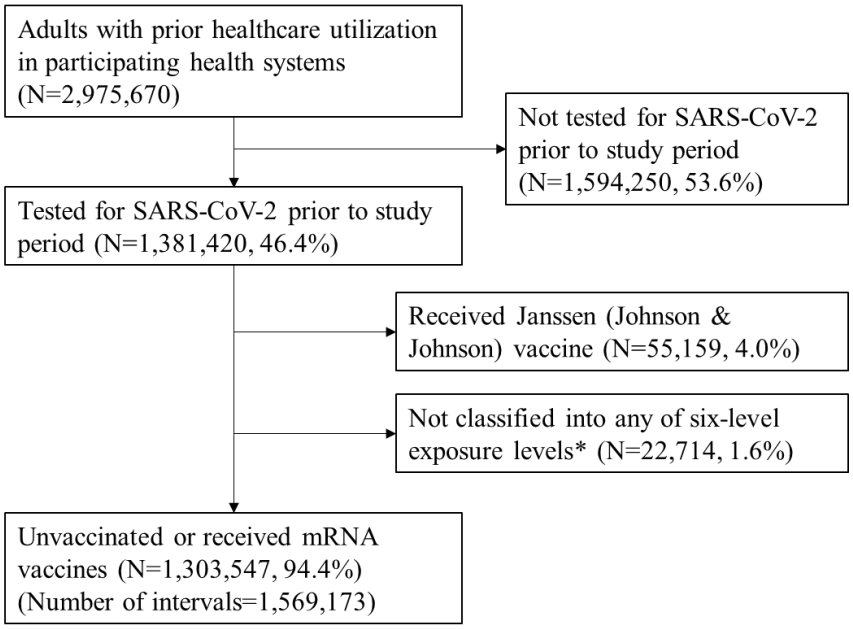
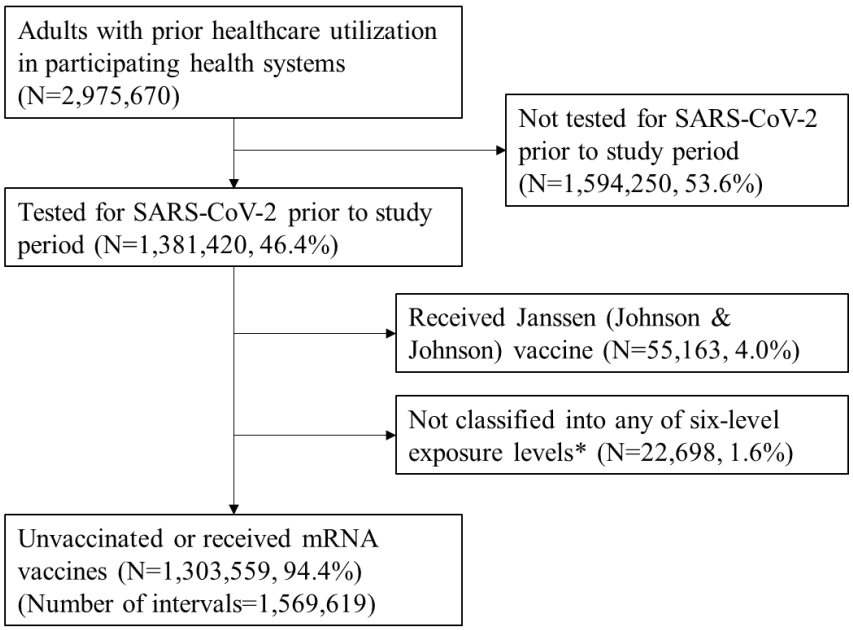
Figure S1. Flow chart of inclusion and exclusion criteria for adults aged ≥18 years followed until a (A) COVID-19-associated emergency department/urgent care (ED/UC) encounter or (B) COVID-19-associated hospitalization during Delta predominance

(A)



* See Table S1 for definition of 6-level exposure variable

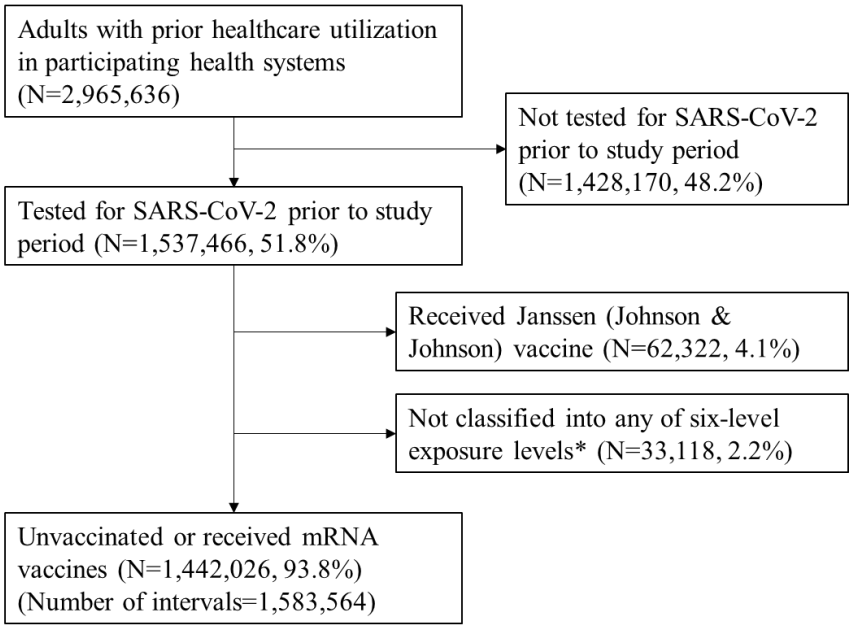
(B)



