05	3063.28	18	35
20	5	0.98	30	2.60	3.95	46	59
64	7	25.24	15	9.67	8.36	51	63
63	4	23.64	560	480.55	1952.06	29	26
82	12	23.52	80	52.76	53.87	55	58
85	6	22.74	30	26.15	19.01	39	48
74	29	27.04	40	38.43	34.38	65	72
88	3	23.53	320	92.93	80.90	50	67
94	2	21.59	160	45.15	51.68	58	68
105	3	0.66	<10	1.14	2.00		
100	-47	18.46	60	5.97	8.56	46	45
115	7	21.38	<10	5.30	5.12	51	59

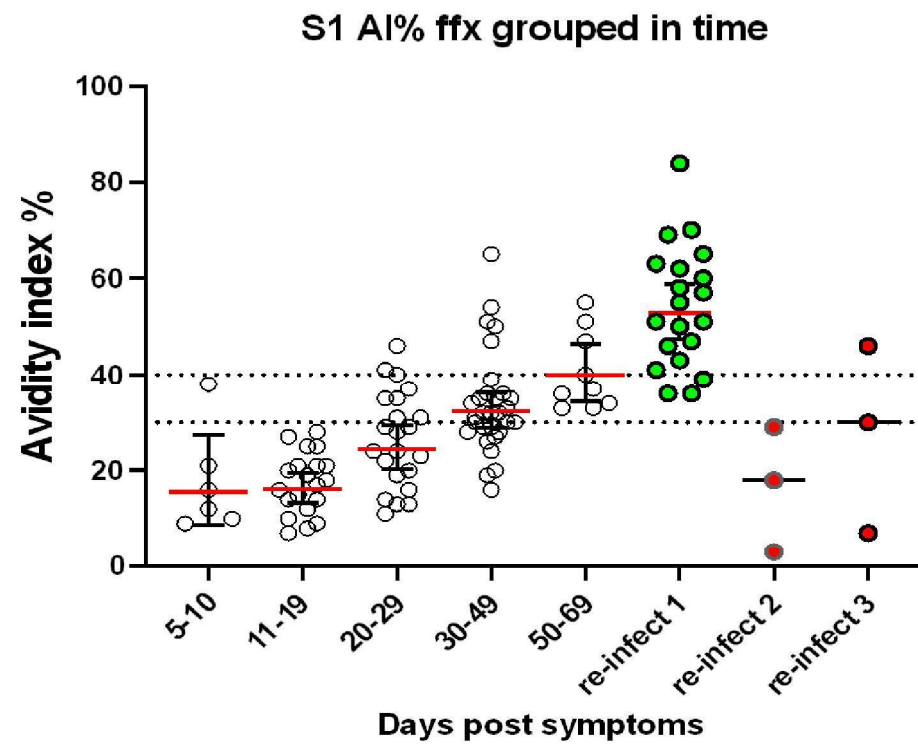


Serological evidence of re-infection; part 2

days between onset 1 and onset 2	days between onset 2 and serum collection	Wantai ratio	VNT50	IgG (GMC) S1	IgG (GMC) RBD	Ai% S1	Ai% RBD
79	3	0.02					
73	6	23.74	560	198.19	194.86	63	79
84	13	23.95	560	315.52	751.05	57	39
118	12	19.6	40	14.53	20.06	69	57
122	14	21.19	40	13.07	16.42	70	73
74	3	23.44	60	79.46	271.42	47	21
79	6	22.01	80	42.18	61.40	36	48
62	5	23.38	20	17.26	18.05	43	80
57	12	16.86	20	12.17	11.55	41	59
133	19	26.42	40	50.45	40.35	65	69
119	6	11.11	<10	3.74	6.59	36	32
125	1	24	<10	5.63	5.48	62	64
133	7	20.41	15	5.09	8.60	60	45



Serological evidence of re-infection; avidity index





Conclusions

- Twentynine potential re-infection cases investigated by laboratory testing
- Seven re-infection cases confirmed by sequence analysis
 - Qualitative comparison, not easy to obtain
 - Re-infection with identical virus would not qualify
- Fourteen re-infection cases confirmed by serological criteria
 - Quantitative criteria:
 - > avidity index >50%, <30 days after onset
- None from the set of 7 occur in the set of 14
- Four possible re-infection cases; <50% AI, >20 Wantai ratio, <14 days after onset
- Four are probably not re-infection cases, PCR not confirmed, few samples available, no serological response after onset of symptoms