

Supplementary Online Content

Buchan SA, Seo CY, Johnson C, et al. Epidemiology of myocarditis and pericarditis following mRNA vaccination by vaccine product, schedule, and interdose interval among adolescents and adults in Ontario, Canada. *JAMA Netw Open*. 2022;5(6):e2218505. doi:10.1001/jamanetworkopen.2022.18505

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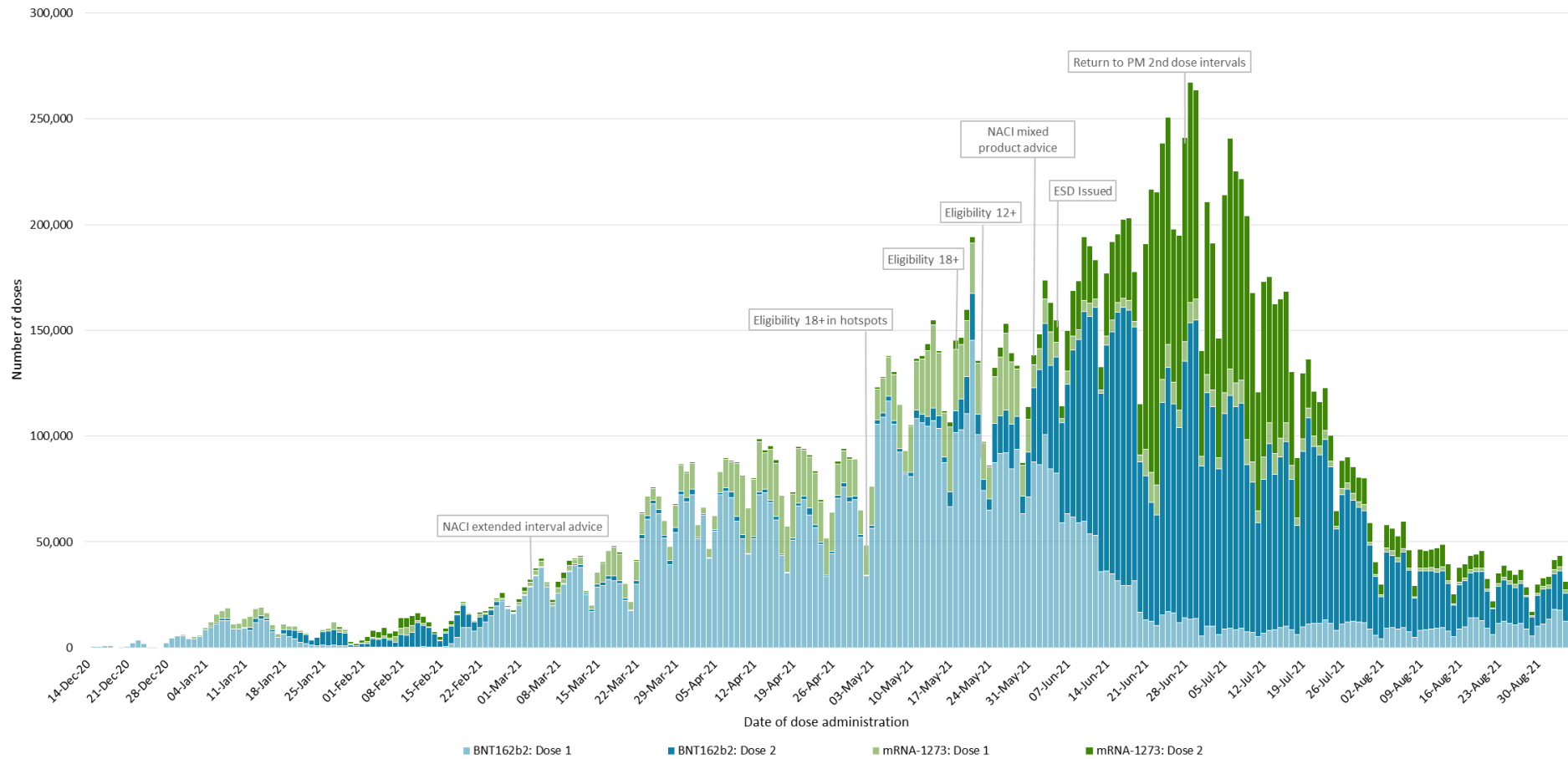
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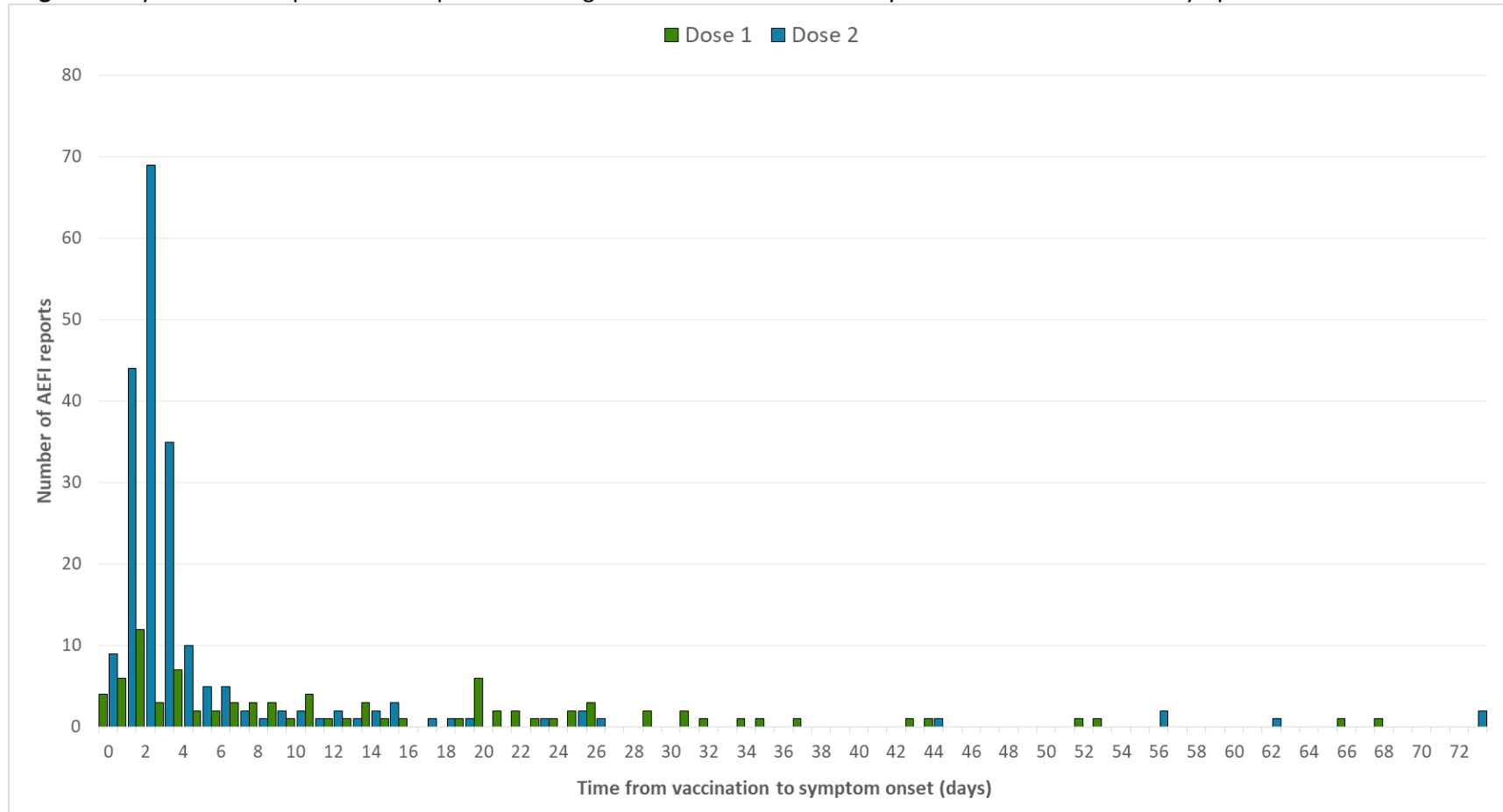
This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Number of COVID-19 mRNA vaccine doses administered in Ontario by dose number and vaccine product and overview of vaccine program changes



