

# THE LANCET

## Healthy Longevity

### Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Shrotri M, Krutikov M, Nacer-Laidi H, et al. Duration of vaccine effectiveness against SARS-CoV-2 infection, hospitalisation, and death in residents and staff of long-term care facilities in England (VIVALDI): a prospective cohort study. *Lancet Healthy Longev* 2022; **3**: e470–80.

## SUPPLEMENTARY MATERIAL

### **Figure S1**

Cycle threshold values of a) Nucleocapsid and b) ORF1ab gene targets from viral isolates, by vaccination status

### **Figure S2**

Ct values of a) Nucleocapsid and b) ORF1ab gene targets in unvaccinated individuals before and during Delta variant predominance.

### **Table S1**

Person-time at risk and numbers of recorded PCR test results for staff and residents by prior COVID-19 status and vaccination exposure group.

### **Table S2**

Vaccine effectiveness estimates against infection, hospitalisation, and death for exposed residents, using the unvaccinated exposed group as the comparator.

### **Table S3**

Vaccine effectiveness estimates against infection for exposed staff, using the unvaccinated exposed group as the comparator; and descriptive data on hospitalisations and deaths in exposed staff.

### **Table S4**

Crude rates, adjusted hazard ratios, and vaccine effectiveness against infections, stratified by vaccine type, in unexposed residents and staff.

### **Table S5**

Crude rates, adjusted hazard ratios, and vaccine effectiveness against infections in the pre-Delta period in unexposed residents and staff.

### **Table S6**

Crude rates, adjusted hazard ratios, and vaccine effectiveness against hospitalisations, stratified by vaccine type, in unexposed residents and staff.

### **Table S7**

Crude rates, adjusted hazard ratios, and vaccine effectiveness against deaths, stratified by vaccine type, in unexposed residents.

### **Table S8**

Cycle threshold values of Nucleocapsid and ORF1ab gene targets from viral isolates, by vaccination status across the whole study period; and in unvaccinated individuals before and during Delta variant predominance.

