

# Results of COVID-19 Vaccine Effectiveness Studies: An Ongoing Systematic Review

## Weekly Summary Tables

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## 1. Summary of Study Results for Post-Authorization COVID-19 Vaccine Effectiveness#

(Detailed methods available on VIEW-hub Resources page: <https://view-hub.org/resources>)

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
290	<a href="#">Mayr et al* (June 22, 2022)</a>	USA	Test-negative case control	4.8 million veterans	Non-VOC, Alpha, Delta <sup>††</sup>	Excluded	BNT162b2	Symptomatic disease (all ages)	76.1 (71.1-80.2)	14 d-1 mo	2 weeks
									0.1 (-10.9-10.1)	7 mos	~26 weeks
								Symptomatic disease (<65 y)	81.6 (75.9-85.9)	14 d-1 mo	2 weeks
									22.5 (7.2-35.2)	7 mos	~26 weeks
								Symptomatic disease (65+ y)	66.3 (55.7-74.4)	14 d-1 mo	2 weeks
									-23.3 (-40.5 to -8.2)	7 mos	~26 weeks
								Hospitalization (all ages)	72.9 (61.7-80.7)	14 d-1 mo	2 weeks
									19.8 (2.5-34.1)	7 mos	~26 weeks
								Hospitalization (<65 y)	85.6 (72.6-92.4)	14 d-1 mo	2 weeks
									57 (31.2-73.2)	7 mos	~26 weeks
								Hospitalization (65+ y)	61 (41.3-74.2)	14 d-1 mo	2 weeks
									1.7 (-22-20.8)	7 mos	~26 weeks
							mRNA-1273	ICU admission or death (all ages)	74.7 (54.2-86)	14 d-1 mo	2 weeks
									39.5 (17.6-55.6)	7 mos	~26 weeks
								ICU admission or death (<65 y)	87.6 (61-96.1)	14 d-1 mo	2 weeks
									66.4 (7.7-87.8)	7 mos	~26 weeks
								ICU admission or death (65+ y)	67.4 (32.6-84.3)	14 d-1 mo	2 weeks
									29.3 (2.3-48.9)	7 mos	~26 weeks
								Symptomatic disease (all ages)	84.6 (80.5-87.8)	14 d-1 mo	2 weeks
									46.6 (40.8-51.9)	7 mos	~26 weeks
								Symptomatic disease (<65 y)	89.7 (84.8-93)	14 d-1 mo	2 weeks
									57.3 (48.4-64.7)	7 mos	~26 weeks
								Symptomatic disease (65+ y)	78.4 (71.1-83.9)	14 d-1 mo	2 weeks
									36.2 (27.7-43.6)	7 mos	~26 weeks
								Hospitalization (all ages)	76.6 (63.9-84.8)	14 d-1 mo	2 weeks
									71.3 (64-77.1)	7 mos	~26 weeks
								Hospitalization (<65 y)	92 (76.1-97.3)	14 d-1 mo	2 weeks
									83.1 (66.8-91.4)	7 mos	~26 weeks
								Hospitalization (65+ y)	66.1 (45.3-79)	14 d-1 mo	2 weeks
									64.7 (55.2-72.3)	7 mos	~26 weeks
							Ad26.COV2.S	ICU admission or death (all ages)	80.5 (64.1-89.4)	14 d-1 mo	2 weeks
									77.2 (68.4-83.5)	7 mos	~26 weeks
								ICU admission or death (<65 y)	89.2 (49.5-97.7)	14 d-1 mo	2 weeks
									84.4 (59-94.1)	7 mos	~26 weeks
							Ad26.COV2.S	ICU admission or death (65+ y)	75.4 (51.7-87.5)	14 d-1 mo	2 weeks
									73.8 (62.9-81.5)	7 mos	~26 weeks
							Ad26.COV2.S		25.4 (2.9-42.6)	14 d-1 mo	2 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
								Symptomatic disease (all ages)	25.5 (-2.2-45.6)	7 mos	~26 weeks
								Hospitalization (all ages)	55.8 (20.6-75.4)	14 d-1 mo	2 weeks
								ICU admission or death (all ages)	61.1 (11.9-82.8)	14 d-1 mo	2 weeks
									63.3 (-15.5-88.3)	7 mos	~26 weeks
289	<a href="#">Chemaitelly et al (July 26, 2022)</a>	Qatar	Retrospective cohort	35,806 children aged 12-17 years	Omicron <sup>^</sup>	Excluded	BNT162b2 (30 mcg)	Documented infection	51.3 (34.9-63.6)	14+	~68 weeks
				37,456 children aged 5-11 years			BNT162b2 (10 mcg)		-1.7 (-20-10)	172+	
				46,634 children aged 12-17 years	Alpha and Delta <sup>^</sup>		BNT162b2 (30 mcg)		49.6 (28.5-64.5)	14-30	