NACI: National Advisory Committee on Immunization; ESD: Enhanced Surveillance Directive; PM: Product Monograph

eFigure 2. Myocarditis and pericarditis reports following COVID-19 mRNA vaccines by dose number and time to symptom onset^a



^a2 reports with unknown time to onset were excluded from this figure

eTable 1. Clinical diagnosis and severity of myocarditis and pericarditis

	Myocarditis (n=105)	Pericarditis (n=85)	Myopericarditis^a (n=107)	Total (N=297)
Age group (years)				
12-17	28 (26.7%)	8 (9.4%)	19 (17.8%)	55 (18.5%)
18-24	30 (28.6%)	16 (18.8%)	50 (46.7%)	96 (32.3%)
25-39	30 (28.6%)	12 (14.1%)	30 (28.0%)	72 (24.2%)
≥40	17 (16.2%)	49 (57.6%)	8 (7.5%)	74 (24.9%)
Healthcare utilization/outcome				
Emergency department	101 (96.2%)	83 (97.6%)	106 (99.1%)	290 (97.6%)
In-patient hospitalization	87 (82.9%)	33 (38.8%)	90 (84.1%)	210 (70.7%)
Intensive care unit admission	5 (4.8%)	5 (5.9%)	4 (3.7%)	14 (4.7%)
Death	0	0	0	0
BC level				
1	34 (32.4%)	5 (5.9%)	28 (26.2%)	67 (22.6%)
2	68 (64.8%)	73 (85.9%)	79 (73.8%)	220 (74.1%)
3	3 (2.9%)	7 (8.2%)	0 (0.0%)	10 (3.4%)

^aMyopericarditis reports were assessed against Brighton Collaboration (BC) case definitions for myocarditis and pericarditis. The highest level of certainty was assigned to the report (e.g., if a report met level 1 for myocarditis and level 3 for pericarditis, it was assigned as level 1).

eTable 2. Crude rate^a of reported myocarditis meeting BC level 1 and 2 only per million doses administered and 95% CI by vaccine product, dose number, age, and sex: series initiated on or after June 1, 2021

BNT162b2						
	All		Female		Male	
Age group (years)	Dose 1	Dose 2	Dose 1	Dose 2	Dose 1	Dose 2
12-17	21.5 (10.7 - 38.4)	49.7 (30.8 - 76.0)	8.1 (1.0 - 29.1)	9.7 (1.2 - 35.1)	34.2 (15.6 - 64.9)	88.1 (53.0 - 137.5)
18-24	10.7 (2.2 - 31.3)	19.0 (3.9 - 55.5)	7.9 (0.2 - 44.1)	NR	13.1 (1.6 - 47.3)	35.5 (7.3 - 103.7)
25-39	9.3 (3.0 - 21.7)	12.8 (3.5 - 32.9)	NR	13.1 (1.6 - 47.5)	17.9 (5.8 - 41.8)	12.6 (1.5 - 45.4)
≥40	NR	NR	NR	NR	NR	NR
Total	10.2 (6.1 - 15.9)	23.2 (15.4 - 33.5)	3.4 (0.7 - 9.8)	6.8 (1.9 - 17.4)	16.6 (9.5 - 27.0)	38.8 (24.9 - 57.8)
mRNA-1273						
	All		Female		Male	
Age group (years)	Dose 1	Dose 2	Dose 1	Dose 2	Dose 1	Dose 2
12-17^b	NA	NA	NA	NA	NA	NA
18-24	NR	195.5 (117.7 - 305.3)	NR	69.1 (14.2 - 201.9)	NR	299.5 (171.2 - 486.4)
25-39	16.2 (3.3 - 47.3)	48.9 (23.5 - 90.0)	NR	21.5 (2.6 - 77.7)	28.8 (5.9 - 84.3)	72.1 (31.1 - 142.0)
≥40	10.0 (1.2 - 36.1)	NR	NR	NR	18.3 (2.2 - 66.2)	NR
Total	10.4 (3.4 - 24.4)	58.4 (39.1 - 83.9)	NR	22.0 (7.1 - 51.4)	18.7 (6.1 - 43.7)	89.4 (57.3 - 133.0)

