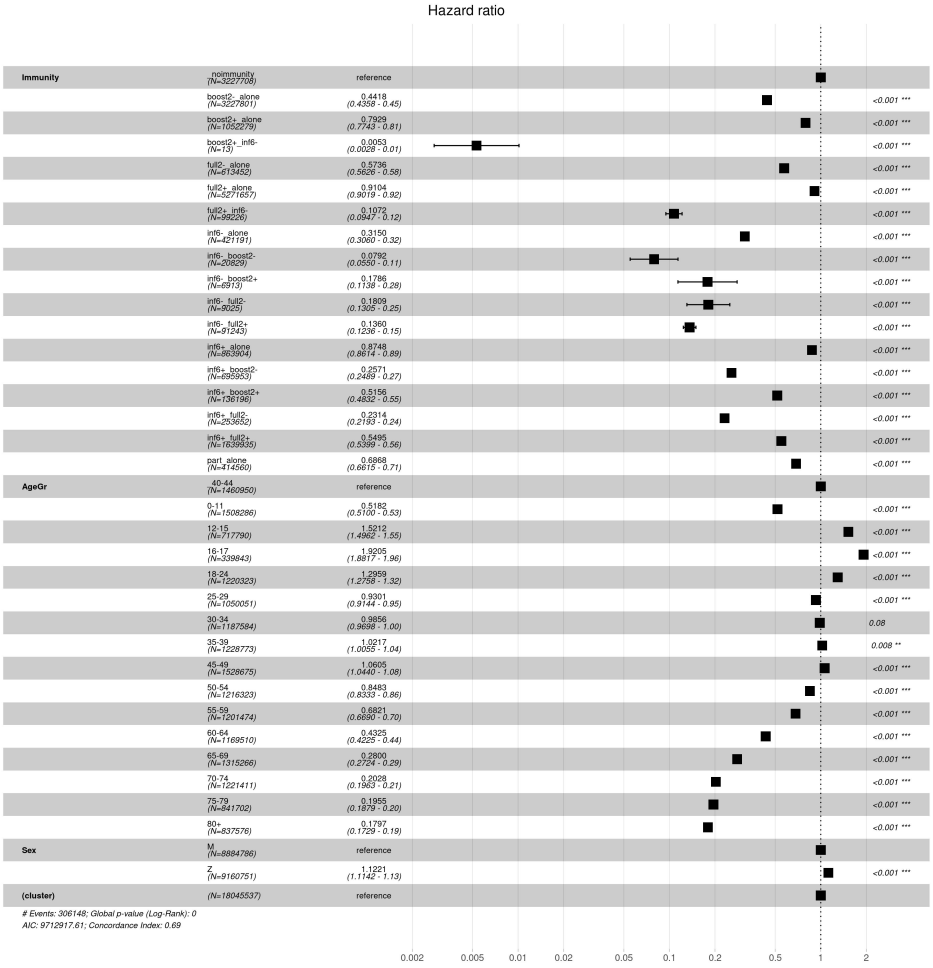
Protection provided by covid-19 vaccines and previous infection against the Omicron variant

Supplementary material 2 – Results of Statistical Estimation

February 26, 2022

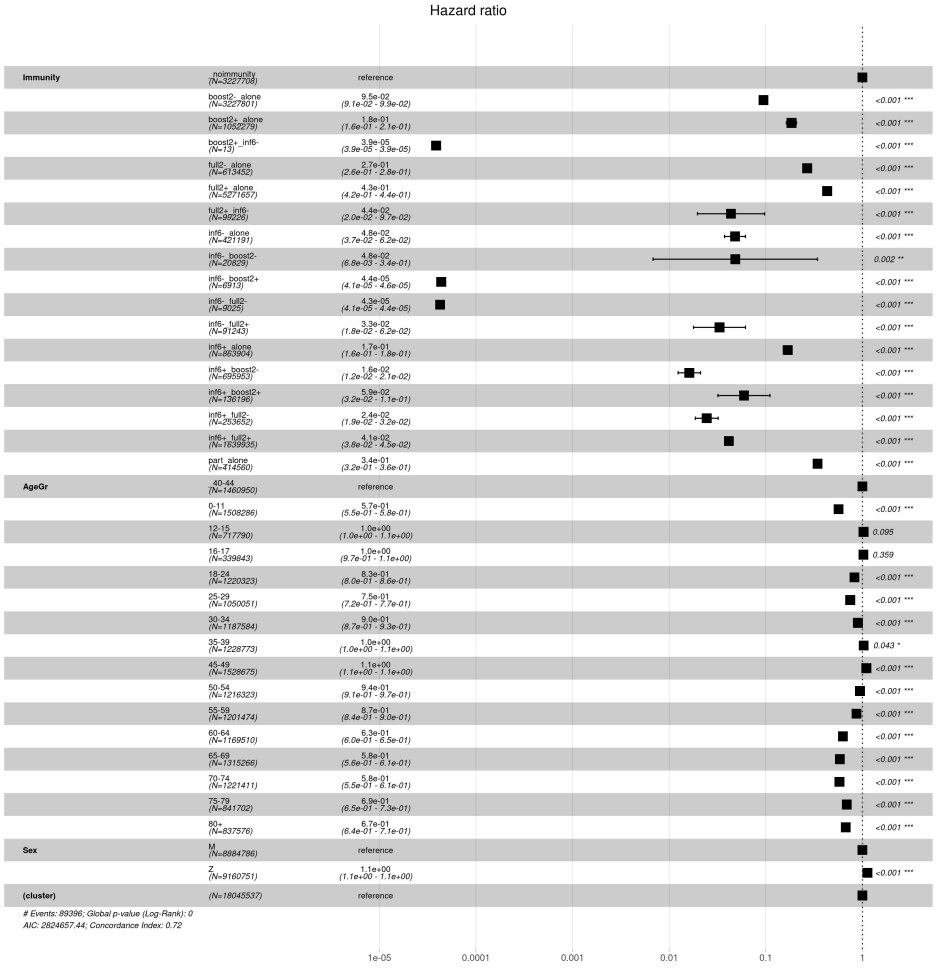
This material contains results of the analyses by Cox Regression (1–14) and Logistic Regression (15–19). The output information of the former include a forest plot of hazard ratios (the VE's and the protectouns can be computed by suptraction from one), the number of indivudiuals entering the study with the individual immunity statuses and the numbers suffering the outcome having indivdiual immunity statuses. The result of logictic regressions include forest plots of individual covariates and, in particular, the odds ratio betwen variants.