									-9.5 (-30-35)	>120	
									95.3 (92-97.2)	14-30	
									70.6 (18-92)	>152	
288	<a href="#">Mazagatos et al*(July 26,2022)</a>	Spain	Test-negative case control	1772 SARI patients aged 20 and older	Alpha and Delta <sup>^</sup>	Included	BNT162b2 or mRNA-1273	Hospitalization in 20-59 year old	95 (82-98)	<90	~19 weeks
								Hospitalization in 60-69 year old	91 (50-98)	>152	
								Hospitalization in 70-79 year old	97 (87-99)	<90	
								Hospitalization in 80+ year old	96 (47-100)	>152	
								Hospitalization in 20-59 year old	98 (90-100)	<90	~23 weeks
								Hospitalization in 60-69 year old	91 (24-99)	>152	
								Hospitalization in 80+ year old	86 (70-94)	<90	~33 weeks
								Hospitalization in 20-59 year old	48 (-51-82)	>152	
							Ad26.COVS.2	Hospitalization in 20-59 year old	71 (-3 - 92)	14+	~19 weeks
								Hospitalization in 60-69 year old	82 (-78-98)		
287	<a href="#">Tan et al* (July 20,2022)</a>	Singapore	Retrospective cohort	225,280 children aged 5-11 years	Omicron <sup>^</sup>	Excluded	BNT162b2	Hospitalization in 60-69 year old	48.8 (46.9-50.8)	7-14	~9 weeks
								PCR-confirmed infection	25.6 (19.3-31.5)	>60	
								Hospitalization	70.6 (65.9-74.7)	7-14	
									42.7 (12-62.7)	>60	
									87.8 (72.2-94.7)	7-14	
									80.4 (67-88.4)	30-59	
286	<a href="#">Hatfield et al* (July 20,2022)</a>	USA	Retrospective cohort	4,315 nursing home residents	Non-VOC, Alpha <sup>^</sup>	Excluded	BNT162b2	Documented infection	67 (40-82)	14-150	~44 weeks
					Delta <sup>^</sup>		mRNA-1273		75 (32-91)		
							BNT162b2		33 (-2-56)	>150	
							mRNA-1273		77 (48-91)		
285	<a href="#">Cerqueira-Silva et al* (July 18,2022)</a>	Brazil	Test-negative case control	2,471,576 individuals aged 18+	Omicron <sup>^</sup>	Included	CoronaVac	Symptomatic infection	-0.7 (-1.6-0.2)	14-180	~59 weeks
								Hospitalization or death	3.2 (2.1-4.2)	>180	
								Death	64.5 (62.6-66.3)	14-180	
									61.8 (60.3-63.2)	>180	
									67.8 (64-71.3)	14-180	
									63.1 (60.9-65.1)	>180	
284	<a href="#">Link-Gelles et al</a>	USA				Excluded		ED/UC encounter	47 (44-50)	14-140	~44 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	(July 15, 2022)		Test-negative case control	159,432 ED/UC encounters and hospitalizations in adults aged 18+	Omicron BA.1 <sup>^</sup>		BNT162b2 or mRNA-1273		39 (37-41)	≥150	
								Hospitalization	68 (63-73)	14-140	
									61 (58-63)	≥150	
				113,837 ED/UC encounters and hospitalizations in adults aged 18+	Omicron BA.2 <sup>^</sup>			ED/UC encounter	59 (40-71)	14-140	
									18 (10-26)	≥150	
								Hospitalization	57 (19-77)	14-140	
									24 (12-35)	≥150	
283	<a href="#">Guedalia et al</a> (July 11, 2022)	Israel	Retrospective cohort	82,803 pregnant women aged 16+	Omicron BA.1 <sup>^</sup>	Excluded	BNT162b2	Hospitalization	-12 (-36-8)	0+	~60 weeks
								Hospitalization with moderate disease	51 (-47-84)		
								Severe disease	83 (-47-98)		
					Delta <sup>^</sup>			Hospitalization	61 (51-69)		~44 weeks
								Hospitalization with moderate disease	97 (92-99)		
								Severe disease	96 (86-99)		
282	<a href="#">Stephenson et al*</a> (July 11, 2022)	USA	Retrospective cohort	2315 hospitalized individuals aged 18+	Non-VOC, Alpha <sup>††</sup>	Included	BNT162b2 or mRNA-1273	Hospitalization	85 (81-89)	14+	~18 weeks