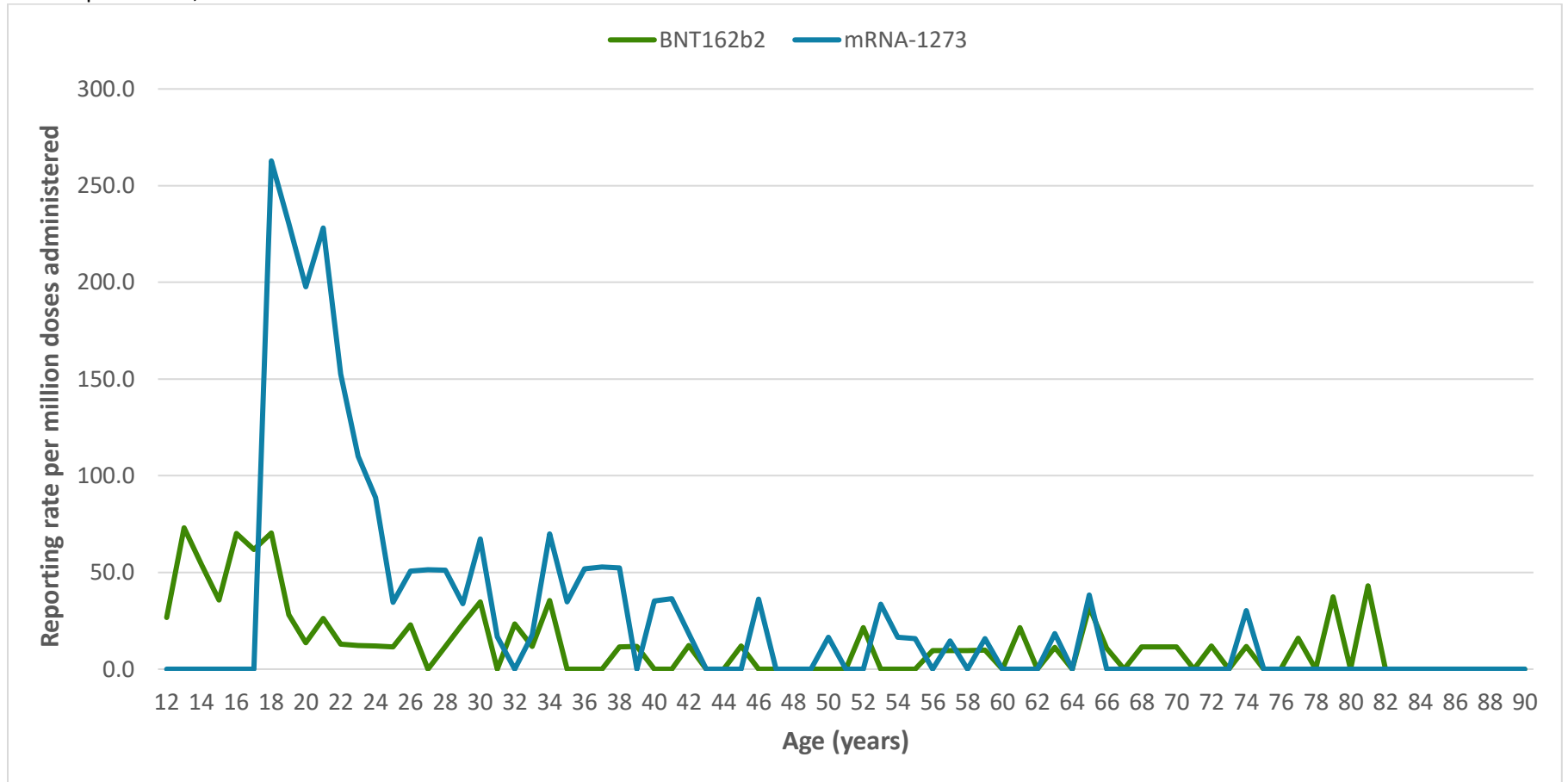
^aEstimates were not provided for strata with 0 reported events. ^bEstimates for mRNA-1273 were not provided for individuals aged 12-17 because this product was not used for this age group in Ontario. NA, not applicable; NR, not reported.