* See Table S1 for definition of 6-level exposure variable

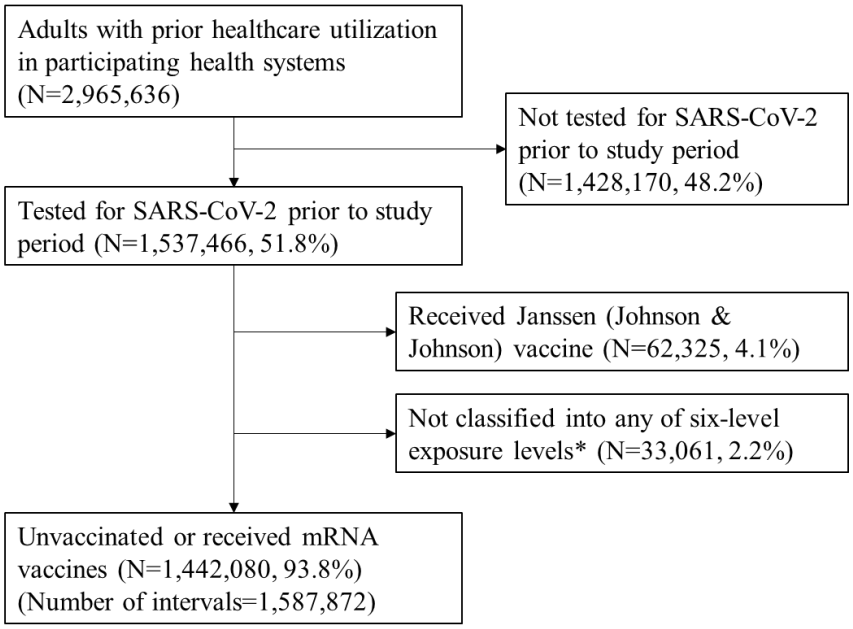
Figure S2. Flow chart of inclusion and exclusion criteria for adults aged ≥18 years followed until a (A) COVID-19-associated emergency department/urgent care (ED/UC) encounter or (B) COVID-19-associated hospitalization during Omicron predominance

(A)



* See Table S1 for definition of 6-level exposure variable

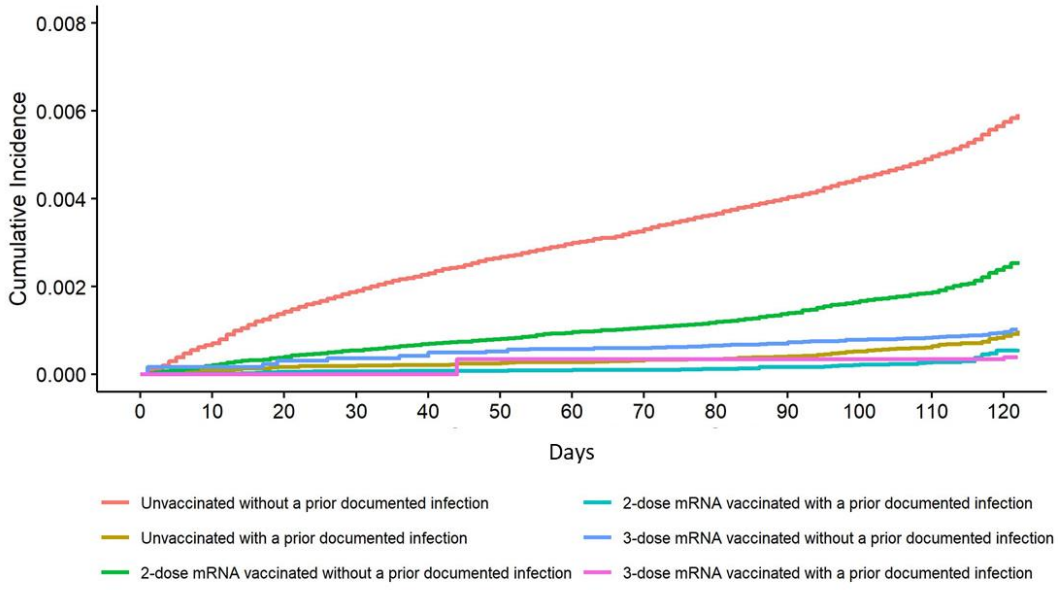
(B)



* See Table S1 for definition of 6-level exposure variable

Figure S3. Cumulative incidence of laboratory-confirmed COVID-19–associated emergency department/urgent care encounters among adults aged ≥18 years during (A) Delta predominance and (B) Omicron predominance

(A)



(B)

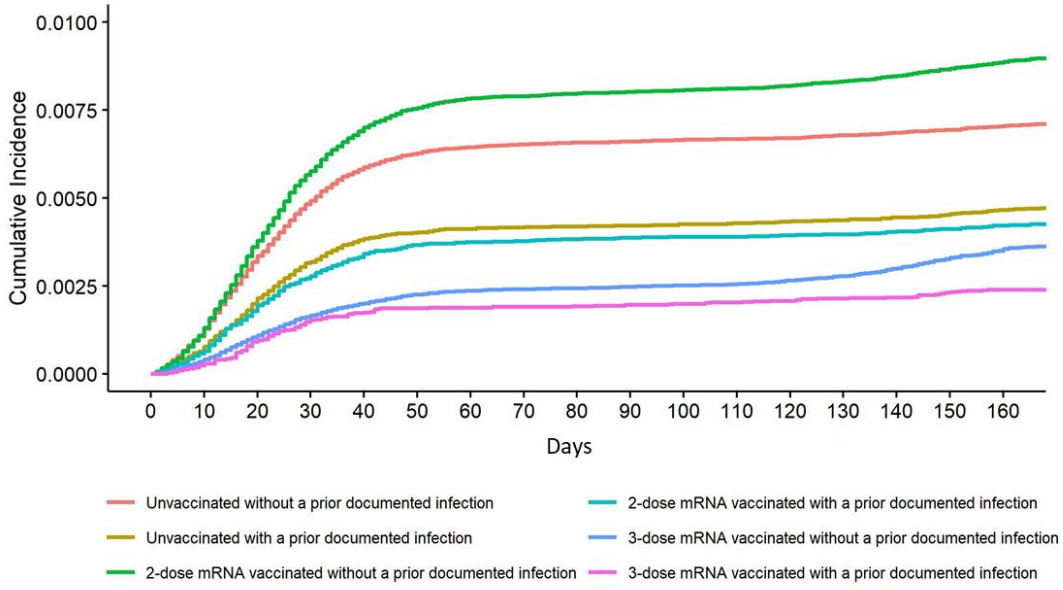
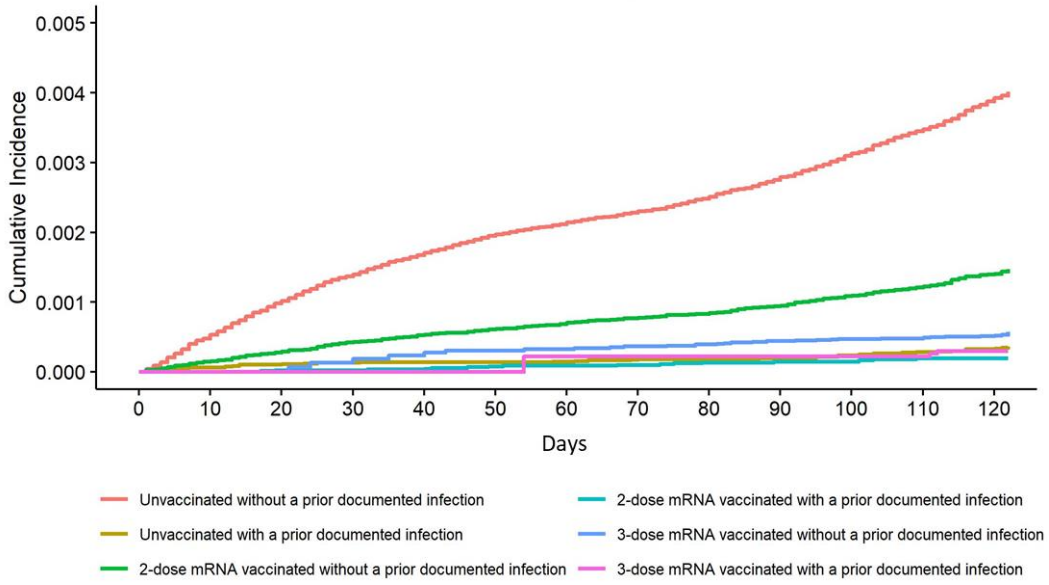