Fig S1a

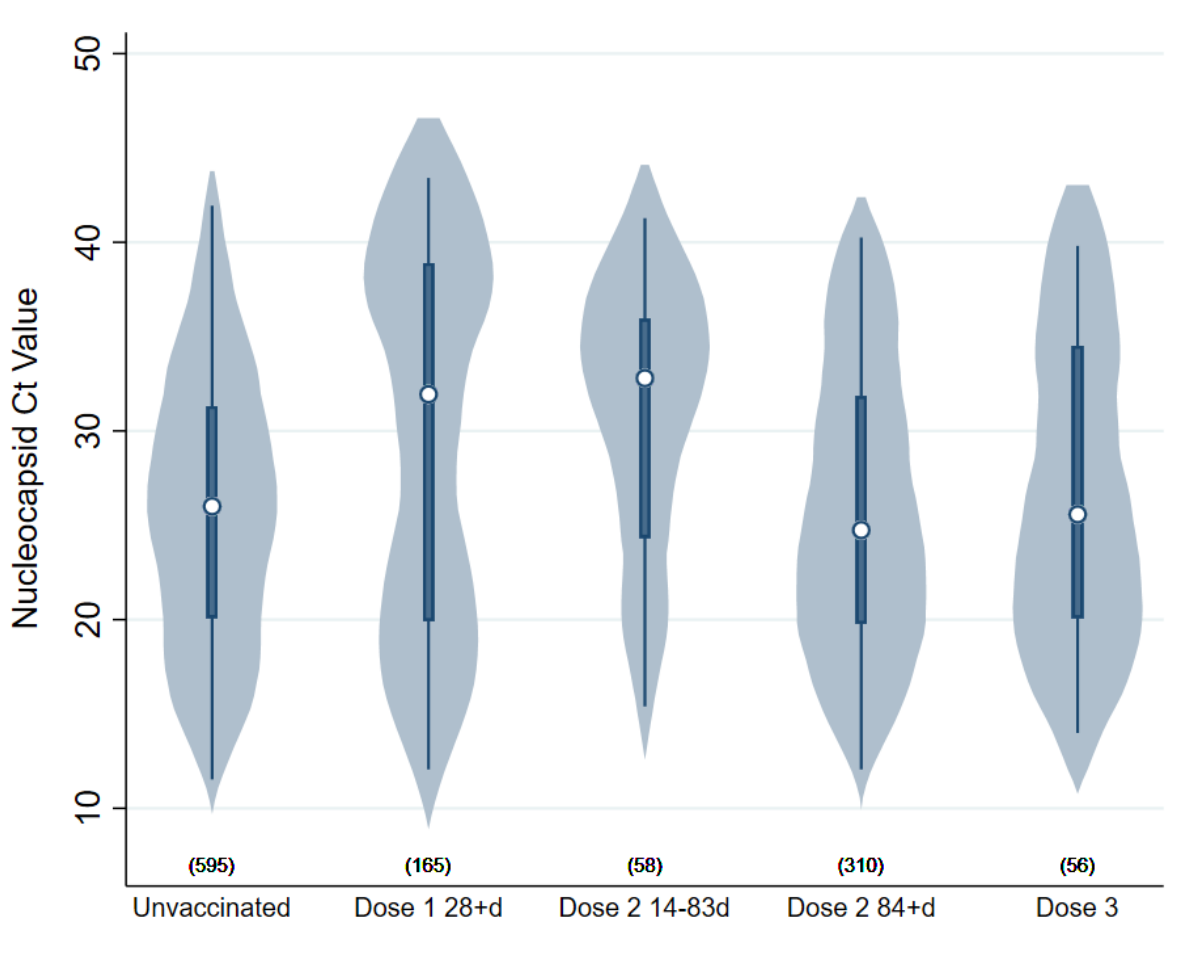