281	<a href="#">Kerr et al*</a> (July 9, 2022)	Scotland	Test-negative case control	269,712 individuals aged 18+	Delta and Delta plus (AY.4.2) <sup>^</sup>	Unknown	BNT162b2	Symptomatic infection	78.7 (69.9-85)	14+	~38 weeks
							mRNA-1273		93.7 (86.4-97.1)		
							AZD1222		54.5 (35.7-67.8)		
280	<a href="#">Tonnara et al*</a> (July 4, 2022)	Republic of San Marino	Retrospective cohort	18,109 individuals aged ≥18 years	Alpha and Delta <sup>^</sup>	Excluded	Sputnik V	Documented infections	91.8 (86.3-95.1)	7-59	~27 weeks
									57.8 (42.2-69.2)	120+	
								Hospitalization	95.2 (79.1-98.9)	7-59	
									89.7 (52.7-97.7)	120+	
					Alpha <sup>^</sup>			Documented infections	97.3 (94.2-98.7)	7+	~15 weeks
								Hospitalization	96.9 (86.5-99.3)	7+	
279	<a href="#">Paternina-Cacedo et al*</a> (July 1, 2022)	Colombia	Retrospective cohort	7,19,735 adults aged ≥40 years	Mu <sup>^</sup>	Excluded	BNT162b2	Symptomatic disease	13 (5.3-20)	14+	~25 weeks
								Hospitalization	45.5 (29.4-58)		
								Critical care admission	82.2 (60.1-92.1)		
								Death	94.1 (76.4-98.5)		
							CoronaVac	Symptomatic disease	-45.1 (-53.6- -37.1)		
								Hospitalization	-3 (-18-10.2)		
								Critical care admission	13.6 (-13.2-34)		
								Death	20.6 (-0.5-37.3)		
278	<a href="#">Tartof et al</a> (June 30, 2022)	USA	Test-negative case control	29,507 hospital admissions and 36,306 ED admissions in	Omicron BA.1 specifically <sup>^</sup>	Included	BNT162b2	Hospitalization	54 (38-65)	<6 months	~70 weeks
									32 (16-45)	≥6 months	
								ED admissions	42 (31-52)	<6 months	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
				individuals aged ≥18 years	Omicron BA.2 specifically^				19 (6-31)	≥6 months	
								Hospitalization	56 (-2-81)	<6 months	
									56 (28-73)	≥6 months	
								ED admissions	27 (-11-52)	<6 months	
									12 (-10-31)	≥6 months	
277	<a href="#">Ionescu et al (June 28, 2022)</a>	Canada	Test-negative case control	193,899 tests among adolescents aged 12-17 in Quebec	Omicron^	Excluded	BNT162b2	Documented infection	41.9 (37.7-45.8)	14+	~26 weeks
									75.6 (65.8-82.6)	14-27	2 weeks
									33.9 (27.4-39.9)	168-195	~26 weeks
								Symptomatic disease	55.2 (49.5-60.3)	14+	
					Delta, Omicron^			Documented infection	82.8 (81-84.4)	14+	~22 weeks
									83.1 (68.9-90.8)	14-27	2 weeks
									75.4 (72.1-78.4)	140-167	~22 weeks
					Delta^			Symptomatic disease	87.9 (86.1-89.5)	14+	
								Documented infection	95.5 (95-96)	14+	~18 weeks
									97.7 (96.2-98.6)	14-27	2 weeks
									92.4 (90.4-94)	112-139	~18 weeks
								Symptomatic disease	97.3 (96.8-97.7)	14+	
				60,903 tests among adolescents aged 12-17 in British Columbia	Omicron^			Documented infection	33.9 (25.7-41.1)	14+	~26 weeks
									63.4 (21.4-83)	14-27	2 weeks
									22.2 (8.4-33.9)	168-195	~26 weeks
					Delta, Omicron^				88 (85.1-90.3)	14+	~22 weeks
									94.8 (83.7-98.4)	28-55	~6 weeks
									84.2 (77.8-88.8)	140-167	~22 weeks
					Delta^				95.7 (95.1-96.2)	14+	~18 weeks
									96.8 (94.4-98.2)	14-27	2 weeks
									90.9 (87.7-93.2)	112-139	~18 weeks
276	<a href="#">Cohen-Stavi et al* (June 29, 2022)</a>	Israel	Target trial emulation	94,728 matched pairs of children aged 5-11 years	Omicron^	Excluded	BNT162b2	Documented infection	51 (39-61)	7-21	1 week