Figure S4. Cumulative incidence of laboratory-confirmed COVID-19–associated hospitalizations among adults aged ≥18 years during (A) Delta predominance and (B) Omicron predominance

(A)



(B)

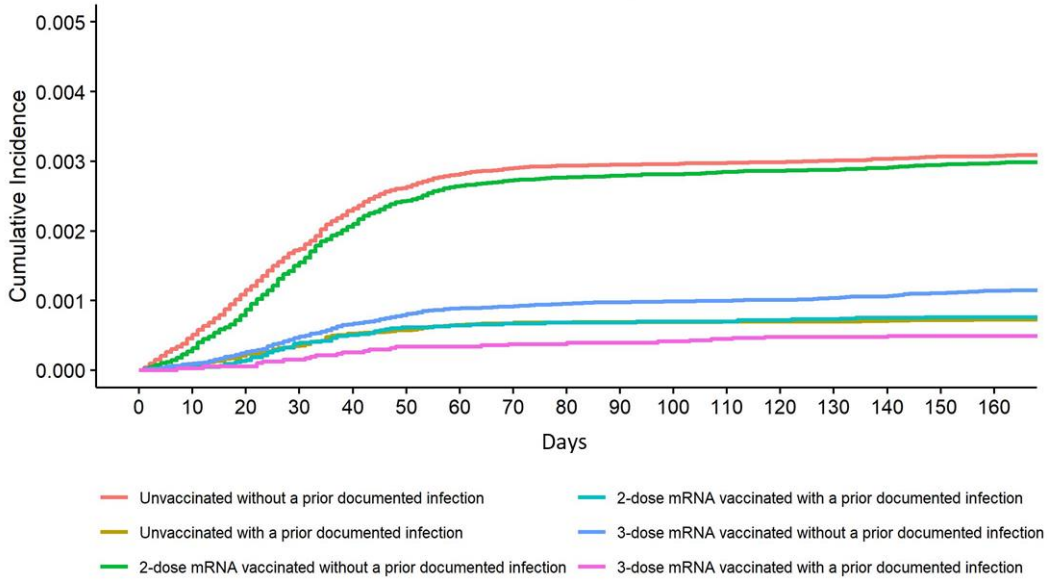


Figure S5. Weekly rates of SARS-CoV-2 testing (per 1,000 person-days) by COVID-19 vaccination status during periods of Delta and Omicron predominance