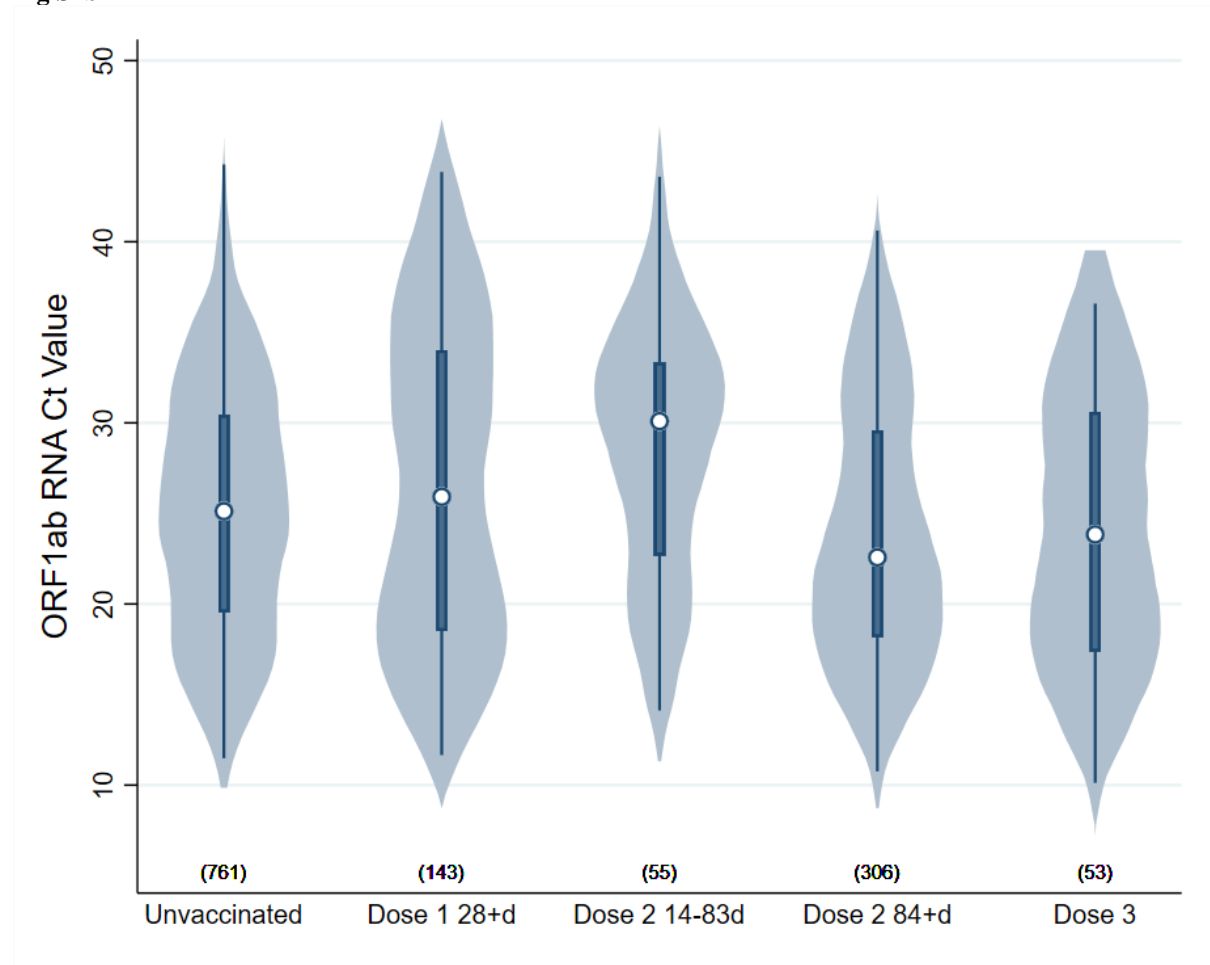
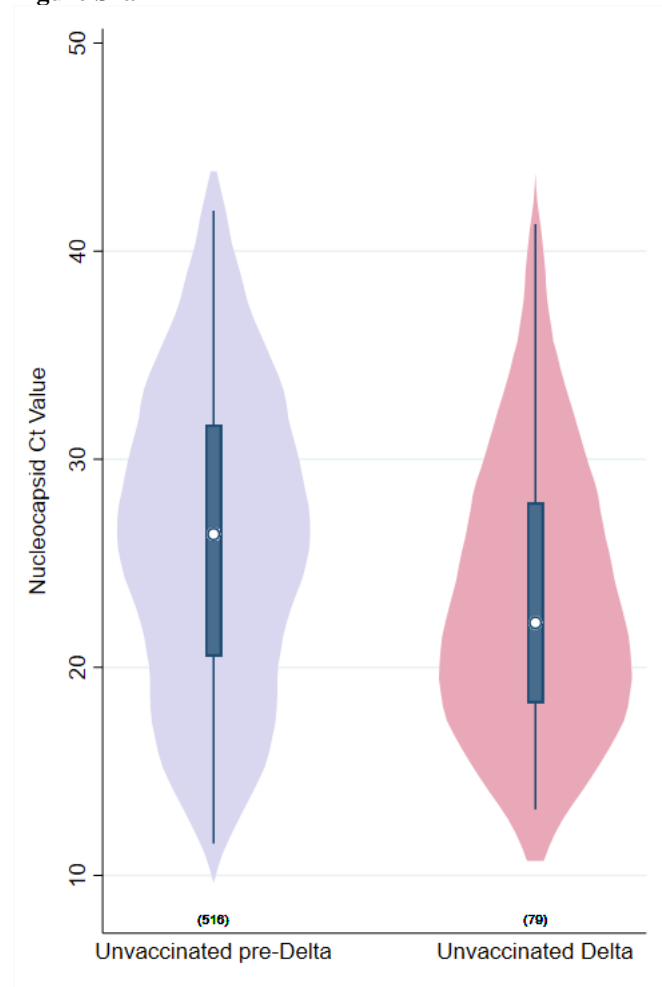