1 Infections – Omicron



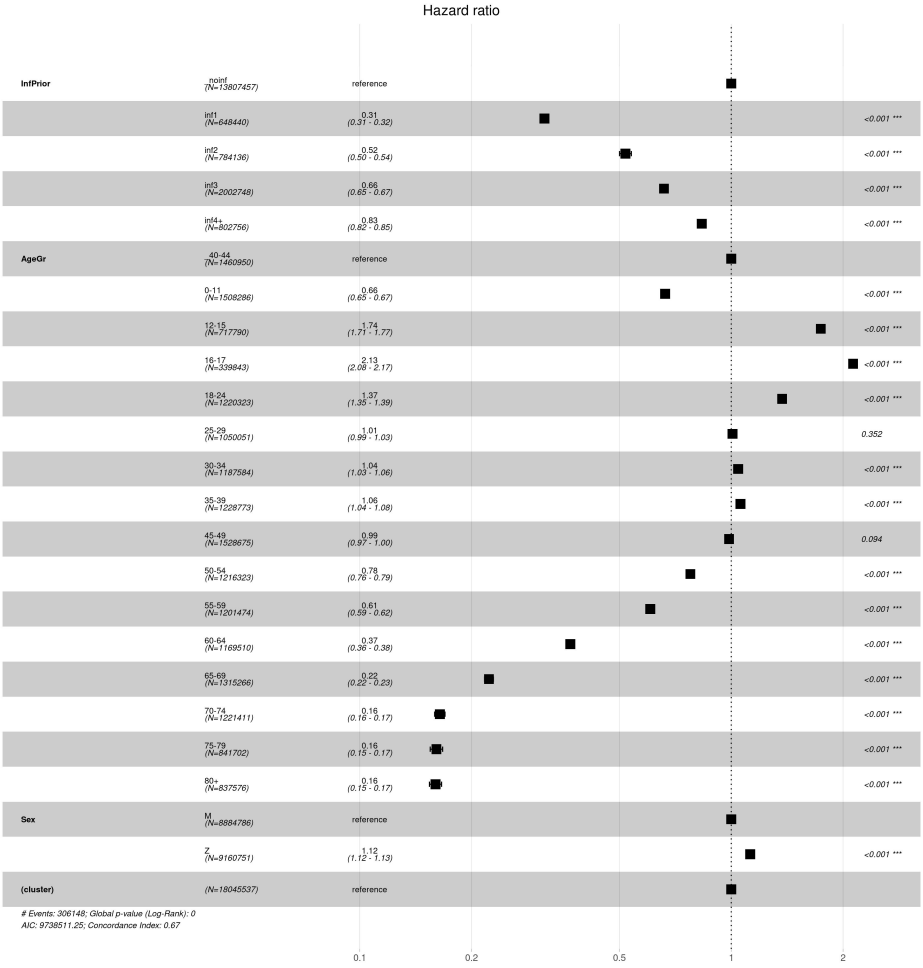
Immunity	entered	events
_noimmunity	799055	114191
boost2-_alone	783053	31773
boost2+_alone	5313	8814
full2-_alone	250234	11767
full2+_alone	4004420	91261
inf6-_alone	25504	4882
inf6+_alone	542432	19148
part_alone	173116	2822
inf6-_boost2-	187	29
inf6-_boost2+	4	19
inf6-_full2-	737	36
inf6-_full2+	5669	420
inf6+_boost2-	87565	3927
inf6+_boost2+	517	927
inf6+_full2-	86763	1363
inf6+_full2+	825962	14516
full2+_inf6-	802	253
boost2+_inf6-	0	0
other	0	0
rare	0	0

2 Infections – Delta



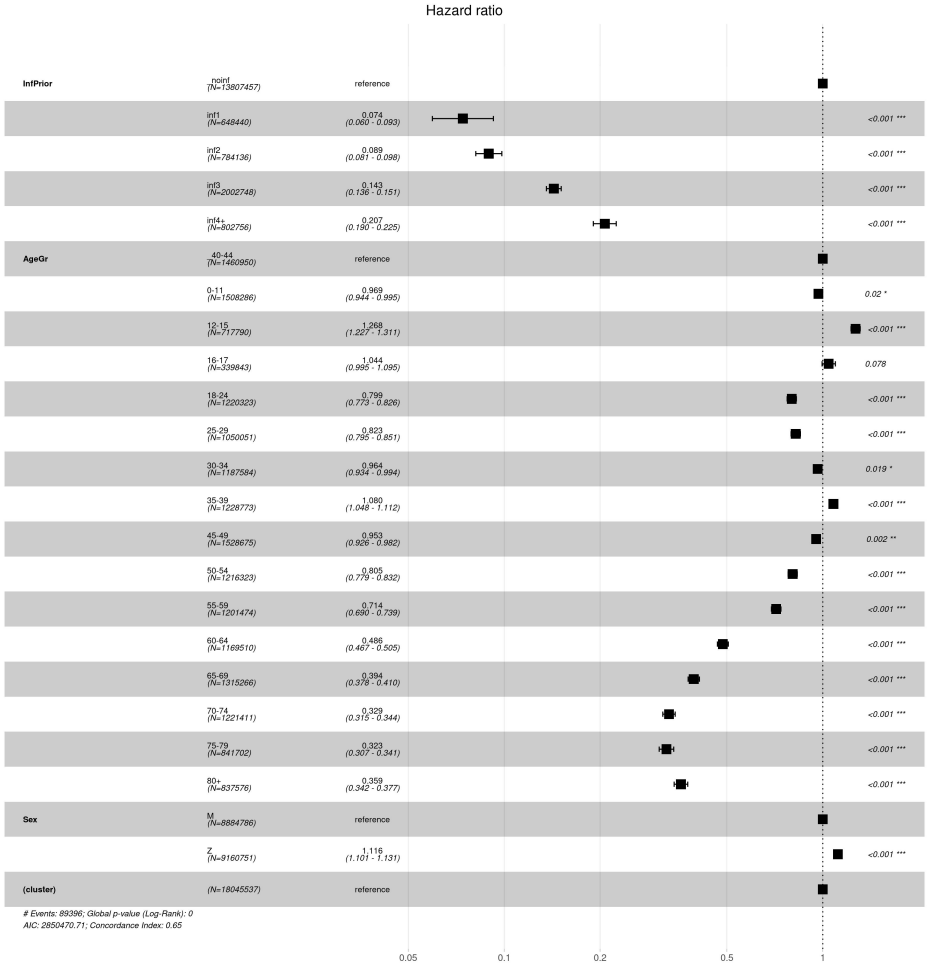
Immunity	entered	events
_noimmunity	799055	53531
boost2-_alone	783053	2211
boost2+_alone	5313	272
full2-_alone	250234	1770
full2+_alone	4004420	28067
inf6-_alone	25504	62
inf6+_alone	542432	1627
part_alone	173116	1098
inf6-_boost2-	187	1
inf6-_boost2+	4	0
inf6-_full2-	737	0
inf6-_full2+	5669	10
inf6+_boost2-	87565	54
inf6+_boost2+	517	10
inf6+_full2-	86763	52
inf6+_full2+	825962	625
full2+_inf6-	802	6
boost2+_inf6-	0	0
other	0	0
rare	0	0