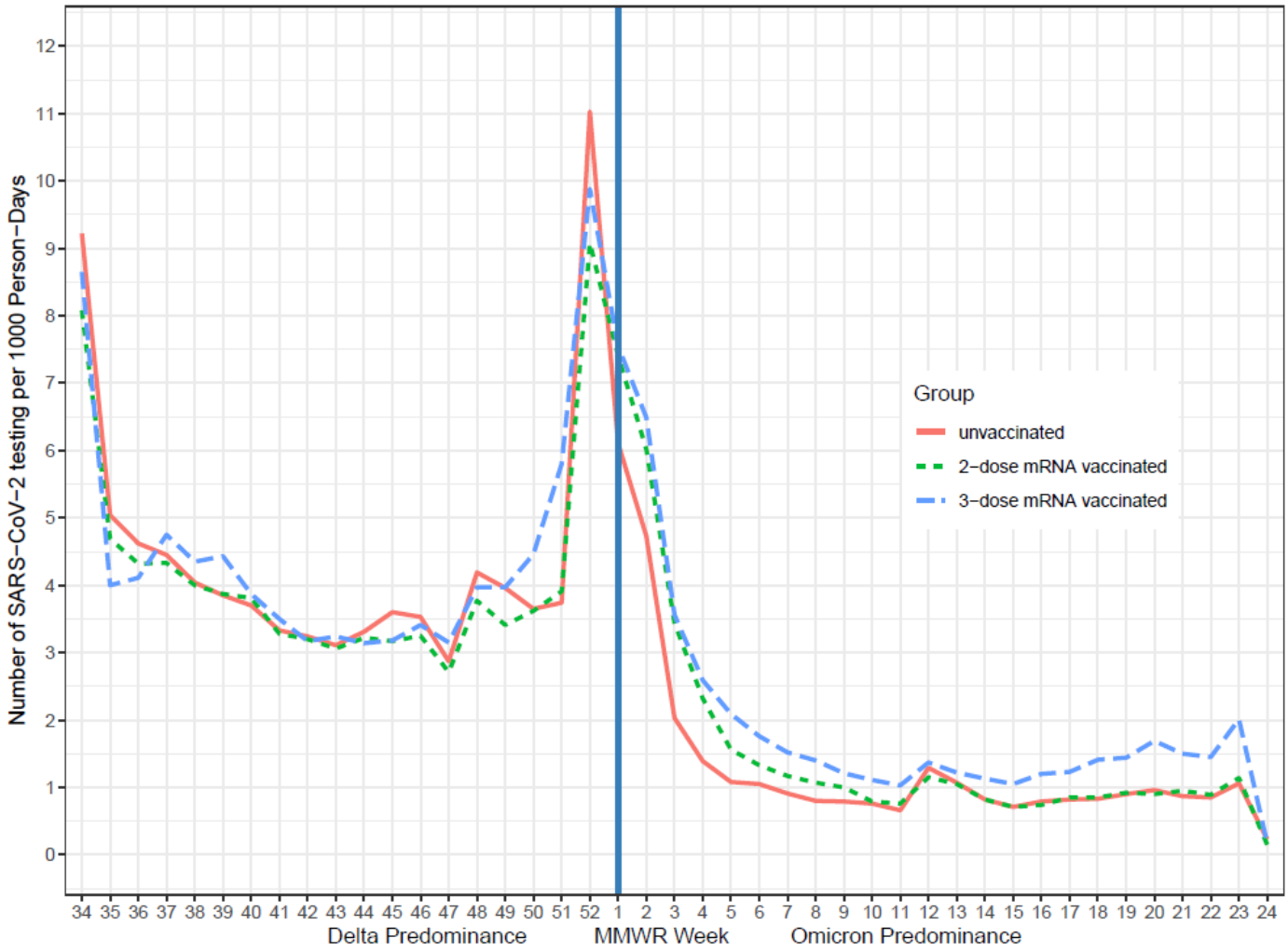


Table S1. Definition of exposure levels using for main and secondary analyses

Analysis	Levels of exposure variable
Main analysis	Unvaccinated without documented prior infection Unvaccinated with documented prior infection 2-dose mRNA vaccinated without documented prior infection 2-dose mRNA vaccinated with documented prior infection 3-dose mRNA vaccinated without documented prior infection 3-dose mRNA vaccinated with documented prior infection
Secondary analysis accounting for timing since most recent immunizing event	Unvaccinated without documented prior infection Unvaccinated with documented prior infection, <150 days since prior infection Unvaccinated with documented prior infection, ≥150 days since prior infection 2-dose mRNA vaccinated without documented prior infection, <150 days since 2nd dose 2-dose mRNA vaccinated without documented prior infection, ≥150 days since 2nd dose 2-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event 2-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event 3-dose mRNA vaccinated without documented prior infection, <150 days since 3rd dose 3-dose mRNA vaccinated without documented prior infection, ≥150 days since 3rd dose 3-dose mRNA vaccinated with prior infection, <150 days since last immunizing event 3-dose mRNA vaccinated with prior infection, ≥150 days since last immunizing event
Secondary analysis accounting for	Unvaccinated without documented infection Unvaccinated with documented infection 2-dose mRNA vaccinated without documented infection

ordering of immunizing event	Documented infection followed by 2 doses of mRNA vaccine 2-dose mRNA vaccinated followed by documented infection 3-dose mRNA vaccinated without documented infection Documented infection followed by 3 doses of mRNA vaccine 3-dose mRNA vaccinated followed by documented infection
Secondary analysis excluding immunocompromised patients	Unvaccinated without documented prior infection Unvaccinated with documented prior infection 2-dose mRNA vaccinated without documented prior infection 2-dose mRNA vaccinated with documented prior infection 3-dose mRNA vaccinated without documented prior infection 3-dose mRNA vaccinated with documented prior infection

Table S2. Full listing of estimates of unadjusted and adjusted hazard ratios and protection conferred from prior SARS-CoV-2 infection and/or COVID-19 mRNA vaccination against laboratory-confirmed COVID-19–associated Emergency Department or Urgent Care encounters, separately during Delta predominance and Omicron predominance

	Delta predominance											
					Unadjusted hazard ratio			Adjusted hazard ratio (aHR)			Protection ((1-aHR) x 100%)	
	Contributing adults	Total person-days	Median person-days (IQR)	Number of COVID-19-associated ED/UC encounters	%	95% CI		%	95% CI		%	95% CI
Allowing for both time-varying infection and vaccination												
Unvaccinated without documented prior infection	501,671	55,887,313	120 (112-122)	2652	REF			REF			REF	
Unvaccinated with documented prior infection	140,706	13,915,758	112 (107-122)	108	0.16	0.13	0.19	0.15	0.13	0.19	85	81 - 87
2-dose mRNA vaccinated without documented prior infection	565,034	53,846,891	112 (77-120)	996	0.40	0.37	0.43	0.28	0.26	0.30	72	70 - 74
2-dose mRNA vaccinated with documented prior infection	108,954	10,451,611	112 (80-120)	38	0.08	0.06	0.11	0.06	0.04	0.08	94	92 - 96
3-dose mRNA vaccinated without documented prior infection	222,589	9,609,910	40 (19-63)	70	0.14	0.11	0.18	0.09	0.07	0.11	91	89 - 93
3-dose mRNA vaccinated with documented prior infection	30,219	1,062,517	30 (13-50)	2	0.04	0.01	0.13	0.02	0.01	0.09	98	91 - 99
Accounting for timing since most recent immunizing event												
Unvaccinated without documented prior infection	501,671	55,887,313	120 (112-122)	2652	REF			REF			REF	
Unvaccinated with documented prior infection, <150 days since prior infection	40,012	1,468,179	37 (24-52)	20	0.26	0.17	0.41	0.24	0.16	0.37	76	63 - 84
Unvaccinated with documented prior infection, ≥150 days since prior infection	115,590	12,447,579	120 (112-122)	88	0.15	0.12	0.18	0.14	0.12	0.18	86	82 - 88
2-dose mRNA vaccinated without documented prior infection, <150 days since 2nd dose	330,966	14,008,674	35 (17-60)	191	0.27	0.24	0.32	0.18	0.16	0.21	82	79 - 84
2-dose mRNA vaccinated without documented prior infection, ≥150 days since 2nd dose	511,410	39,838,217	79 (55-107)	805	0.45	0.41	0.48	0.32	0.30	0.35	68	65 - 70
2-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	82,391	3,948,253	42 (23-69)	18	0.10	0.06	0.15	0.06	0.04	0.10	94	90 - 96
2-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	84,458	6,503,358	79 (55-103)	20	0.07	0.05	0.11	0.05	0.03	0.08	95	92 - 97
3-dose mRNA vaccinated without documented prior infection, <150 days since 3rd	221,920	9,445,799	39 (19-62)	64	0.13	0.10	0.17	0.08	0.07	0.11	92	89 - 93
3-dose mRNA vaccinated without documented prior infection, ≥150 days since 3rd	2,400	164,111	70 (42-97)	6	0.82	0.37	1.84	0.78	0.35	1.74	22	-74 - 65
3-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	30,133	1,034,407	30 (13-49)	2	0.04	0.01	0.13	0.02	0.01	0.09	98	91 - 99
3-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	426	28,110	66 (38.25-91)	0	0.02	0.02	0.03	0.01	0.01	0.01	NC	NC - NC