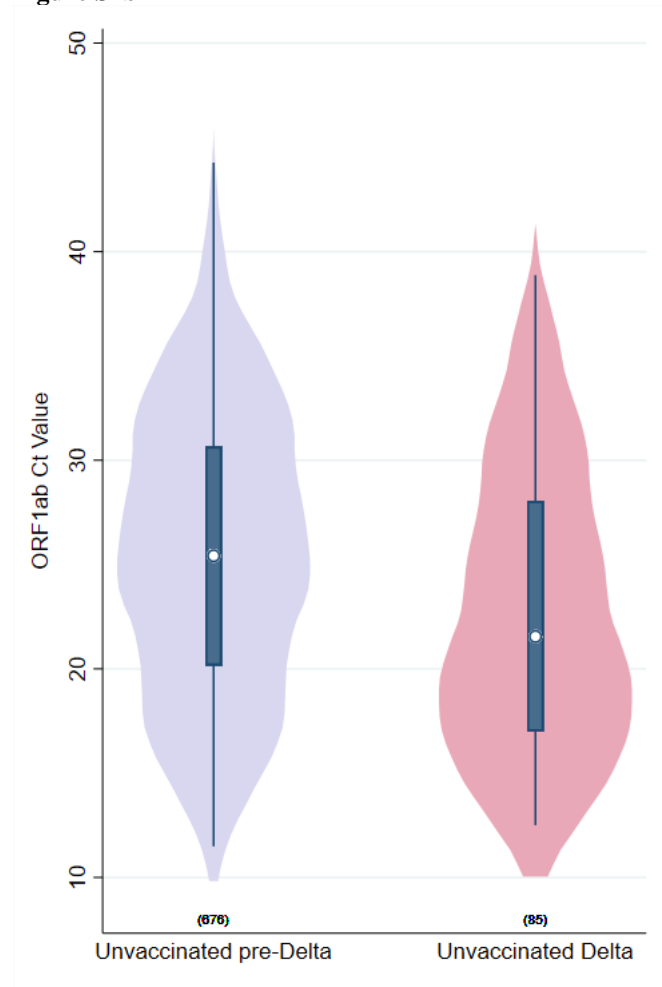
Fig S1b



**Figure S2a**



**Figure S2b**



**Table S1**

Prior SARS-CoV2 exposure	Vaccination exposure group	Person Days at Risk	Number of PCR test results	PCR testing rate per 1000 person days
<b>RESIDENTS</b>				
Unexposed	Unvaccinated	523,032	22,654	43.3
	D1 0-27d	206,819	10,011	48.4
	D1 28+d	373,898	14,680	39.3
	D2 0-13d	93,620	3,004	32.1
	D2 14-83d	492,694	15,736	31.9
	D2 84+d	813,540	34,311	42.2
	D3	213,518	12,923	60.5
Exposed	Unvaccinated	88,174	2,771	31.4
	D1 0-27d	37,241	1,311	35.2
	D1 28+d	66,887	2,486	37.2
	D2 0-13d	16,856	489	29.0
	D2 14-83d	85,975	2,512	29.2
	D2 84+d	133,079	5,021	37.7
	D3	34,596	2,056	59.4
<b>Total</b>		3,179,929	129,965	40.9
<b>STAFF</b>				
Unexposed	Unvaccinated	986,082	79,434	80.6
	D1 0-27d	295,501	26,693	90.3
	D1 28+d	523,450	44,503	85.0
	D2 0-13d	133,742	11,734	87.7
	D2 14-83d	676,226	59,722	88.3
	D2 84+d	1,051,338	96,546	91.8
	D3	214,360	25,857	120.6
Exposed	Unvaccinated	81,565	5,091	62.4
	D1 0-27d	27,084	1,698	62.7
	D1 28+d	47,838	4,012	83.9
	D2 0-13d	12,249	1,083	88.4
	D2 14-83d	61,543	5,597	90.9
	D2 84+d	96,691	9,027	93.4
	D3	23,109	2,669	115.5
<b>Total</b>		4,230,778	373,666	88.3