3 Re-infections – Omicron



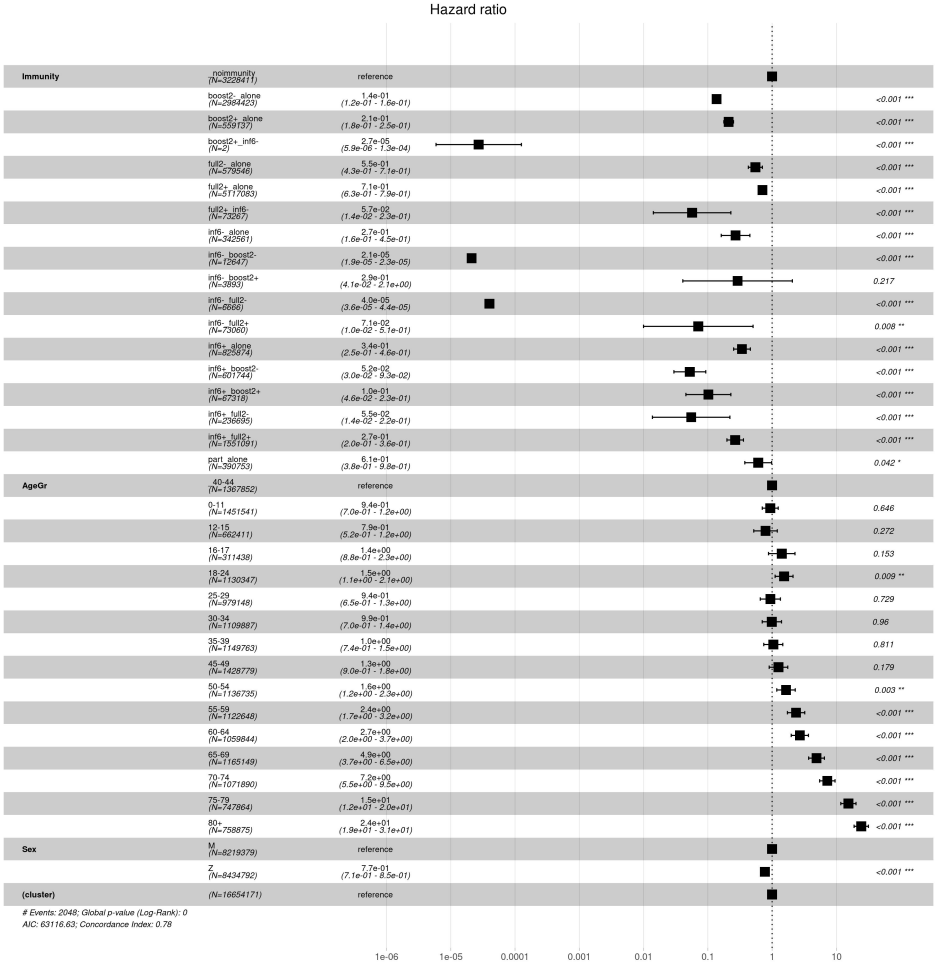
Immunity	entered	events
_noimmunity	799055	114191
boost2-_alone	783053	31773
boost2+_alone	5313	8814
full2-_alone	250234	11767
full2+_alone	4004420	91261
inf6-_alone	25504	4882
inf6+_alone	542432	19148
part_alone	173116	2822
inf6-_boost2-	187	29
inf6-_boost2+	4	19
inf6-_full2-	737	36
inf6-_full2+	5669	420
inf6+_boost2-	87565	3927
inf6+_boost2+	517	927
inf6+_full2-	86763	1363
inf6+_full2+	825962	14516
full2+_inf6-	802	253
boost2+_inf6-	0	0
other	0	0
rare	0	0

4 Re-infections – Delta



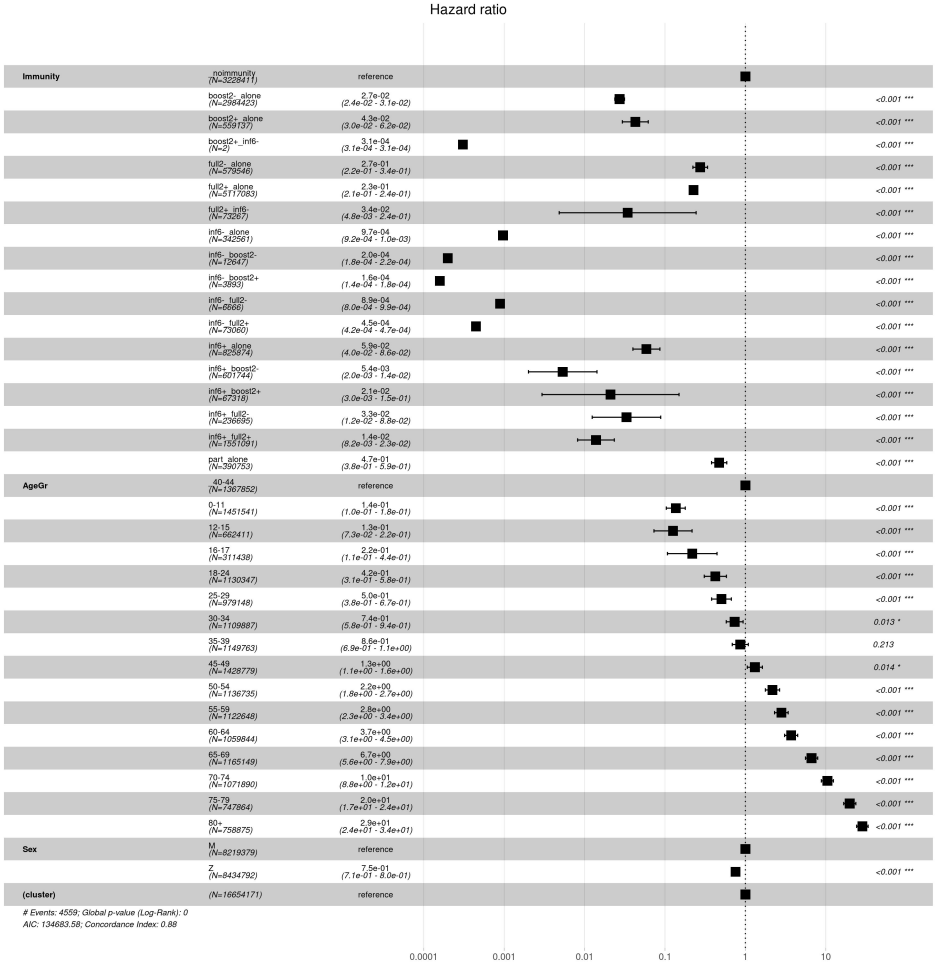
Immunity	entered	events
_noimmunity	799055	53531
boost2-_alone	783053	2211
boost2+_alone	5313	272
full2-_alone	250234	1770
full2+_alone	4004420	28067
inf6-_alone	25504	62
inf6+_alone	542432	1627
part_alone	173116	1098
inf6-_boost2-	187	1
inf6-_boost2+	4	0
inf6-_full2-	737	0
inf6-_full2+	5669	10
inf6+_boost2-	87565	54
inf6+_boost2+	517	10
inf6+_full2-	86763	52
inf6+_full2+	825962	625
full2+_inf6-	802	6
boost2+_inf6-	0	0
other	0	0
rare	0	0