Accounting for ordering of immunizing event[2]												
Unvaccinated without documented infection	501,671	55,887,313	120 (112-122)	2652	REF			REF			REF	
Unvaccinated with documented infection	140,706	13,915,758	112 (107-122)	108	0.16	(0.13	- 0.19)	0.15	(0.13	- 0.19)	85	(81 - 87)
2-dose mRNA vaccinated without documented infection	565,034	53,846,891	112 (77-120)	996	0.40	(0.37	- 0.43)	0.28	(0.26	- 0.30)	72	(70 - 74)
Documented infection followed by 2 doses of mRNA vaccine	99,393	10,080,486	112 (91-121)	34	0.08	(0.06	- 0.11)	0.05	(0.04	- 0.07)	95	(93 - 96)
2-dose mRNA vaccinated followed by documented infection	9,561	371,125	33 (18-50)	4	0.21	(0.08	- 0.56)	0.16	(0.06	- 0.42)	84	(58 - 94)
3-dose mRNA vaccinated without documented infection	222,589	9,609,910	40 (19-63)	70	0.14	(0.11	- 0.18)	0.09	(0.07	- 0.12)	91	(88 - 93)
Documented infection followed by 3 doses of mRNA vaccine	30,134	1,059,815	30 (13-50)	2	0.04	(0.01	- 0.13)	0.02	(0.01	- 0.09)	98	(91 - 99)
3-dose mRNA vaccinated followed by documented infection	85	2,702	25 (14-40)	0	0.02	(0.02	- 0.03)	0	(0	- 0)	NC	(NC - NC)
Excluding immunocompromised patients												
Unvaccinated without documented prior infection	454,763	50,683,773	120 (112-122)	2303	REF			REF			REF	
Unvaccinated with documented prior infection	130,285	12,880,605	112 (108-122)	97	0.16	(0.13	- 0.20)	0.16	(0.13	- 0.19)	84	(81 - 87)
2-dose mRNA vaccinated without documented prior infection	493,013	47,538,718	112 (79-120)	793	0.38	(0.35	- 0.41)	0.26	(0.24	- 0.29)	74	(71 - 76)
2-dose mRNA vaccinated with documented prior infection	97,715	9,447,966	112 (82-120)	31	0.08	(0.05	- 0.11)	0.05	(0.04	- 0.08)	95	(92 - 96)
3-dose mRNA vaccinated without documented prior infection	186,288	7,644,716	38 (18-59)	47	0.12	(0.09	- 0.16)	0.08	(0.06	- 0.11)	92	(89 - 94)
3-dose mRNA vaccinated with documented prior infection	25,860	872,705	29 (13-48)	1	0.03	(0.01	- 0.11)	0.02	(0.00	- 0.09)	98	(91 - 100)

	Omicron predominance											
					Unadjusted hazard ratio			Adjusted hazard ratio (aHR)			Protection ((1-aHR) x 100%)	
	Contributing adults	Total person-days	Median person-days (IQR)	Number of COVID-19-associated ED/UC encounters	%	(95% CI	)	%	(95% CI	)	%	(95% CI)
Allowing for both time-varying infection and vaccination												
Unvaccinated without documented prior infection	502,816	80,404,869	169 (169-171)	3459	REF			REF			REF	
Unvaccinated with documented prior infection	185,573	27,534,302	169 (162-171)	703	0.66	(0.61	- 0.71)	0.63	(0.59	- 0.69)	37	(31 - 41)
2-dose mRNA vaccinated without documented prior infection	370,855	48,601,528	169 (92-171)	2799	1.26	(1.20	- 1.32)	0.82	(0.78	- 0.86)	18	(14 - 22)
2-dose mRNA vaccinated with documented prior infection	111,858	13,620,814	162 (63-169)	323	0.59	(0.53	- 0.66)	0.38	(0.34	- 0.42)	62	(58 - 66)
3-dose mRNA vaccinated without documented prior infection	342,929	51,486,337	164 (146-169)	1078	0.51	(0.48	- 0.55)	0.34	(0.31	- 0.36)	66	(64 - 69)
3-dose mRNA vaccinated with documented prior infection	69,533	9,137,786	157 (99-169)	110	0.36	(0.30	- 0.43)	0.24	(0.20	- 0.29)	76	(71 - 80)
Accounting for timing since most recent immunizing event												
Unvaccinated without documented prior infection	502,816	80,404,869	169 (169-171)	3459	REF			REF			REF	
Unvaccinated with documented prior infection, <150 days since prior infection	74,945	3,461,871	59 (33-60)	94	0.54	(0.44	- 0.66)	0.48	(0.39	- 0.59)	52	(41 - 61)
Unvaccinated with documented prior infection, ≥150 days since prior infection	176,995	24,072,431	169 (123-169)	609	0.68	(0.63	- 0.75)	0.67	(0.62	- 0.73)	33	(27 - 38)
2-dose mRNA vaccinated without documented prior infection, <150 days since 2nd dose	61,358	3,346,578	45 (25-76)	465	1.64	(1.49	- 1.81)	0.79	(0.72	- 0.88)	21	(12 - 28)
2-dose mRNA vaccinated without documented prior infection, ≥150 days since 2nd dose	363,484	45,254,950	169 (60-171)	2334	1.20	(1.14	- 1.27)	0.82	(0.78	- 0.86)	18	(14 - 22)
2-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	56,102	2,965,288	58 (38-60)	95	0.65	(0.53	- 0.79)	0.34	(0.27	- 0.41)	66	(59 - 73)
2-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	97,216	10,655,526	139 (35-169)	228	0.58	(0.50	- 0.66)	0.40	(0.35	- 0.46)	60	(54 - 65)
3-dose mRNA vaccinated without documented prior infection, <150 days since 3rd dose	341,287	36,028,923	113 (85-135)	805	0.42	(0.39	- 0.45)	0.27	(0.25	- 0.30)	73	(70 - 75)
3-dose mRNA vaccinated without documented prior infection, ≥150 days since 3rd dose	288,564	15,457,414	49 (28-74)	273	1.58	(1.38	- 1.80)	1.07	(0.94	- 1.22)	-7	(-22 - 6)
3-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	69,247	7,052,815	112 (65-137)	92	0.32	(0.26	- 0.39)	0.22	(0.18	- 0.27)	78	(73 - 82)
3-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	49,160	2,084,971	36 (17-61)	18	0.75	(0.47	- 1.20)	0.53	(0.33	- 0.85)	47	(15 - 67)