							Symptomatic disease	48 (29-63)			
275	<a href="#">Carazo et al (June 27,2022)</a>	Canada	Test-negative case control	37,732 cases and 73,507 controls amongst HCWs in Quebec aged 18-59 years	Omicron BA.2 specifically^	Excluded	BNT162b2 or mRNA-1273	Documented infection	35 (27-42)	14+	~70 weeks
							Symptomatic disease	61 (52-69)			

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
274	<a href="#">Moline et al*</a> (June 27, 2022)	USA	Outbreak investigation	91 residents of skilled nursing facility aged 50+	Beta <sup>^</sup>	Excluded	BNT162b2 or mRNA-1273	Documented infection	65 (25-84)	14+	~12 weeks
273	<a href="#">Magro et al</a> (June 22, 2022)	USA	Matched case control	4,238 skilled nursing facility healthcare personnel aged 18-54 in California	Non-VOC, Alpha <sup>††</sup>	Included Excluded	BNT162b2 or mRNA-1273	Documented infection	71.7 (55.9-81.8) 72.7 (54.3-83.7)	14+	~10 weeks
272	<a href="#">Adams et al</a> (June 14, 2022)	USA	Prospective test-negative case control	3,181 hospitalised patients aged ≥18 years	<b>Omicron specifically<sup>^</sup></b>	Included	BNT162b2 mRNA-1273 BNT162b2 or mRNA-1273 Ad26.COV2.S	Hospitalization	46 (30-58) 47 (30-60) 40 (-668-95) 41 (9-62)	14+	~64 weeks
271	<a href="#">Gray et al *</a> (June 9, 2022)  [Published version of December 29, 2021 preprint; see reference #17 in Table 2]	South Africa	Test-negative case control	93,854 HCWs	<b>Omicron<sup>^</sup></b>	Excluded	BNT162b2	Hospitalization ICU admission	88 (62-96) 67 (63-71) 69 (56-79) 71 (65-76)	14-27 148-207 14-27 148-207	~30 weeks
270	<a href="#">Al Kaabi et al*</a> (June 9, 2022)	UAE	Retrospective cohort	1,153,515 vaccinated individuals matched with 1,153,515 unvaccinated individuals (18+ years)	Non-VOC <sup>^</sup>  Alpha <sup>^</sup>  Delta <sup>^</sup>	Excluded	BBIBP-CorV	Hospitalization Critical care admission Death Hospitalization Critical care admission Death Hospitalization Critical care admission Death	97.3 (95.7-98.3) 98.8 (95.3-99.7) 100 (100-100) 73.3 (70.6-75.7) 79.1 (73.1-83.7) 81.9 (66.9-90.1) 34.6 (14.2-50.2) 49.6 (0-76.4) 62.5 (31.4-79.5)	14+	~39 weeks
269	<a href="#">European Centre for Disease Prevention and Control</a> (March 14, 2022)	11 EU countries	Test-negative case control	4,828 hospitalized adults aged 30+	Non-VOC, Alpha <sup>††</sup> (pre-Delta <sup>^</sup> ) Delta <sup>^</sup>	Included	BNT162b2 BNT162b2 AZD1222	Hospitalization	94 (88-97) 82 (76-87) 79 (69-86)	14+	~45 weeks
268	<a href="#">European Centre for Disease Prevention and Control</a> (October 8, 2021)	10 EU countries	Test-negative case control	1456 hospitalized adults aged 65+	Non-VOC, Alpha <sup>††</sup> (pre-Delta <sup>^</sup> )	Included	BNT162b2	Hospitalization	91 (80-96)	14+	~22 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
267	<a href="#">Lewis et al*</a> (June 8, 2022)	USA	Test-negative case control	6208 adults (18+ years) hospitalized in 21 facilities across the US	Alpha, Delta <sup>^</sup>	Included	Ad26.COV2.S	Hospitalization: All	70 (63-75) 73 (60-82) 70 (54-81)	14+ 14-90 >180	~39.5 weeks
					Alpha <sup>^</sup>			Hospitalization: Immunocompromised	55 (31-72)	14+	
					Delta <sup>^</sup>			Hospitalization: All	68 (43-83) 72 (64-78)		