Table S2

RESIDENTS										
SARS-CoV2 Infections										
Prior SARS-CoV2 Exposure	Vaccination Status	Person-days	Infections*	Infection rate per 1000pd	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Exposed	Unvaccinated	88174	29	0.329	1 (ref)					
	D1 0-27d	37241	21	0.564	1.056	0.455	2.449	-5.6	-144.9	54.5
	D1 28+d	66887	10	0.150	0.884	0.369	2.119	11.6	-111.9	63.1
	D2 0-13d	16856	0	0.000	.	.	.	.	.	.
	D2 14-83d	85975	3	0.035	2.228	0.603	8.239	-122.8	-723.9	39.7
	D2 84+d	133079	9	0.068	0.771	0.302	1.966	22.9	-96.6	69.8
	D3	34596	0	0.000	.	.	.	.	.	.
COVID-19 related Hospitalisations										
Prior SARS-CoV2 Exposure	Vaccination Status	Person-days	Hospitalisations	Hospitalisation rate per 1000pd	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Exposed	Unvaccinated	89011	14	0.157	1 (ref)					
	D1 0-27d	37689	3	0.080	0.235	0.068	0.816	76.5	18.4	93.2
	D1 28+d	68142	4	0.059	0.510	0.161	1.616	49.0	-61.6	83.9
	D2 0-13d	17123	1	0.058	1.013	0.134	7.653	-1.3	-665.3	86.6
	D2 14-83d	87342	0	0.000	.	.	.	.	.	.
	D2 84+d	135472	2	0.015	0.264	0.057	1.220	73.6	-22.0	94.3
	D3	35461	2	0.056	0.299	0.065	1.370	70.1	-37.0	93.5
COVID-19 related Deaths										
Prior SARS-CoV2 Exposure	Vaccination Status	Person-days	Deaths	Death rate per 1000 pd	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Exposed	Unvaccinated	90663	8	0.088	1 (ref)					
	D1 0-27d	38167	3	0.079	0.216	0.055	0.854	78.4	14.6	94.5



D1 28+d	69280	5	0.072	0.827	0.226	3.023	17.3	-202.3	77.4
D2 0-13d	17413	1	0.057	1.973	0.229	17.040	-97.3	-1604.0	77.1
D2 14-83d	88851	1	0.011	0.676	0.078	5.881	32.4	-488.1	92.2
D2 84+d	137905	1	0.007	0.328	0.034	3.212	67.2	-221.2	96.6
D3	35948	0	0.000	.	.	.	.	.	.

\*Where there were no events in a cell we have not included hazard ratios or vaccine effectiveness estimates due to sparse data.

**Table S3**

<b>STAFF</b>										
<b>SARS-CoV2 Infections</b>										
Prior SARS-CoV2 Exposure	Vaccination Status	Person-days	Infections	Infection rate per 1000pd	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Exposed	Unvaccinated	81565	40	0.490	1 (ref)					
	D1 0-27d	27084	7	0.258	0.428	0.181	1.012	57.2	-1.2	81.9
	D1 28+d	47838	5	0.105	0.425	0.158	1.144	57.5	-14.4	84.2
	D2 0-13d	12249	1	0.082	0.466	0.065	3.357	53.4	-235.7	93.5
	D2 14-83d	61543	4	0.065	0.573	0.199	1.653	42.7	-65.3	80.1
	D2 84+d	96691	28	0.290	0.932	0.484	1.796	6.8	-79.6	51.6
	D3	23109	3	0.130	0.223	0.062	0.799	77.7	20.1	93.8
<b>COVID-19 related Hospitalisations</b>										
Prior SARS-CoV2 Exposure	Vaccination Status	Person-days	Hospitalisations	Hospitalisation rate per 1000pd	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Exposed	Unvaccinated	85500	4	0.047						
	D1 0-27d	28273	0	0.000						
	D1 28+d	49231	0	0.000						
	D2 0-13d	12788	0	0.000						
	D2 14-83d	64376	0	0.000						
	D2 84+d	101008	0	0.000						
	D3	24311	0	0.000						
<b>COVID-19 related Deaths</b>										
Prior SARS-CoV2 Exposure	Vaccination Status	Person-days	Deaths	Death rate per 1000pd	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Exposed	Unvaccinated	85799	0	0.000						
	D1 0-27d	28381	0	0.000						
	D1 28+d	49759	0	0.000						
	D2 0-13d	12821	0	0.000						
	D2 14-83d	64516	0	0.000						
	D2 84+d	101186	0	0.000						
	D3	24390	0	0.000						