Accounting for ordering of immunizing event[2]															
Unvaccinated without documented infection	502,816	80,404,869	169	(169-171)	3459	REF				REF				REF			
Unvaccinated with documented infection	185,573	27,534,302	169	(162-171)	703	0.66	(	0.61	- 0.71)	0.63	(	0.59	- 0.69)	37	(	31	- 41)
2-dose mRNA vaccinated without documented infection	370,855	48,601,528	169	(92-171)	2799	1.26	(	1.20	- 1.32)	0.82	(	0.78	- 0.86)	18	(	14	- 22)
Documented infection followed by 2 doses of mRNA vaccine	73,824	10,282,017	169	(162-171)	291	0.64	(	0.57	- 0.72)	0.40	(	0.36	- 0.46)	60	(	54	- 64)
2-dose mRNA vaccinated followed by documented infection	38,034	3,338,797	70	(53-131)	32	0.37	(	0.26	- 0.52)	0.24	(	0.17	- 0.33)	76	(	67	- 83)
3-dose mRNA vaccinated without documented infection	342,929	51,486,337	164	(146-169)	1078	0.51	(	0.48	- 0.55)	0.34	(	0.31	- 0.36)	66	(	64	- 69)
Documented infection followed by 3 doses of mRNA vaccine	57,060	8,418,699	162	(139-169)	106	0.36	(	0.30	- 0.43)	0.24	(	0.2	- 0.3)	76	(	70	- 80)
3-dose mRNA vaccinated followed by documented infection	12,473	719,087	56	(44-68)	4	0.41	(	0.15	- 1.07)	0.22	(	0.08	- 0.58)	78	(	42	- 92)
Excluding immunocompromised patients															
Unvaccinated without documented prior infection	456,492	73,146,723	169	(169-171)	3054	REF				REF				REF			
Unvaccinated with documented prior infection	170,678	25,430,763	169	(162-171)	632	0.66	(	0.60	- 0.72)	0.64	(	0.59	- 0.7)	36	(	30	- 41)
2-dose mRNA vaccinated without documented prior infection	330,769	43,385,199	169	(96-171)	2396	1.24	(	1.18	- 1.31)	0.82	(	0.78	- 0.87)	18	(	13	- 22)
2-dose mRNA vaccinated with documented prior infection	101,052	12,351,220	163	(63-169)	281	0.58	(	0.52	- 0.66)	0.38	(	0.33	- 0.43)	62	(	57	- 67)
3-dose mRNA vaccinated without documented prior infection	292,956	44,118,341	164	(146-169)	820	0.47	(	0.44	- 0.51)	0.32	(	0.29	- 0.35)	68	(	65	- 71)
3-dose mRNA vaccinated with documented prior infection	60,673	7,984,425	157	(101-169)	82	0.31	(	0.25	- 0.38)	0.22	(	0.18	- 0.28)	78	(	72	- 82)

[1]If the last immunizing event was the prior infection, then days since prior infection were between 91-<150 days

[2]Persons who had an infection that occurred in between mRNA vaccine doses were excluded from this sensitivity analysis.

NC = not calculated because no events were reported within this exposure group.

Table S3. Full listing of estimates of unadjusted and adjusted hazard ratios and protection conferred from prior SARS-CoV-2 infection and/or COVID-19 mRNA vaccination against laboratory-confirmed COVID-19–associated hospitalizations, separately during Delta predominance and Omicron predominance