5 Hospitalizations – Omicron



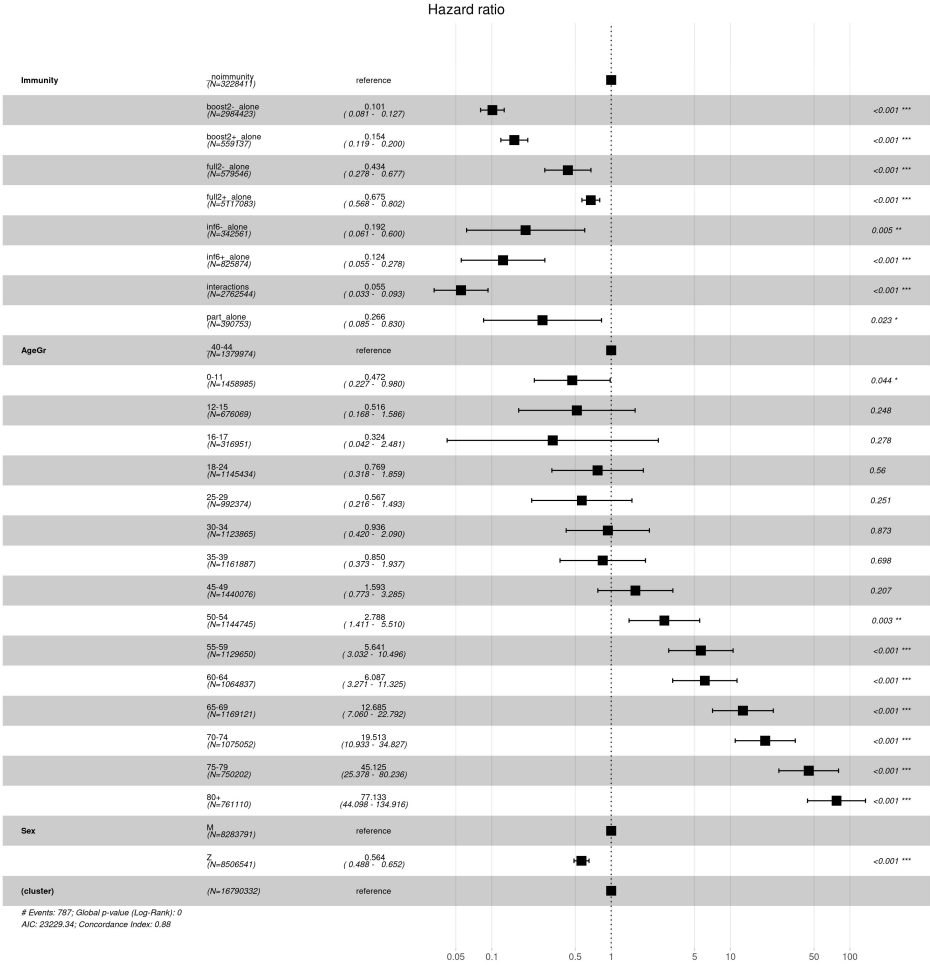
Immunity	entered	events
_noimmunity	799368	833
boost2-_alone	783071	255
boost2+_alone	5313	175
full2-_alone	250248	68
full2+_alone	4004620	569
inf6-_alone	25507	15
inf6+_alone	542247	45
part_alone	173127	17
inf6-_boost2-	189	0
inf6-_boost2+	4	1
inf6-_full2-	731	0
inf6-_full2+	5553	1
inf6+_boost2-	87520	12
inf6+_boost2+	517	6
inf6+_full2-	86745	2
inf6+_full2+	825807	47
full2+_inf6-	915	2
boost2+_inf6-	0	0
other	0	0
interactions	0	0
rare	0	0

6 Hospitalizations – Delta



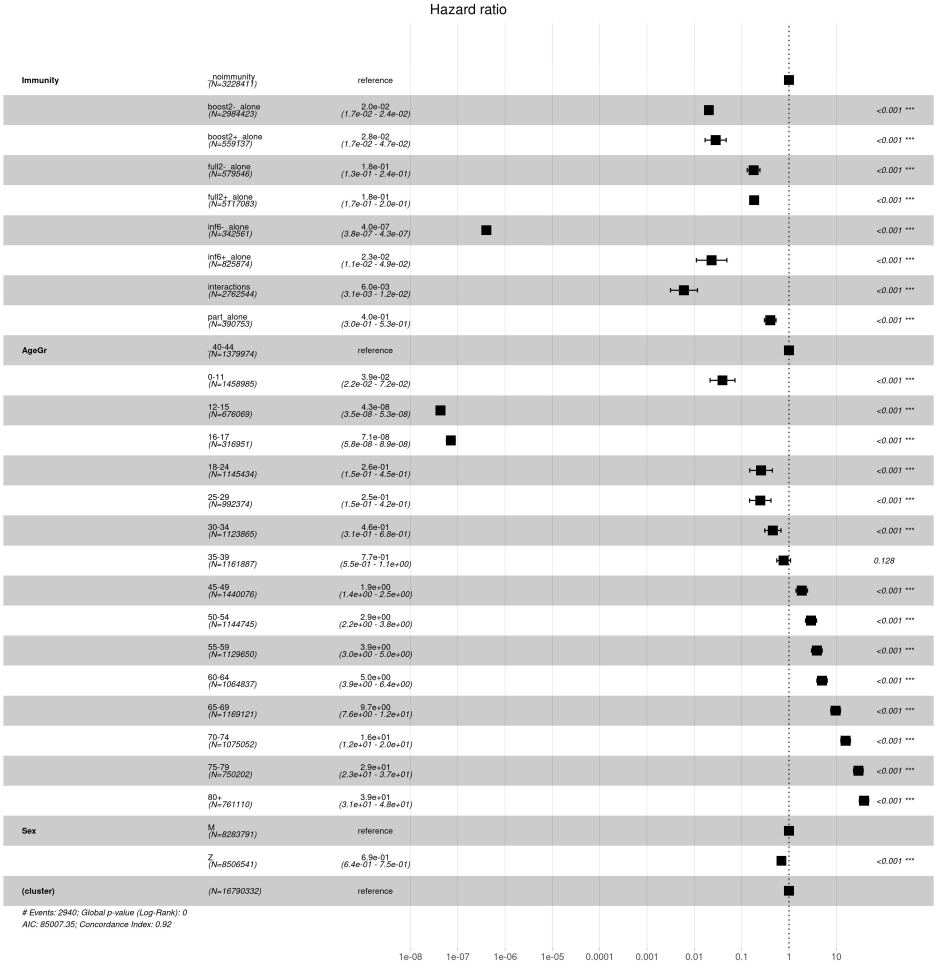
Immunity	entered	events
_noimmunity	799368	2805
boost2-_alone	783071	221
boost2+_alone	5313	29
full2-_alone	250248	91
full2+_alone	4004620	1280
inf6-_alone	25507	0
inf6+_alone	542247	26
part_alone	173127	83
inf6-_boost2-	189	0
inf6-_boost2+	4	0
inf6-_full2-	731	0
inf6-_full2+	5553	0
inf6+_boost2-	87520	4
inf6+_boost2+	517	1
inf6+_full2-	86745	4
inf6+_full2+	825807	14
full2+_inf6-	915	1
boost2+_inf6-	0	0
other	0	0
interactions	0	0
rare	0	0