Table S4

Residents										
Prior SARS-CoV2 Status	Vaccination Status	Person-days	Infection Events	Infection rate per 1000 person-days	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
	AZ D1 0-27d	141935	263	1.853	0.733	0.497	1.081	26.7	-8.1	50.3
	AZ D1 28+d	261294	81	0.310	0.430	0.280	0.662	57.0	33.8	72.0
	AZ D2 0-13d	64982	11	0.169	1.505	0.540	4.194	-50.5	-319.4	46.0
	AZ D2 14-83d	341448	9	0.026	0.301	0.130	0.700	69.9	30.0	87.0
	AZ D2 84+d	539330	207	0.384	0.809	0.533	1.229	19.1	-22.9	46.7
	AZ + mRNA D3*	132964	43	0.323	0.272	0.154	0.481	72.8	51.9	84.6
	mRNA D1 0-27d	64884	194	2.990	0.953	0.598	1.520	4.7	-52.0	40.2
	mRNA D1 28+d	112604	67	0.595	0.492	0.298	0.810	50.8	19.0	70.2
	mRNA D2 0-13d	28638	1	0.035	0.122	0.017	0.864	87.8	13.6	98.3
	mRNA D2 14-83d	151246	8	0.053	0.559	0.274	1.140	44.1	-14.0	72.6
	mRNA D2 84+d	274210	80	0.292	0.702	0.432	1.140	29.8	-14.0	56.8
	mRNA D3	80554	25	0.310	0.279	0.161	0.483	72.1	51.7	83.9
Staff										
Prior SARS-CoV2 Status	Vaccination Status	Person-days	Infection Events	Infection rate per 1000 person-days	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
	AZ D1 0-27d	134378	134	0.997	1.103	0.802	1.518	-10.3	-51.8	19.8
	AZ D1 28+d	267114	56	0.210	0.673	0.488	0.926	32.7	7.4	51.2
	AZ D2 0-13d	60405	3	0.050	0.411	0.131	1.284	58.9	-28.4	86.9
	AZ D2 14-83d	313395	41	0.131	0.597	0.384	0.928	40.3	7.2	61.6
	AZ D2 84+d	464836	217	0.467	0.632	0.505	0.792	36.8	20.8	49.5
	AZ + mRNA D3*	73145	21	0.287	0.239	0.150	0.380	76.1	62.0	85.0

mRNA D1 0-27d	161123	217	1.347	1.035	0.807	1.327	-3.5	-32.7	19.3
mRNA D1 28+d	256336	94	0.367	0.591	0.453	0.771	40.9	22.9	54.7
mRNA D2 0-13d	73337	17	0.232	0.407	0.251	0.659	59.3	34.1	74.9
mRNA D2 14-83d	362831	39	0.107	0.332	0.234	0.469	66.8	53.1	76.6
mRNA D2 84+d	586502	186	0.317	0.547	0.439	0.683	45.3	31.7	56.1
mRNA D3	141215	34	0.241	0.211	0.146	0.304	78.9	69.6	85.4

\*This category refers to individuals who received the AZ vaccine for Doses 1 and 2, followed by an mRNA vaccine as Dose 3.