	Delta predominance						
					Unadjusted hazard ratio	Adjusted hazard ratio (aHR)	Protection ((1-aHR) x 100%)
	Contributing adults	Total person-days	Median person-days (IQR)	Number of COVID-19-associated hospitalizations	% (95% CI)	% (95% CI)	% (95% CI)
Allowing for both time-varying infection and vaccination							
Unvaccinated without documented prior infection	501,667	55,887,284	120 (112-122)	1820	REF	REF	REF
Unvaccinated with documented prior infection	141,022	13,923,102	112 (104.25-122)	40	0.09 (0.06 - 0.12)	0.09 (0.07 - 0.13)	91 (87 - 93)
2-dose mRNA vaccinated without documented prior infection	565,034	53,846,896	112 (77-120)	619	0.35 (0.32 - 0.39)	0.27 (0.25 - 0.30)	73 (70 - 75)
2-dose mRNA vaccinated with documented prior infection	109,059	10,453,393	112 (80-120)	17	0.05 (0.03 - 0.08)	0.04 (0.03 - 0.07)	96 (93 - 97)
3-dose mRNA vaccinated without documented prior infection	222,589	9,609,911	40 (19-63)	36	0.12 (0.08 - 0.16)	0.07 (0.05 - 0.10)	93 (90 - 95)
3-dose mRNA vaccinated with documented prior infection	30,248	1,062,890	30 (13-50)	3	0.08 (0.03 - 0.26)	0.05 (0.02 - 0.15)	95 (85 - 98)
	1,569,619						
Accounting for timing since most recent immunizing event							
Unvaccinated without documented prior infection	501,667	55,887,284	120 (112-122)	1820	REF	REF	REF
Unvaccinated with documented prior infection, <150 days since prior infection	40,328	1,473,865	37 (24-51)	7	0.14 (0.07 - 0.30)	0.16 (0.08 - 0.34)	84 (66 - 92)
Unvaccinated with documented prior infection, ≥150 days since prior infection	115,598	12,449,237	120 (112-122)	33	0.08 (0.06 - 0.12)	0.08 (0.06 - 0.12)	92 (88 - 94)
2-dose mRNA vaccinated without documented prior infection, <150 days since 2nd dose	330,966	14,008,680	35 (17-60)	79	0.15 (0.12 - 0.19)	0.15 (0.12 - 0.19)	85 (81 - 88)
2-dose mRNA vaccinated without documented prior infection, ≥150 days since 2nd dose	511,410	39,838,216	79 (55-107)	540	0.44 (0.40 - 0.48)	0.31 (0.28 - 0.35)	69 (65 - 72)
2-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	82,496	3,950,119	42 (23-69)	6	0.04 (0.02 - 0.10)	0.04 (0.02 - 0.09)	96 (91 - 98)
2-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	84,461	6,503,274	79 (55-103)	11	0.06 (0.03 - 0.10)	0.04 (0.02 - 0.08)	96 (92 - 98)
3-dose mRNA vaccinated without documented prior infection, <150 days since 3rd dose	221,920	9,445,800	39 (19-62)	33	0.11 (0.08 - 0.16)	0.06 (0.05 - 0.09)	94 (91 - 95)
3-dose mRNA vaccinated without documented prior infection, ≥150 days since 3rd dose	2,400	164,111	70 (42-97)	3	0.60 (0.19 - 1.88)	0.34 (0.11 - 1.05)	66 (-5 - 89)
3-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	30,162	1,034,780	30 (13-49)	3	0.09 (0.03 - 0.27)	0.05 (0.02 - 0.15)	95 (85 - 98)
3-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	426	28,110	66 (38.25-91)	0	0.01 (0.01 - 0.01)	0.01 (0.01 - 0.01)	NC (NC - NC)

Accounting for ordering of immunizing event[2]												
Unvaccinated without documented infection	501,667	55,887,284	120 (112-122)	1820	REF			REF			REF	
Unvaccinated with documented infection	141,022	13,923,102	112 (104.25-122)	40	0.09	(0.06	- 0.12)	0.09	(0.07	- 0.13)	91	(87 - 93)
2-dose mRNA vaccinated without documented infection	565,034	53,846,896	112 (77-120)	619	0.35	(0.32	- 0.39)	0.27	(0.25	- 0.30)	73	(70 - 75)
Documented infection followed by 2 doses of mRNA vaccine	99,430	10,081,473	112 (91-121)	15	0.05	(0.03	- 0.08)	0.04	(0.03	- 0.07)	96	(93 - 97)
2-dose mRNA vaccinated followed by documented infection	9,629	371,920	32 (18-50)	2	0	(0	- 1)	0	(0	- 0)	90	(60 - 98)
3-dose mRNA vaccinated without documented infection	222,589	9,609,911	40 (19-63)	36	0.12	(0.08	- 0.16)	0.07	(0.05	- 0.10)	93	(90 - 95)
Documented infection followed by 3 doses of mRNA vaccine	30,160	1,060,160	30 (13-50)	3	0.08	(0.03	- 0.26)	0.05	(0.02	- 0.15)	95	(85 - 98)
3-dose mRNA vaccinated followed by documented infection	88	2,730	24.5 (12.75-36.25)	0	0	(0	- 0)	0	(0	- 0)	NC	(NC - NC)
Excluding immunocompromised patients												
Unvaccinated without documented prior infection	454,759	50,683,757	120 (112-122)	1378	REF			REF			REF	
Unvaccinated with documented prior infection	130,608	12,887,681	112 (104.75-122)	31	0.09	(0.06	- 0.13)	0.09	(0.06	- 0.13)	91	(87 - 94)
2-dose mRNA vaccinated without documented prior infection	493,013	47,538,732	112 (79-120)	367	0.29	(0.25	- 0.32)	0.22	(0.19	- 0.24)	78	(76 - 81)
2-dose mRNA vaccinated with documented prior infection	97,832	9,450,065	112 (82-120)	10	0.04	(0.02	- 0.07)	0.03	(0.02	- 0.06)	97	(94 - 98)
3-dose mRNA vaccinated without documented prior infection	186,288	7,644,717	38 (18-59)	11	0.05	(0.03	- 0.10)	0.03	(0.02	- 0.06)	97	(94 - 98)
3-dose mRNA vaccinated with documented prior infection	25,893	873,190	29 (13-48)	0	0	(0	- 0)	0	(0	- 0)	NC	(NC - NC)