eTable 3. Crude rate of reported myocarditis and pericarditis per million doses administered and 95% CI by vaccine product, dose number, age, and sex: series initiated on or after December 14, 2020

BNT162b2						
	All		Female		Male	
Age group (years)	Dose 1	Dose 2	Dose 1	Dose 2	Dose 1	Dose 2
12-17	24.7 (14.9 - 38.6)	53.6 (37.5 - 74.2)	15.9 (5.8 - 34.6)	12.0 (3.3 - 30.8)	33.4 (17.8 - 57.0)	94.5 (64.6 - 133.4)
18-24	18.8 (10.5 - 31.1)	24.3 (13.0 - 41.6)	7.5 (1.5 - 21.8)	7.2 (0.9 - 25.9)	30.6 (15.8 - 53.5)	43.4 (21.7 - 77.6)
25-39	8.2 (4.6 - 13.4)	13.2 (7.7 - 21.2)	5.3 (1.7 - 12.3)	11.7 (5.0 - 23.0)	11.3 (5.4 - 20.7)	15.0 (6.9 - 28.5)
≥40	4.2 (2.5 - 6.5)	6.4 (4.2 - 9.5)	2.0 (0.7 - 4.7)	4.7 (2.3 - 8.7)	6.8 (3.7 - 11.3)	8.5 (4.8 - 14.1)
Total	8.5 (6.6 - 10.8)	14.3 (11.5 - 17.5)	4.5 (2.7 - 7.1)	7.0 (4.5 - 10.5)	13.1 (9.7 - 17.3)	22.7 (17.6 - 28.8)
mRNA-1273						
	All		Female		Male	
Age group (years)	Dose 1	Dose 2	Dose 1	Dose 2	Dose 1	Dose 2
12-17^b	NA	NA	NA	NA	NA	NA
18-24	16.2 (4.4 - 41.4)	177.8 (136.9 - 227.1)	17.4 (2.1 - 63.0)	45.7 (19.7 - 90.0)	15.2 (1.8 - 54.8)	305.2 (230.6 - 396.4)
25-39	10.5 (3.9 - 22.9)	39.1 (27.1 - 54.6)	7.5 (0.9 - 27.1)	12.1 (3.9 - 28.2)	13.3 (3.6 - 33.9)	63.9 (42.8 - 91.8)
≥40	10.1 (5.2 - 17.7)	8.3 (4.9 - 13.2)	8.2 (2.7 - 19.1)	3.7 (1.0 - 9.4)	12.3 (4.9 - 25.3)	13.2 (7.2 - 22.1)
Total	11.0 (6.9 - 16.6)	34.2 (28.3 - 41)	9.1 (4.1 - 17.2)	10.1 (5.9 - 16.2)	12.9 (6.9 - 22.1)	58.2 (47.3 - 70.9)

^aEstimates were not provided for strata with 0 reported events. ^bEstimates for mRNA-1273 were not provided for individuals aged 12-17 because this product was not used for this age group in Ontario. NA, not applicable; NR, not reported.

eFigure 3. Rate of reported myocarditis and pericarditis per million doses administered following dose 2 of mRNA vaccine for all sexes in Ontario as of September 4, 2021



eTable 4. Rate^a of reported myocarditis and pericarditis per million doses administered and 95% CI by dose 2 product and interdose interval, for individuals receiving dose 2 on or after June 1, 2021