**Table S5**

<b>Residents</b>										
Prior SARS-CoV2 Status	Vaccination Status	Person-days	Infection Events*	Infection rate per 1000 person-days	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Unexposed	Unvaccinated	315640	788	2.500	1 (ref)					
	D1 0-27d	203526	455	2.240	0.572	0.394	0.831	42.8	16.9	60.6
	D1 28+d	315271	132	0.420	0.224	0.132	0.380	77.6	62.0	86.8
	D2 0-13d	87389	11	0.130	0.325	0.109	0.964	67.5	3.6	89.1
	D2 14-83d	17084	5	0.290	0.553	0.251	1.216	44.7	-21.6	74.9
	D2 84+d	62	0	0.000	.	.	.	.	.	.
<b>Staff</b>										
Prior SARS-CoV2 Status	Vaccination Status	Person-days	Infection Events	Infection rate per 1000 person-days	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Unexposed	Unvaccinated	513181	840	1.640	1 (ref)					
	D1 0-27d	261759	334	1.280	0.747	0.597	0.935	25.3	6.5	40.3
	D1 28+d	363423	116	0.320	0.388	0.293	0.514	61.2	48.6	70.7
	D2 0-13d	100529	10	0.100	0.173	0.092	0.324	82.7	67.6	90.8
	D2 14-83d	91272	23	0.250	0.302	0.195	0.469	69.8	53.1	80.5
	D2 84+d	1936	2	1.030	3.975	0.905	17.457	-297.5	-1645.7	9.5

\*Where there were no events in a cell we have not included hazard ratios or vaccine effectiveness estimates due to sparse data.

Table S6

Residents										
Prior SARS-CoV2 Status	Vaccination Status	Person-days	Hospitalisation Events**	Hospitalisation rate per 1000 person-days	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Unexposed	Unvaccinated	544118	225	0.414	1 (ref)					
	AZ D1 0-27d	151077	47	0.311	0.357	0.220	0.581	64.3	41.9	78.0
	AZ D1 28+d	280201	30	0.107	0.419	0.251	0.697	58.1	30.3	74.9
	AZ D2 0-13d	69998	4	0.057	0.441	0.099	1.961	55.9	-96.1	90.1
	AZ D2 14-83d	366426	3	0.008	0.133	0.043	0.412	86.7	58.8	95.7
	AZ D2 84+d	583626	45	0.077	0.488	0.289	0.823	51.2	17.7	71.1
	AZ + mRNA D3*	144716	5	0.035	0.065	0.026	0.167	93.5	83.3	97.4
	mRNA D1 0-27d	67230	20	0.297	0.328	0.166	0.646	67.2	35.4	83.4
	mRNA D1 28+d	121698	22	0.181	0.450	0.231	0.878	55.0	12.2	76.9
	mRNA D2 0-13d	30666	0	0.000	.	.	.	.	.	.
	mRNA D2 14-83d	161276	1	0.006	0.082	0.011	0.602	91.8	39.8	98.9
	mRNA D2 84+d	292101	14	0.048	0.338	0.179	0.638	66.2	36.2	82.1
mRNA D3	86703	7	0.081	0.162	0.073	0.359	83.8	64.1	92.7	
Staff										
Prior SARS-CoV2 Status	Vaccination Status	Person-days	Hospitalisation Events**	Hospitalisation rate per 1000 person-days	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Unexposed	Unvaccinated	1046689	38	0.036	1 (ref)					
	AZ D1 0-27d	146790	3	0.020	0.406	0.118	1.397	59.4	-39.7	88.2
	AZ D1 28+d	296396	4	0.014	0.790	0.289	2.159	21.0	-115.9	71.1
	AZ D2 0-13d	67057	0	0.000	.	.	.	.	.	.
	AZ D2 14-83d	347427	0	0.000	.	.	.	.	.	.
	AZ D2 84+d	518779	4	0.008	0.105	0.031	0.357	89.5	64.3	96.9
	AZ + mRNA D3*	81261	0	0.000	.	.	.	.	.	.
	mRNA D1 0-27d	169075	3	0.018	0.321	0.092	1.117	67.9	-11.7	90.8
	mRNA D1 28+d	276699	0	0.000	.	.	.	.	.	.