	Omicron predominance											
					Unadjusted hazard ratio			Adjusted hazard ratio (aHR)			Protection ((1-aHR) x 100%)	
	Contributing adults	Total person-days	Median person-days (IQR)	Number of COVID-19-associated hospitalizations	%	(95% CI	)	%	(95% CI	)	%	(95% CI)
Allowing for both time-varying infection and vaccination												
Unvaccinated without documented prior infection	502,815	80,405,021	169 (169-171)	1496	REF			REF			REF	
Unvaccinated with documented prior infection	187,501	27,726,004	169 (161-171)	108	0.23	(0.19	- 0.28)	0.24	(0.20	- 0.29)	76	(71 - 80)
2-dose mRNA vaccinated without documented prior infection	370,855	48,601,591	169 (92-171)	913	0.96	(0.88	- 1.04)	0.61	(0.56	- 0.67)	39	(33 - 44)
2-dose mRNA vaccinated with documented prior infection	113,542	13,748,379	162 (62-169)	57	0.25	(0.19	- 0.32)	0.17	(0.13	- 0.23)	83	(77 - 87)
3-dose mRNA vaccinated without documented prior infection	342,929	51,486,384	164 (146-169)	347	0.37	(0.33	- 0.42)	0.23	(0.20	- 0.26)	77	(74 - 80)
3-dose mRNA vaccinated with documented prior infection	70,230	9,184,730	157 (96-169)	24	0.17	(0.12	- 0.26)	0.10	(0.07	- 0.16)	90	(84 - 93)
Accounting for timing since most recent immunizing event												
Unvaccinated without documented prior infection	502,815	80,405,021	169 (169-171)	1496	REF			REF			REF	
Unvaccinated with documented prior infection, <150 days since prior infection	76,875	3,569,372	59 (33-60)	11	0.16	(0.09	- 0.28)	0.14	(0.08	- 0.26)	86	(74 - 92)
Unvaccinated with documented prior infection, ≥150 days since prior infection	178,027	24,156,632	169 (122-169)	97	0.25	(0.20	- 0.31)	0.26	(0.21	- 0.32)	74	(68 - 79)
2-dose mRNA vaccinated without documented prior infection, <150 days since 2nd dose	61,358	3,346,601	45 (25-76)	90	0.76	(0.61	- 0.93)	0.61	(0.49	- 0.76)	39	(24 - 51)
2-dose mRNA vaccinated without documented prior infection, ≥150 days since 2nd dose	363,483	45,254,990	169 (60-171)	823	0.99	(0.91	- 1.08)	0.61	(0.56	- 0.67)	39	(33 - 44)
2-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	57,786	3,056,693	58 (38-60)	13	0.21	(0.12	- 0.37)	0.15	(0.09	- 0.26)	85	(74 - 91)
2-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	97,930	10,691,686	138 (34-169)	44	0.26	(0.19	- 0.35)	0.18	(0.14	- 0.25)	82	(75 - 86)
3-dose mRNA vaccinated without documented prior infection, <150 days since 3rd dose	341,287	36,028,964	113 (85-135)	266	0.30	(0.27	- 0.35)	0.19	(0.16	- 0.22)	81	(78 - 84)
3-dose mRNA vaccinated without documented prior infection, ≥150 days since 3rd dose	288,564	15,457,420	49 (28-74)	81	1.63	(1.27	- 2.09)	0.69	(0.54	- 0.88)	31	(12 - 46)
3-dose mRNA vaccinated with documented prior infection, <150 days since last immunizing event[1]	69,944	7,094,541	111 (64-137)	20	0.15	(0.10	- 0.24)	0.09	(0.06	- 0.14)	91	(86 - 94)
3-dose mRNA vaccinated with documented prior infection, ≥150 days since last immunizing event[1]	49,376	2,090,189	36 (17-61)	4	0.66	(0.24	- 1.78)	0.28	(0.10	- 0.75)	72	(25 - 90)

Accounting for ordering of immunizing event[2]												
Unvaccinated without documented infection	502,815	80,405,021	169 (169-171)	1496	REF			REF			REF	
Unvaccinated with documented infection	187,501	27,726,004	169 (161-171)	108	0.23	(0.19	- 0.28)	0.24	(0.20	- 0.29)	76	(71 - 80)
2-dose mRNA vaccinated without documented infection	370,855	48,601,591	169 (92-171)	913	0.96	(0.88	- 1.04)	0.61	(0.56	- 0.67)	39	(33 - 44)
Documented infection followed by 2 doses of mRNA vaccine	73,864	10,316,221	169 (162-171)	42	0.21	(0.16	- 0.29)	0.16	(0.12	- 0.22)	84	(78 - 88)
2-dose mRNA vaccinated followed by documented infection	39,678	3,432,158	69 (53-125)	15	0.42	(0.25	- 0.70)	0.21	(0.13	- 0.35)	79	(65 - 87)
3-dose mRNA vaccinated without documented infection	342,929	51,486,384	164 (146-169)	347	0.37	(0.33	- 0.42)	0.23	(0.20	- 0.26)	77	(74 - 80)
Documented infection followed by 3 doses of mRNA vaccine	57,270	8,439,999	162 (139-169)	21	0.16	(0.10	- 0.24)	0.09	(0.06	- 0.14)	91	(86 - 94)
3-dose mRNA vaccinated followed by documented infection	12,960	744,731	56 (44-68)	3	1.11	(0.36	- 3.48)	0.48	(0.15	- 1.56)	52	(-56 - 85)
Excluding immunocompromised patients												
Unvaccinated without documented prior infection	456,491	73,146,895	169 (169-171)	1060	REF			REF			REF	
Unvaccinated with documented prior infection	172,579	25,612,929	169 (162-171)	78	0.23	(0.19	- 0.30)	0.24	(0.19	- 0.3)	76	(70 - 81)
2-dose mRNA vaccinated without documented prior infection	330,769	43,385,271	169 (96-171)	533	0.80	(0.72	- 0.89)	0.53	(0.47	- 0.59)	47	(41 - 53)
2-dose mRNA vaccinated with documented prior infection	102,661	12,471,561	162 (62-169)	29	0.18	(0.12	- 0.26)	0.13	(0.09	- 0.18)	87	(82 - 91)
3-dose mRNA vaccinated without documented prior infection	292,956	44,118,386	164 (146-169)	146	0.24	(0.20	- 0.28)	0.14	(0.12	- 0.17)	86	(83 - 88)
3-dose mRNA vaccinated with documented prior infection	61,312	8,026,663	156 (97-169)	13	0.14	(0.08	- 0.24)	0.08	(0.05	- 0.14)	92	(86 - 95)

[1]If the last immunizing event was the prior infection, then days since prior infection were between 91-<150 days

[2]Persons who had an infection that occurred in between mRNA vaccine doses were excluded from this sensitivity analysis.

NC = not calculated because no events were reported within this exposure group.