7 Oxygen therapy – Omicron



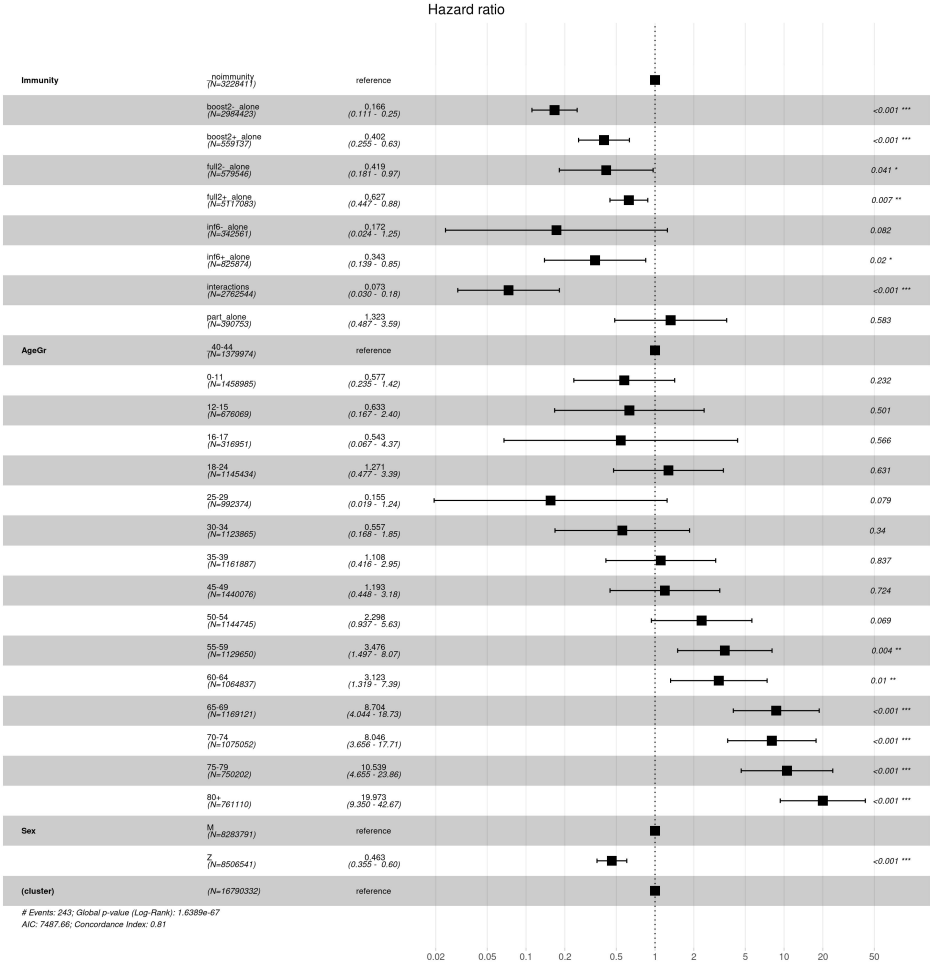
Immunity	entered	events
_noimmunity	799368	833
boost2-_alone	783071	255
boost2+_alone	5313	175
full2-_alone	250248	68
full2+_alone	4004620	569
inf6-_alone	25507	15
inf6+_alone	542247	45
part_alone	173127	17
inf6-_boost2-	0	0
inf6-_boost2+	0	0
inf6-_full2-	0	0
inf6-_full2+	0	0
inf6+_boost2-	0	0
inf6+_boost2+	0	0
inf6+_full2-	0	0
inf6+_full2+	0	0
full2+_inf6-	0	0
boost2+_inf6-	0	0
other	0	0
interactions	1060778	71
rare	0	0

8 Oxygen therapy – Delta



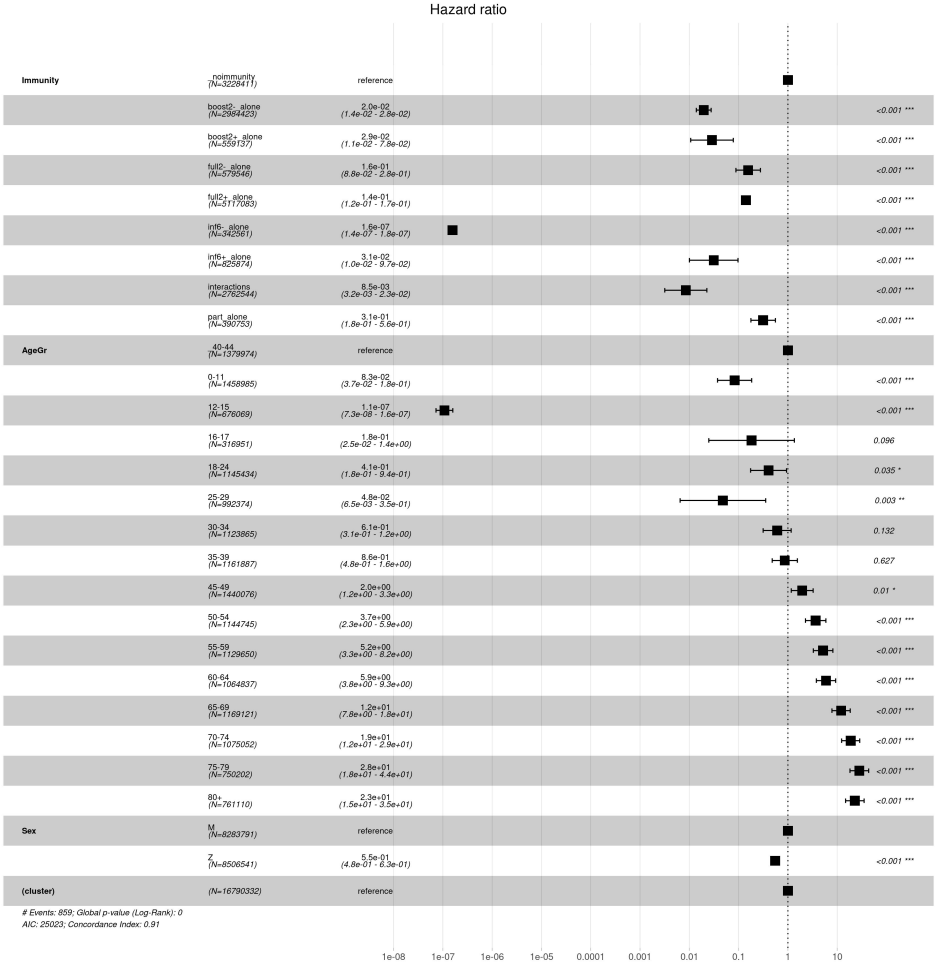
Immunity	entered	events
_noimmunity	799368	2805
boost2-_alone	783071	221
boost2+_alone	5313	29
full2-_alone	250248	91
full2+_alone	4004620	1280
inf6-_alone	25507	0
inf6+_alone	542247	26
part_alone	173127	83
inf6-_boost2-	0	0
inf6-_boost2+	0	0
inf6-_full2-	0	0
inf6-_full2+	0	0
inf6+_boost2-	0	0
inf6+_boost2+	0	0
inf6+_full2-	0	0
inf6+_full2+	0	0
full2+_inf6-	0	0
boost2+_inf6-	0	0
other	0	0
interactions	1060778	25
rare	0	0