BNT162b2 – Dose 2							
	Females	Males	12-17 years ^c	18-24 years	25-39 years	≥40 years	OVERALL
Product schedule*^b							
BNT162b2- BNT162b2	5.9 (3.5 - 9.5)	25.0 (19.3 - 32.0)	53.8 (37.7 - 74.5)	26.9 (14.3 - 45.9)	13.4 (7.5 - 22.1)	5.4 (3.1 - 8.6)	14.9 (11.9 - 18.6)
mRNA-1273 – BNT162b2	NR	14.6 (0.4 - 81.2)	NA	NR	NR	12.5 (0.3 - 69.7)	7.6 (0.2 - 42.3)
Interval (days)							
≤30	25.8 (8.4 - 60.3)	79.3 (44.4 - 130.8)	101.9 (55.7 - 170.9)	45.3 (5.5 - 163.7)	42.5 (11.6 - 108.7)	NR	52.1 (31.8 - 80.5)
31-55	4.1 (1.1 - 10.6)	28.2 (18.6 - 41.0)	37.7 (21.6 - 61.3)	34.7 (15.9 - 66)	8.7 (2.8 - 20.3)	1.5 (0.0 - 8.3)	16.1 (10.9 - 22.8)
≥56	4.5 (2.0 - 9.0)	15.6 (9.9 - 23.4)	55.7 (20.4 - 121.2)	10.1 (1.2 - 36.5)	12.3 (4.5 - 26.7)	6.9 (4.0 - 11.1)	9.6 (6.5 - 13.6)
mRNA-1273 – Dose 2							
	Females	Males	12-17 years**	18-24 years	25-39 years	≥40 years	OVERALL
Product schedule							
mRNA-1273 - mRNA-1273	9.5 (3.8 - 19.6)	58.3 (42.4 - 78.3)	NA	162.0 (108.5 - 232.6)	30.1 (16.0 - 51.4)	10.2 (4.7 - 19.4)	34.2 (25.4 - 44.9)
BNT162b2 -mRNA- 1273	13.1 (6.0 - 25.0)	72.5 (53.8 - 95.6)	NA	203.9 (142.0 - 283.6)	52.0 (32.2 - 79.5)	3.8 (0.8 - 11.0)	42.9 (32.6 - 55.3)
Interval (days)							
≤30	36.2 (7.5 - 105.8)	125.7 (64.9 - 219.5)	NA	353.1 (182.4 - 616.8)	39.5 (8.1 - 115.4)	NR	83.9 (47.0 - 138.4)
31-55	9.4 (3.5 - 20.5)	96.0 (74.4 - 121.9)	NA	184.0 (133.7 - 247.0)	45.0 (29.1 - 66.4)	7.4 (2.0 - 19.0)	54.6 (42.8 - 68.7)
≥56	10.0 (4.0 - 20.6)	23.1 (12.9 - 38.0)	NA	103.2 (44.5 - 203.3)	29.4 (10.8 - 64)	7.5 (3.2 - 14.7)	16.2 (10.2 - 24.6)

^aEstimates were not provided for strata with 0 reported events. ^bThere were 5 reports following ChAdOx1-mRNA-1273 among 350,628 doses administered and 5 reports following ChAdOx1-BNT162b2 among 279,805 doses administered. These are excluded from Table 5. ^cEstimates for mRNA-1273 were not provided for individuals aged 12-17 because this product was not used for this age group in Ontario. NA, not applicable; NR, not reported.

eTable 5. Rates^a of reported myocarditis and pericarditis per million doses administered and 95% CI among males aged 18-24 years by vaccine product and interdose interval with dose 2 on or after June 1, 2021

Vaccine schedule	Reports (N)	Doses administered (N)	Reported rate (95% CI) per million doses
People with two doses			
Homologous schedule			
BNT162b2-BNT162b2	11	235,819	46.6 (23.3 – 83.5)
Interval ≤30 days	2	21,160	94.5 (11.4 – 341.4)
Interval 31-55 days	8	124,235	64.4 (27.8 – 126.9)
Interval ≥56 days	1	90,424	11.1 (0.3 – 61.6)
mRNA-1273-mRNA-1273	27	93,616	288.4 (190.1 – 419.6)
Interval ≤30 days	4	10,623	376.5 (102.6 – 964.1)
Interval 31-55 days	20	60,352	331.4 (202.4 – 511.8)
Interval ≥56 days	3	22,641	132.5 (27.3 – 387.2)
Heterologous schedule			
mRNA-1273-BNT162b2	0	8,853	NR
Interval ≤30 days	0	1,058	NR
Interval 31-55 days	0	5,402	NR
Interval ≥56 days	0	2,393	NR
BNT162b2-mRNA-1273	29	85,893	337.6 (226.1 - 484.9)
Interval ≤30 days	6	7,720	777.2 (285.2 - 1691.6)
Interval 31-55 days	20	62,717	318.9 (194.8 - 492.5)
Interval ≥56 days	3	15,456	194.1 (40.0 - 567.2)

^a Estimates were not provided for strata with 0 reported events. NR, not reported.