mRNA D2 0-13d	78805	0	0.000	.	.	.	.	.	.
mRNA D2 14-83d	390613	0	0.000	.	.	.	.	.	.
mRNA D2 84+d	633995	3	0.005	0.079	0.021	0.307	92.1	69.3	97.9
mRNA D3	155440	1	0.006	0.067	0.006	0.756	93.3	24.4	99.4

\* This category refers to individuals who received the AZ vaccine for Doses 1 and 2, followed by an mRNA vaccine as Dose 3.

\*\*Where there were no events in a cell we have not included hazard ratios or vaccine effectiveness estimates due to sparse data.

**Table S7**

Residents										
Prior SARS-CoV2 Status	Vaccination Status	Person-days	Deaths**	Death rate per 1000 person-days	aHR	L 95% CI	U 95% CI	VE	L 95% CI	U 95% CI
Unexposed	Unvaccinated	556900	293	0.526	1 (ref)					
	AZ D1 0-27d	154656	58	0.375	0.160	0.104	0.245	84.0	75.5	89.6
	AZ D1 28+d	289546	36	0.124	0.324	0.187	0.563	67.6	43.7	81.3
	AZ D2 0-13d	72112	0	0.000	.	.	.	.	.	.
	AZ D2 14-83d	377974	2	0.005	0.055	0.013	0.239	94.5	76.1	98.7
	AZ D2 84+d	600790	33	0.055	0.371	0.196	0.699	62.9	30.1	80.4
	AZ + mRNA D3*	148276	1	0.007	0.013	0.002	0.098	98.7	90.2	99.8
	mRNA D1 0-27d	67906	36	0.530	0.271	0.153	0.480	72.9	52.0	84.7
	mRNA D1 28+d	123441	31	0.251	0.287	0.164	0.503	71.3	49.7	83.6
	mRNA D2 0-13d	31095	2	0.064	0.292	0.066	1.284	70.8	-28.4	93.4
	mRNA D2 14-83d	163794	0	0.000	.	.	.	.	.	.
	mRNA D2 84+d	296163	13	0.044	0.331	0.153	0.715	66.9	28.5	84.7
mRNA D3	87954	2	0.023	0.047	0.011	0.205	95.3	79.5	98.9	

\*This category refers to individuals who received the AZ vaccine for Doses 1 and 2, followed by an mRNA vaccine as Dose 3.

\*\*Where there were no events in a cell we have not included hazard ratios or vaccine effectiveness estimates due to sparse data.



**Table S8**

<b>Vaccination Status</b>	<b>Nucleocapsid RNA target</b>			<b>ORF1ab RNA target</b>		
	<b>n</b>	<b>Median Ct</b>	<b>IQR</b>	<b>n</b>	<b>Median Ct</b>	<b>IQR</b>
Unvaccinated	595	26.0	20.1, 31.3	761	25.1	19.6, 30.4
Dose 1 28+d	165	31.9	19.9, 38.9	143	25.9	18.5, 34.0
Dose 2 14-83d	58	32.8	24.4, 35.9	55	30.1	22.7, 33.3
Dose 2 84+d	310	24.7	19.8, 31.8	306	22.6	18.2, 29.6
Dose 3	56	25.6	20.1, 34.5	53	23.8	17.4, 30.6
Unvaccinated pre-Delta	516	26.4	20.5, 31.7	676	25.4	20.2, 30.6
Unvaccinated Delta	79	22.1	18.3, 27.9	85	21.6	17.0, 28.0