9 ICU therapy – Omicron



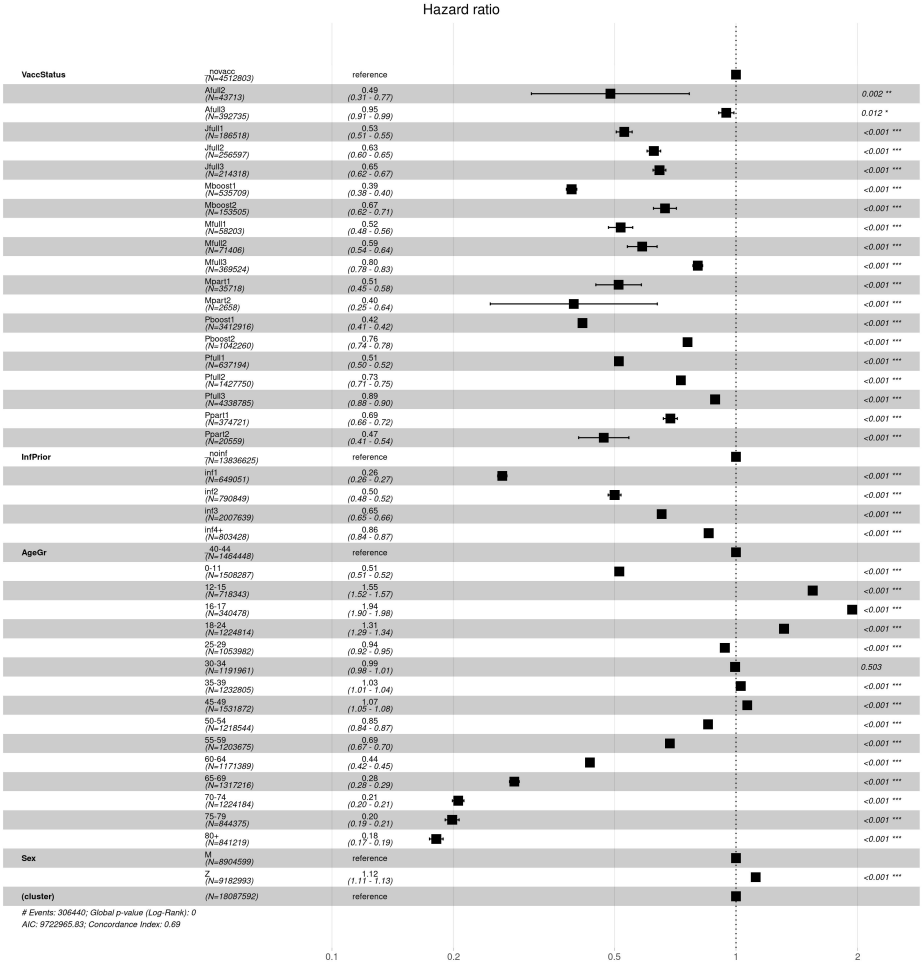
Immunity	entered	events
_noimmunity	799368	833
boost2-_alone	783071	255
boost2+_alone	5313	175
full2-_alone	250248	68
full2+_alone	4004620	569
inf6-_alone	25507	15
inf6+_alone	542247	45
part_alone	173127	17
inf6-_boost2-	0	0
inf6-_boost2+	0	0
inf6-_full2-	0	0
inf6-_full2+	0	0
inf6+_boost2-	0	0
inf6+_boost2+	0	0
inf6+_full2-	0	0
inf6+_full2+	0	0
full2+_inf6-	0	0
boost2+_inf6-	0	0
other	0	0
interactions	1060778	71
rare	0	0

10 ICU therapy – Delta



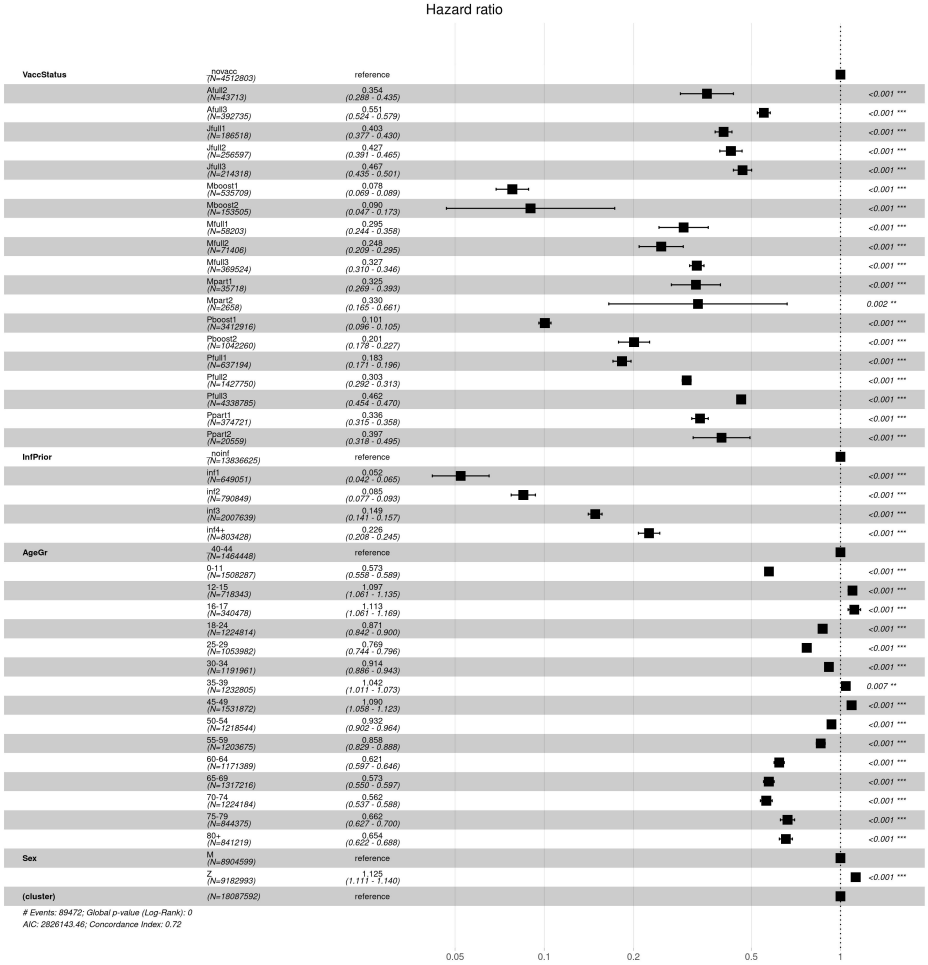
Immunity	entered	events
_noimmunity	799368	2805
boost2-_alone	783071	221
boost2+_alone	5313	29
full2-_alone	250248	91
full2+_alone	4004620	1280
inf6-_alone	25507	0
inf6+_alone	542247	26
part_alone	173127	83
inf6-_boost2-	0	0
inf6-_boost2+	0	0
inf6-_full2-	0	0
inf6-_full2+	0	0
inf6+_boost2-	0	0
inf6+_boost2+	0	0
inf6+_full2-	0	0
inf6+_full2+	0	0
full2+_inf6-	0	0
boost2+_inf6-	0	0
other	0	0
interactions	1060778	25
rare	0	0