266	<a href="#">Lin et al*</a> (June 8, 2022)	USA	RCT crossover	14,164 placebo and 14,287 vaccinated participants 18+ years	Original & Alpha <sup>††</sup>	Excluded	mRNA-1273	Symptomatic disease	92.6 (80.5-97.2) 89.6 (41.7-98.2)	12 days 172 days	~0 weeks ~22.5 weeks
265	<a href="#">Richterman et al*</a> (June 6, 2022)	USA	Test-negative case control	14,520 tests among healthcare workers	Omicron <sup>^</sup> Delta <sup>^</sup>	Excluded	BNT162b2 mRNA-1273 BNT162b2 mRNA-1273	Symptomatic disease	41 (-17-87) 5 (-69-47) 75 (52-87) 73 (56-84)	14+	~63 weeks
264	<a href="#">Spicer et al*</a> (May 26, 2022)	USA	Test-negative case control	89,736 adolescents (aged 12-17 y) in Kentucky	Delta <sup>^</sup>	Excluded Previously infected only	BNT162b2 or mRNA-1273	Documented infection	81 (79.7-82.3) 78.3 (66.7-86.5)	14+	~36.5 weeks
263	<a href="#">Grewal et al*</a> (July 6, 2022)  [Update to June 1, 2022 preprint]	Canada	Test-negative case control	13,654 cases and 205,862 controls amongst LTCF residents aged 60+ in Ontario	Omicron specifically <sup>^</sup>	Included	BNT162b2 or mRNA-1273	Documented infection Symptomatic disease Hospitalization or death	6 (-5-15) 23 (1-40) 52 (33-65)	0+	~66 weeks
262	<a href="#">Carlsen et al*</a> (June 1, 2022)	Norway	Retrospective cohort study	21, 643 newborns	Omicron <sup>^</sup> Delta <sup>^</sup>	Excluded	BNT162b2 or mRNA-1273  (~4% of mothers received AZD1222 as first dose)	Documented infection during an infant's first 4 months of life (born to unvaccinated mothers and mothers vaccinated in 2 <sup>nd</sup> or 3 <sup>rd</sup> trimester) Documented infection during an infant's first 4 months of life (born to unvaccinated mothers and mothers vaccinated in 2 <sup>nd</sup> or 3 <sup>rd</sup> trimester)	30 (17-41) 71 (56-81)	14+	~45 weeks
261	<a href="#">Chin et al</a>	USA			Omicron <sup>^</sup>	Excluded		Documented infection	14.9 (12.3-19.7)	14+	~ 65 weeks



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	(May 27,2022)		Retrospective test-negative case control	15,783 resident and 8,539 staff cases, matched with 180,169 resident and 90,409 staff controls aged 18+		Included before July 01/2021	BNT612b2 or mRNA-1273		47.8 (46.6-52.8)		
						Included since July 01/2021			73.1 (69.8-80.1)		
260	<a href="#">Amir et al</a> (May 25, 2022)	Israel	Retrospective cohort	691,921 children 5-10 years	Omicron <sup>^</sup>	Excluded	BNT162b2	Documented infection	58.3 (54.6-61.5)	14-35	~2 weeks
259	<a href="#">Tsundue et al*</a> (May 24, 2022)	India	Prospective cohort	1114 residents of congregate living facilities in Dharamshala (all ages)	Delta <sup>^</sup>	Included	Covishield	Documented infection	98 (85-99.8)	14+	13 weeks
								Shortness of breath/ use of supplemental oxygen, hospitalisation, or death	99 (90-99.8)		
258	<a href="#">Paranthaman et al*</a> (May 20, 2022)	UK	Retrospective cohort	197,885 LTCF residents aged 65+ in England	Alpha, Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	62 (46-73)	7-34	~3 weeks
									47 (32-58)	147+	~37 weeks
								Death	86 (67-94)	7-34	~3 weeks
									69 (51-80)	147+	~37 weeks
							AZD1222	Documented infection	61 (40-74)	7-34	~3 weeks
									29 (10-43)	147+	~24.5 weeks
								Death	83 (58-94)	7-34	~3 weeks
									56 (33-70)	147+	~24.5 weeks
						Previously infected persons only	BNT162b2	Documented infection	79 (15-95)	7-34	~3 weeks
									80 (43-93)	147+	~37 weeks
							AZD1222	Documented infection	37 (-50-73)	7-34	~3 weeks
