
Supplementary information

Effectiveness of COVID-19 booster vaccines against COVID-19-related symptoms, hospitalization and death in England

In the format provided by the
authors and unedited

Supplementary table 1: Descriptive characteristics of positive and negative test results in individuals tested for SARS-CoV-2 in England for the study population. *

				Overall		Positive		Negative	
				n	%	n	%	n	%
Test Result				893,845	100.0%	343,955	38.5%	549,890	61.5%
Vaccination Status and intervals after vaccine**	Primary vaccine	Booster	Days post vaccine						
	Unvaccinated			278,096	31.1%	142,421	41.4%	135,675	24.7%
	ChAdOx1-S	None	175+	223,198	25.0%	106,368	30.9%	116,830	21.2%
	BNT162b2	None	175+	171,079	19.1%	53,225	15.5%	117,854	21.4%
	ChAdOx1-S	Any	0-1	12,014	1.3%	5619	1.6%	6,395	1.2%
	ChAdOx1-S	Any	2-6	22,100	2.5%	10,229	3.0%	11,871	2.2%
	ChAdOx1-S	BNT162b2	7-13	16,121	1.8%	3,250	0.9%	12,871	2.3%
	ChAdOx1-S	BNT162b2	14-34	25,863	2.9%	2,252	0.7%	23,611	4.3%
	ChAdOx1-S	BNT162b2	35-69	9,381	1.0%	1,022	0.3%	8,359	1.5%
	ChAdOx1-S	BNT162b2	70+	27	0.0%	7	0.0%	20	0.0%
	ChAdOx1-S	mRNA-1273	7-13	2,325	0.3%	415	0.1%	1,910	0.3%
	ChAdOx1-S	mRNA-1273	14-34	1,169	0.1%	57	0.0%	1,112	0.2%
	ChAdOx1-S	mRNA-1273	35-69	19	0.0%	4	0.0%	15	0.0%
	BNT162b2	Any	0-1	8,184	0.9%	2,631	0.8%	5,553	1.0%
	BNT162b2	Any	2-6	18,453	2.1%	5,793	1.7%	12,660	2.3%
	BNT162b2	BNT162b2	7-13	20528	2.3%	2637	0.8%	17,891	3.3%
	BNT162b2	BNT162b2	14-34	46719	5.2%	3966	1.2%	42,753	7.8%
	BNT162b2	BNT162b2	35-69	36460	4.1%	3826	1.1%	32,634	5.9%
	BNT162b2	BNT162b2	70+	401	0.0%	42	0.0%	359	0.1%
	BNT162b2	mRNA-1273	7-13	972	0.1%	135	0.0%	837	0.2%
	BNT162b2	mRNA-1273	14-34	717	0.1%	53	0.0%	664	0.1%
	BNT162b2	mRNA-1273	35-69	19	0.0%	3	0.0%	16	0.0%
Age Group	18-49			557,805	62.4%	215,138	62.5%	342,667	62.3%
	50-64			212,892	23.8%	83,658	24.3%	129,234	23.5%
	65-79			102,517	11.5%	38,711	11.3%	63,806	11.6%
	80+			20,631	2.3%	6,448	1.9%	14,183	2.6%
Gender	female			572,502	64.0%	200,230	58.2%	372,272	67.7%
	male			319,698	35.8%	143,106	41.6%	176,592	32.1%
	missing			1,645	0.2%	619	0.2%	1,026	0.2%
Ethnicity	African			11,845	1.3%	4303	1.3%	7,542	1.4%
	Another Asian background			10,673	1.2%	3,206	0.9%	7,467	1.4%

	Another Black background	1,540	0.2%	615	0.2%	925	0.2%
	Another ethnic background	6,042	0.7%	2138	0.6%	3,904	0.7%
	Arab	3414	0.4%	1198	0.3%	2,216	0.4%
	Bangladeshi	5,958	0.7%	2449	0.7%	3,509	0.6%
	Caribbean	8,609	1.0%	4,009	1.2%	4,600	0.8%
	Chinese	4,960	0.6%	1436	0.4%	3,524	0.6%
	Indian	30,134	3.4%	8,835	2.6%	21,299	3.9%
	Mixed or multiple ethnic groups	16,517	1.8%	6,270	1.8%	10,247	1.9%
	Pakistani	17,547	2.0%	6,524	1.9%	11,023	2.0%
	Prefer not to say	35,467	4.0%	14,110	4.1%	21,357	3.9%
	White	741,139	82.9%	288,862	84.0%	452,277	82.2%
NHS Region	East of England	103,777	11.6%	40,107	11.7%	63,670	11.6%
	London	110,072	12.3%	42,238	12.3%	67,834	12.3%
	Midlands	175,956	19.7%	70,125	20.4%	105,831	19.2%
	North East	138,885	15.5%	53,183	15.5%	85,702	15.6%
	North West	126,282	14.1%	47,084	13.7%	79,198	14.4%
	South East	137,198	15.3%	53,217	15.5%	83,981	15.3%
	South West	101,674		38,001			
	missing	1	0.0%	0	0.0%	1	0.0%
IMD Quintiles	1	171,587	19.2%	70,469	20.5%	101,118	18.4%
	2	178,819	20.0%	70,693	20.6%	108,126	19.7%
	3	182,366	20.4%	69,992	20.3%	112,374	20.4%
	4	181,613	20.3%	67,913	19.7%	113,700	20.7%
	5	176,901	19.8%	63,932	18.6%	112,969	20.5%
	Missing	2,559	0.3%	956	0.3%	1,603	0.3%
Vaccine priority groups	Heathcare worker	109,776	12.3%	20,308	5.9%	89,468	16.3%
	CEV	81,867	9.2%	26,215	7.6%	55,652	10.1%
	Carehome Resident	2,011	23.8%	544	21.8%	137,912	25.1%
	Immunosuppressed	11,972	3.2%	3,931	1.9%	8,041	1.5%
	At risk	212,862	0.0%	74,950	0.0%	137,912	25.1%
	Tested Positive >90 days previously	28,327	0.7%	6,616	1.9%	21,711	3.9%

* test or onset date from week 37 onwards in those aged 50 years and over with a sample date within 10 days of symptom onset.

Supplementary table 2: Vaccine effectiveness 14 days after booster by interval between second dose and booster, and odds ratio (OR) of testing positive compared to the longest interval between second dose and booster

vaccination status	interval between dose 2 and 3	test negative	test positive	aOR vs 35+ weeks* (95 %CI)	aVE** (95% CI)
unvaccinated	n/a	10322	15481		base
BNT162b2- BNT162b2/ BNT162b2 boost 14+ days ago	25-29 wks	30976	3818	1.54 (1.35-1.76)	93.2 (92.8-93.6)
BNT162b2- BNT162b2/ BNT162b2 boost 14+ days ago	30-34 wks	4052	401	1.32 (1.12-1.56)	94.1 (93.4-94.8)
BNT162b2- BNT162b2/ BNT162b2 boost 14+ days ago ***	35+ wks	3226	272	baseline	95.6 (94.9-96.1)

* model without unvaccinated included ** model with unvaccinated included as baseline *** this group will be those with a short interval between doses 1 and 2