11 Infections by Vaccines - Omicron



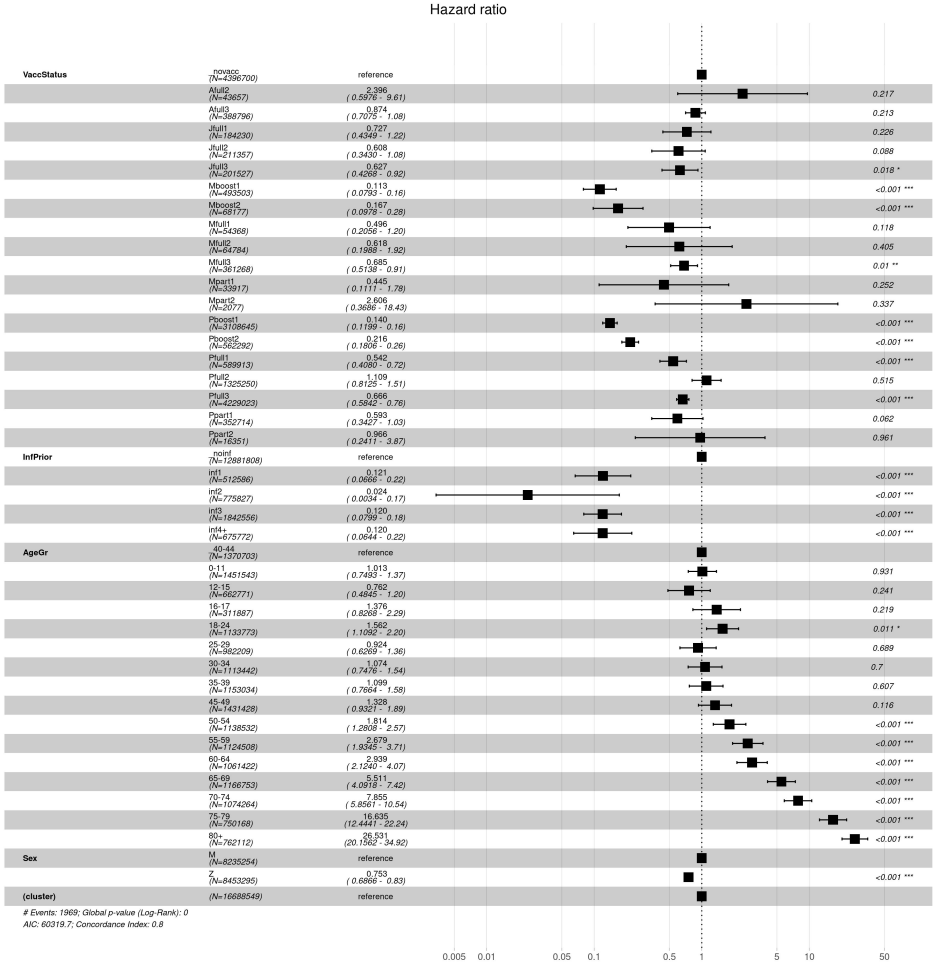
Immunity	entered	events
_noimmunity	799055	114191
boost2-_alone	783128	31776
boost2+_alone	5316	8816
full2-_alone	252497	11825
full2+_alone	4006108	91329
inf6-_alone	25504	4882
inf6+_alone	542432	19148
part_alone	168995	2721
inf6-_boost2-	187	29
inf6-_boost2+	4	19
inf6-_full2-	927	40
inf6-_full2+	5684	420
inf6+_boost2-	87700	3934
inf6+_boost2+	519	928
inf6+_full2-	87376	1374
inf6+_full2+	829279	14550
full2+_inf6-	802	253
boost2+_inf6-	0	0
other	0	0
rare	14273	205

12 Infections by Vaccines - Delta



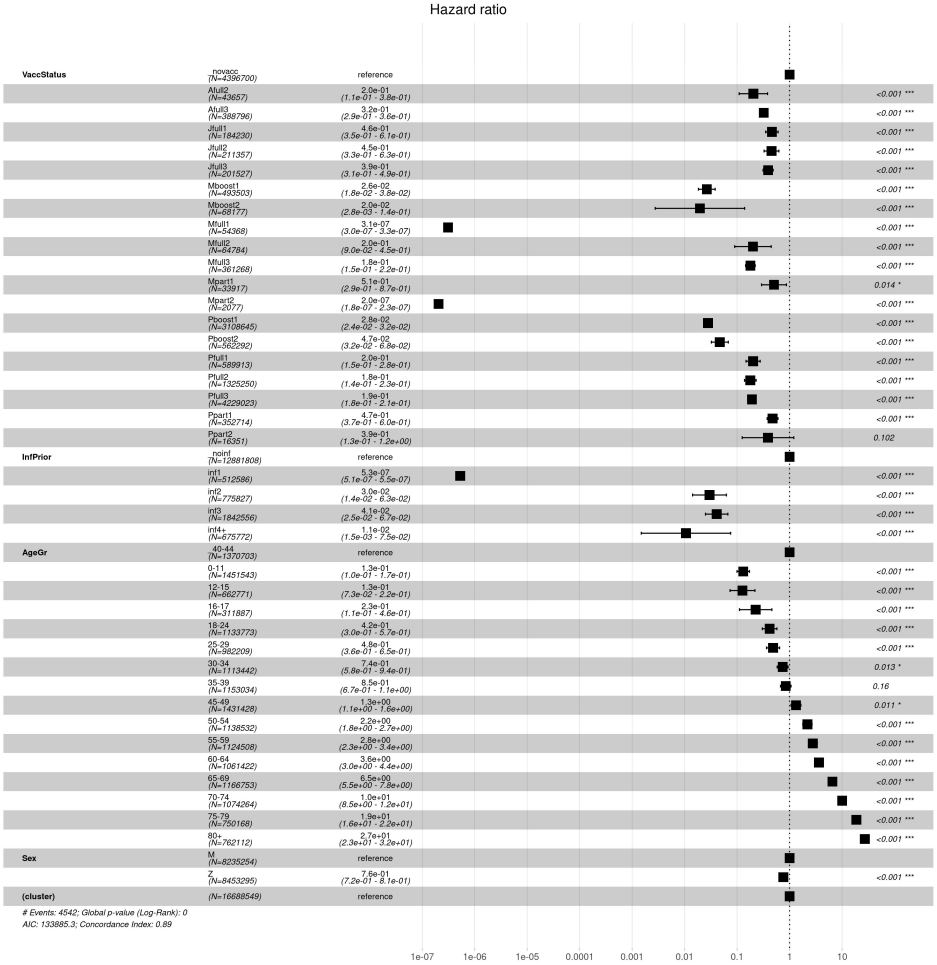
Immunity	entered	events
_noimmunity	799055	53531
boost2-_alone	783128	2212
boost2+_alone	5316	272
full2-_alone	252497	1776
full2+_alone	4006108	28077
inf6-_alone	25504	62
inf6+_alone	542432	1627
part_alone	168995	1068
inf6-_boost2-	187	1
inf6-_boost2+	4	0
inf6-_full2-	927	0
inf6-_full2+	5684	10
inf6+_boost2-	87700	54
inf6+_boost2+	519	10
inf6+_full2-	87376	52
inf6+_full2+	829279	627
full2+_inf6-	802	6
boost2+_inf6-	0	0
other	0	0
rare	14273	87

13 Hospitalizations by Vaccines - Omicron



Immunity	entered	events
_noimmunity	799369	833
boost2-_alone	783146	255
boost2+_alone	5316	175
full2-_alone	252511	71
full2+_alone	4006309	571
inf6-_alone	25504	7
inf6+_alone	542432	10
part_alone	169005	15
inf6-_boost2-	187	0
inf6-_boost2+	4	1
inf6-_full2-	927	0
inf6-_full2+	5571	1
inf6+_boost2-	87701	4
inf6+_boost2+	519	2
inf6+_full2-	87376	1
inf6+_full2+	829281	18
full2+_inf6-	915	2
boost2+_inf6-	0	0
other	0	0
rare	14275	3

14 Hospitalizations by Vaccines - Delta



Immunity	entered	events
_noimmunity	799369	2806
boost2-_alone	783146	221
boost2+_alone	5316	29
full2-_alone	252511	93
full2+_alone	4006309	1283
inf6-_alone	25504	0
inf6+_alone	542432	13
part_alone	169005	83
inf6-_boost2-	187	0
inf6-_boost2+	4	0
inf6-_full2-	927	0
inf6-_full2+	5571	0
inf6+_boost2-	87701	1
inf6+_boost2+	519	1
inf6+_full2-	87376	1
inf6+_full2+	829281	8
full2+_inf6-	915	0
boost2+_inf6-	0	0
other	0	0
rare	14275	3