									65 (14-86)	147+	~24.5 weeks
257	<a href="#">Fano et al*</a> (May 18,2022)	Italy	Retrospective cohort	946,156 individuals aged 12+	Alpha, Delta <sup>^</sup>	Excluded	BNT612b2 or mRNA-1273	Documented infection	70.9 (69.3-72.4)	40-44	~48 weeks
									22.7 (18.5-26.8)	200+	
							AZD1222		76.3 (71.9- 80)	40-44	
									3.8 (0.0-9.2)	125+	
							Ad26.COV2.S		39.4 (28.3-48.8)	40-44	
									2.5 (0.0-9.1)	150+	
							AZD1222+ BNT612b2 or mRNA-1273		81.6 (75.3-86.3)	40-44	
									3.1 (0.0-12.0)	125+	
256	<a href="#">Tenforde et al*</a> (May 17, 2022)	USA	Case-control	10,078 adults (aged 18+) hospitalized at 21	Alpha, Delta <sup>++</sup>	Included	BNT162b2	Hospitalization (Overall)	88 (86-90)	14-179	~23.5 weeks
									79 (74-83)	180+	~47 weeks
							mRNA-1273		93 (91-94)	14-179	~23.5 weeks
									87 (83-90)	180+	~47 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated										
				hospitals across 18 states			BNT612b2 or mRNA-1273	Hospitalization: Immunocompetent persons	90 (88-91) 82 (79-85)	14-179 180+	~23.5 weeks ~47 weeks										
								Hospitalization: Immunocompromised persons	63 (55-69) 65 (57-72) 53 (38-65)	14+ 14-179 180+	~47 weeks ~23.5 weeks ~47 weeks										
									Hospitalization (Overall)	90 (88-91) 83 (80-86)	14-179 180+	~23.5 weeks ~47 weeks									
										Delta^											
								255	<a href="#">Lan et al*</a> (May 12, 2022)	USA	Retrospective cohort	4615 HCW in Massachusetts	Non-VOC, Alpha, Delta <sup>††</sup>	Excluded	BNT162b2 or mRNA-1273  <i>Note: A small proportion (~2.5%) received Ad26.COV2.S</i>	Documented infection	82.3 (75.1-87.4)  76.5 (40.9-90.6)	14+	~36 weeks		
				Delta^																	
254	<a href="#">Braeye et al*</a> (May 11, 2022)	Belgium	Retrospective cohort	139,140 contacts of 123,409 index cases among women aged 45-64	Alpha^	Excluded	BNT162b2	Documented infection	72 (70-74) 82 (79-84) 38 (34-44) 56 (51-59)	7-57 14-64 21-71 14-64	~28.5 weeks										
							mRNA-1273		64 (63-66) 44 (43-44) 75 (71-77) 56 (55-58) 33 (28-38) 22 (19-25) 49 (45-52) 35 (33-37)	7-57 157-207 14-64 164-214 21-71 171-221 14-64 164-214											
							Ad26.COV2.S														
							AZD1222														
							Delta^		Previously infected persons only	BNT162b2		Documented infection	87 (84-88) 82 (81-83) 87 (83-92) 85 (80-89) 88 (85-91) 87 (84-89) 88 (84-94) 83 (81-85)	7-57 157-207 14-64 164-214 21-71 171-221 14-64 164-214							
										mRNA-1273											
										Ad26.COV2.S											
										AZD1222											
										253			<a href="#">Martellucci et al*</a> (April 22, 2022)	Italy	Retrospective cohort	1,279,694 residents of the	Alpha, Delta, <b>Omicron</b> <sup>††</sup>	Excluded	BNT162b2	Documented infection	24 (23-25)
					Hospitalization	86 (84-88)															

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
				Abruzzo region (all ages)				Death	92 (90-94)		
							mRNA-1273	Documented infection	32 (31-34)		
								Hospitalization	90 (86-93)		
								Death	96 (92-98)		
							AZD1222	Documented infection	4 (1-6)		
								Hospitalization	93 (92-95)		
								Death	98 (96-99)		
							Ad26.COVS.2	Documented infection	12 (7-17)		
								Hospitalization	87 (73-94)		
252	<a href="#">Zahradka et al*</a> (May 3, 2022)	Czech Republic	Retrospective cohort	2101 kidney transplant recipients	Alpha^	Excluded	BNT162b2 or mRNA-1273	Documented infection	45.6 (12.4 -67.6)	14+	~12.5 weeks