15 Hospitalizaton given Infection

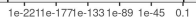
Variable		N	Odds ratio	p
Variant	Delta	89061		Reference
	Omikron	223091		0.36 (0.34, 0.38)	<0.001
Immunity	_noimmunity	138077		Reference
	boost2-_alone	22441		0.27 (0.24, 0.30)	<0.001
	boost2+_alone	5286		0.46 (0.40, 0.53)	<0.001
	full2-_alone	10628		0.83 (0.70, 0.98)	0.029
	full2+_alone	97378		0.43 (0.41, 0.46)	<0.001
	full2+_inf6-	317		0.27 (0.07, 0.76)	0.032
	inf6-_alone	3369		0.29 (0.13, 0.55)	<0.001
	inf6+_alone	15873		0.10 (0.06, 0.14)	<0.001
	inf6+_boost2-	2544		0.05 (0.02, 0.12)	<0.001
	inf6+_boost2+	540		0.11 (0.03, 0.28)	<0.001
	inf6+_full2-	1076		0.12 (0.02, 0.37)	0.003
	inf6+_full2+	11396		0.15 (0.10, 0.21)	<0.001
	part2-_alone	3227		1.14 (0.91, 1.42)	0.250
AgeGr	_40-64	107414		Reference
	0-24	108547		0.21 (0.19, 0.23)	<0.001
	25-39	77090		0.39 (0.35, 0.43)	<0.001
	65+	19101		18.76 (17.61, 20.00)	<0.001
Sex	M	150698		Reference
	Z	161454		0.81 (0.77, 0.85)	<0.001

16 Oxygen given Infection

Variable		N	Odds ratio		p
Variant	Delta	89038		Reference	
	Omikron	223041		0.24 (0.22, 0.26)	<0.001
Immunity	_noimmunity	138077		Reference	
	boost2-_alone	22441		0.21 (0.19, 0.25)	<0.001
	boost2+_alone	5286		0.37 (0.29, 0.45)	<0.001
	full2-_alone	10628		0.54 (0.41, 0.70)	<0.001
	full2+_alone	97378		0.35 (0.32, 0.38)	<0.001
	full2+_inf6-	314		0.00 (0.00, 0.00)	1.0
	inf6-_alone	3361		0.00 (0.00, 0.00)	1.0
	inf6+_alone	15850		0.01 (0.00, 0.04)	<0.001
	inf6+_boost2-	2539		0.00 (0.00, 0.00)	1.0
	inf6+_boost2+	537		0.00 (0.00, 0.00)	1.0
	inf6+_full2-	1074		0.00 (0.00, 0.00)	1.0
	inf6+_full2+	11367		0.00 (0.00, 0.00)	0.9
	part2-_alone	3227		0.78 (0.57, 1.06)	0.1
AgeGr	_40-64	107391		Reference	
	0-24	108545		0.04 (0.03, 0.06)	<0.001
	25-39	77082		0.20 (0.17, 0.24)	<0.001
	65+	19061		18.44 (17.01, 20.02)	<0.001
Sex	M	150658		Reference	
	Z	161421		0.72 (0.67, 0.77)	<0.001

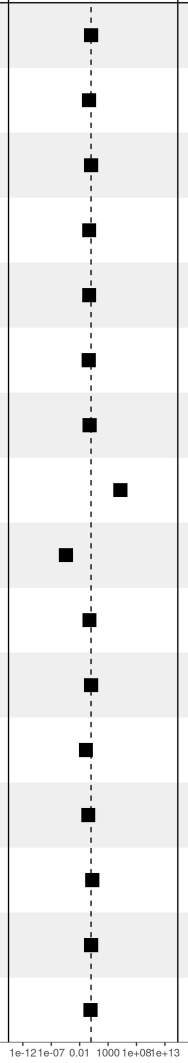
17 ICU given Infection

Variable		N	Odds ratio	p
Variant	Delta	89061	Reference	
	Omikron	223091	0.24 (0.21, 0.28)	<0.001
Immunity	_noimmunity	138077	Reference	
	boost2-_alone	22441	0.30 (0.23, 0.38)	<0.001
	boost2+_alone	5286	0.65 (0.46, 0.90)	0.012
	full2-_alone	10628	0.43 (0.25, 0.70)	0.001
	full2+_alone	97378	0.33 (0.28, 0.38)	<0.001
	full2+_inf6-	317	0.00 (0.00, 0.00)	0.979
	inf6-_alone	3369	0.32 (0.02, 1.45)	0.262
	inf6+_alone	15873	0.15 (0.05, 0.32)	<0.001
	inf6+_boost2-	2544	0.00 (0.00, 0.00)	0.943
	inf6+_boost2+	540	0.00 (0.00, 0.00)	0.973
	inf6+_full2-	1076	0.00 (0.00, 0.00)	0.965
	inf6+_full2+	11396	0.04 (0.00, 0.16)	<0.001
	part2-_alone	3227	0.78 (0.44, 1.28)	0.359
AgeGr	_40-64	107414	Reference	
	0-24	108547	0.09 (0.06, 0.12)	<0.001
	25-39	77090	0.19 (0.14, 0.26)	<0.001
	65+	19101	10.24 (8.94, 11.76)	<0.001
Sex	M	150698	Reference	
	Z	161454	0.55 (0.48, 0.62)	<0.001



18 Oxagen given Hospitalization

Variable		N	Odds ratio	p
Variant	Delta	4521	Reference	
	Omikron	2235	0.44 (0.39, 0.50)	<0.001
Immunity	_noimmunity	3788	Reference	
	boost2-_alone	516	0.47 (0.38, 0.57)	<0.001
	boost2+_alone	246	0.45 (0.34, 0.60)	<0.001
	full2-_alone	175	0.39 (0.28, 0.55)	<0.001
	full2+_alone	1920	0.56 (0.50, 0.63)	<0.001
	inf6+_alone	1	147714.80 (0.00, NA)	0.952
	inf6+_full2+	1	0.00 (NA, 10308582286697.01)	0.959
	part2-_alone	109	0.54 (0.36, 0.82)	0.003
AgeGr	_40-64	1568	Reference	
	0-24	445	0.12 (0.09, 0.16)	<0.001
	25-39	484	0.32 (0.25, 0.40)	<0.001
	65+	4259	1.64 (1.45, 1.86)	<0.001
Sex	M	3330	Reference	
	Z	3426	0.79 (0.71, 0.88)	<0.001



19 ICU given Hospitalization

Variable		N	Odds ratio	p
Variant	Delta	4544	Reference	
	Omikron	2285	0.62 (0.53, 0.73)	<0.001
Immunity	_noimmunity	3788	Reference	
	boost2-_alone	516	0.82 (0.63, 1.07)	0.149
	boost2+_alone	246	1.09 (0.75, 1.56)	0.649
	full2-_alone	175	0.43 (0.24, 0.71)	0.002
	full2+_alone	1920	0.64 (0.54, 0.74)	<0.001
	full2+_inf6-	3	0.00 (NA, 2243344685955.21)	0.970
	inf6-_alone	8	0.80 (0.04, 4.61)	0.838
	inf6+_alone	24	1.13 (0.37, 2.86)	0.812
	inf6+_boost2-	5	0.00 (NA, 313632.44)	0.960
	inf6+_boost2+	3	0.00 (NA, 1091790144331.05)	0.969
	inf6+_full2-	2	0.00 (NA, 211411878393342885888.00)	0.975
	inf6+_full2+	30	0.18 (0.01, 0.86)	0.095
	part2-_alone	109	0.69 (0.38, 1.17)	0.194
AgeGr	_40-64	1591	Reference	
	0-24	447	0.42 (0.29, 0.59)	<0.001
	25-39	492	0.46 (0.33, 0.64)	<0.001
	65+	4299	0.82 (0.71, 0.95)	0.010
Sex	M	3370	Reference	
	Z	3459	0.63 (0.55, 0.72)	<0.001