251	<a href="#">Simwanza et al</a> (June 8, 2022)  [Update to May 7, 2022 preprint]	Zambia	Case-control	180 cases and 202 controls in a correctional facility 18+ y	Omicron^	Included	Ad26.COVS.2	Documented infection	63.6 (33.6-80.5)	14+	~13 weeks
								Symptomatic disease	73 (41.6-87.7)		
							AZD1222	Documented infection	89.4 (59.5-97.8)		
								Symptomatic disease	85.1 (19.5-98)		
250	<a href="#">Rennert et al</a> (May 7, 2022)	USA	Propensity matched case control	1,944 students aged 18-64 658 employees aged 18-65	Omicron^	Included	BNT162b2 mRNA-1273 BNT162b2 mRNA-1273	Documented infection	2.1 (-21.2-21) 17.3 (-10.8-38.3) 30.1 (-24.5-60.8) 14.4 (-64.2-55.4)	14+	~23 weeks
249	<a href="#">Ma et al*</a> (May 3, 2022)	China	Retrospective cohort/Outbreak investigation	1058 close contacts 18+ years	Delta^	Included	BBIBP-CorV CoronaVac Ad5-nCoV	Symptomatic disease Pneumonia Symptomatic disease Pneumonia Symptomatic disease Pneumonia Severe disease	75.5 (63-93.6) 56.5 (-95.9-90.4) 73 (22.3-96) 84.6 (18.8-97.1) 61.5 (9.5-83.6) 67.9 (1.7-89.9) 100 (CI omitted)	14+	~8 weeks
248	<a href="#">Carazo et al</a> (May 3, 2022)	Canada	Test-negative case control	224,007 cases and 472,432 controls among individuals (12+ y) in Quebec	Omicron^	Excluded Previously infected only	BNT162b2 or mRNA-1273	Documented infection Hospitalization Documented infection Hospitalization	42 (41-44) 76 (74-78) 23.2 (21.2-27.4) 68.4 (63.6-73.5)	7+	~51 weeks
247	<a href="#">Kirsebom et al</a> (May 1, 2022)	UK	Test-negative case control	759,450 adults aged 40-64 y 166,720 adults aged 65+ y	Omicron specifically^	Included	AZD1222	Symptomatic disease Symptomatic disease Hospitalization	8.0 (6.0-9.9) 19.5 (11.7-26.6) 61 (49.8-69.7)	175+	~44.5 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
					Delta specifically <sup>^</sup>			Hospitalization	73.4 (70.4-76.2)		
246	<a href="#">Florentino et al (April 29, 2022)</a>	Brazil	Test-negative case control	88,073 cases and 106,185 controls aged 6-11 years	<b>Omicron<sup>^</sup></b>	Included	CoronaVac	Symptomatic disease	41.5 (34.4-47.7)	14+	~12 weeks
								Hospitalization or death	63.5 (5.8-90)		
245	<a href="#">Zhang et al (April 27, 2022)</a>	Morocco	Case control	348,190 individuals 18+ years	Alpha <sup>††</sup>	Unknown	BBIBP-CorV	Critical hospitalization	88.5 (85.8-90.7)	14+	~21 weeks
244	<a href="#">Sharma et al* (April 27, 2022)</a>	USA	Matched case control	221,267 veterans	<b>Omicron<sup>^</sup></b>	Excluded	BNT162b2	Documented infection	25.3 (21.8-28.7)	14+	~42 weeks
								Hospitalization	52.9 (47.8-57.6)		
								Death	50.7 (37.9-61.6)		
							mRNA-1273	Documented infection	39.5 (35.8-43)		
								Hospitalization	66.7 (61.4-71.6)		
								Death	65.6 (52.8-76.3)		
243	<a href="#">Castillo et al* (April 21, 2022)</a>	France	Test-negative case control	761,744 cases 18+ years	<b>Omicron specifically<sup>^</sup></b>	Included	BNT162b2 or mRNA-1273	Symptomatic infection	43 (41-45)	0-30	~48 weeks
									11 (10-13)	>180	
								Hospitalization	59 (49-70)	0-30	
									56 (51-62)	>180	
								ICU admission	70 (40-97)	0-30	
									72 (63-81)	>180	
								Death	60 (24-92)	0-30	
									54 (41-69)	>180	
				166,009 cases	Delta specifically <sup>^</sup>			Symptomatic infection	78 (77-80)	0-30	
									63 (62-64)	>180	
								Hospitalization	91 (87-95)	0-30	
									90 (89-91)	>180	
								ICU admission	93 (86-99)	0-30	
									95 (93-97)	>180	
								Death	90 (79-100)	0-30	
									87 (83-91)	>180	
242	<a href="#">Eick-Cost et al* (April 20, 2022)</a>	USA	Case control	441,379 US military personnel	Pre-Delta <sup>^</sup> (Non-VOC, Alpha <sup>††</sup> )	Excluded	BNT162b2	Documented infection	87.6 (86.2-88.9)	14+	~19 weeks
								Asymptomatic infection	80.3 (76.5-83.5)		
								Symptomatic infection	89.9 (88.4-91.2)		
								Hospitalization	88.0 (75.4-94.1)		
							mRNA-1273	Documented infection	93.5 (91.9-94.7)		
								Asymptomatic infection	94.7 (91.9-96.6)		
								Symptomatic infection	93.1 (91.2-94.6)		
								Hospitalization	89.6 (57.5-97.4)		
							Ad26.COV2.S	Documented infection	81.8 (74.2-87.1)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated								
					Delta^			Asymptomatic infection	81.4 (62.6-90.8)	14+	~35 weeks								
								Symptomatic infection	82.4 (73.9-88.2)										
							BNT162b2	Documented infection	69.3 (68.2-70.3)			Asymptomatic infection	66.0 (64.0-67.8)						
								Symptomatic infection	71.0 (69.7-72.1)				Symptomatic infection	80.6 (79.4-81.8)					
								Hospitalization	88.4 (82.1-92.5)				Hospitalization	88.1 (75.7-94.2)					
								mRNA-1273	Documented infection				79.4 (78.3-80.4)	Asymptomatic infection	77.0 (75.1-78.8)				
					Symptomatic infection		80.6 (79.4-81.8)		Hospitalization			88.1 (75.7-94.2)							
					Ad26.COV2.S		Documented infection		38.3 (34.5-41.9)			Asymptomatic infection	19.6 (12.2-26.4)						
							Symptomatic infection		48.9 (45-52.7)			Hospitalization	57.7 (2.6-81.6)						
							241	<a href="#">Gonzales et al (April 19, 2022)</a>	Argentina			Retrospective cohort	1,536,435 children aged 3-17 years in Buenos Aires Province	Delta, <b>Omicron^</b>	Included	BNT162b2 or mRNA-1273 (ages 12-17)	Hospitalization	81 (59.9-90.1)	14+
					BBIBP-CorV (ages 3-11)											83.4 (70.9-90.2)		~9 weeks	
					<b>Omicron^</b>									BNT162b2 or mRNA-1273 (ages 12-17)		78.2 (42-90.3)		~25 weeks	
														BBIBP-CorV (ages 3-11)		58.6 (4.1-79.7)		16 weeks	
240	<a href="#">Cerqueira-Silva et al (April 14, 2022)</a>	Brazil	Test-negative case control	4,219,703 adults (aged 18+)	<b>Omicron^</b>	Included	BNT162b2	Symptomatic disease	36.9 (36.2-37.6)	2-9 weeks	7 weeks								
									6.9 (5.6-8.2)	20+ weeks	~26 weeks								
								Severe disease	74.5 (71.4-77.2)	2-9 weeks	7 weeks								
									71.5 (68.5-74.2)	20+ weeks	~26 weeks								
							AZD1222	Symptomatic disease	15.9 (14.3-17.4)	2-9 weeks	7 weeks								
									-1.4 (-2.2 to -0.6)	20+ weeks	~29 weeks								
							Severe disease	66.7 (61-71.6)	2-9 weeks	7 weeks									

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
									57.4 (55.8-58.9)	20+ weeks	~29 weeks
		Scotland		370,556 adults (aged 18+)			BNT162b2	Symptomatic disease	43.7 (37.3-49.5)	2-9 weeks	7 weeks
									-5.7 (-11.3 to -0.4)	20+ weeks	~32 weeks
								Severe disease	68.8 (-87-94.8)	2-9 weeks	7 weeks
									38.8 (-20-68.8)	20+ weeks	~32 weeks
							AZD1222	Symptomatic infection	18.1 (-6.7-37.2)	2-9 weeks	7 weeks
									-31.6 (-40.2 to -23.6)	20+ weeks	~29 weeks
								Severe disease	68.9 (-254.3-97.3)	10-19 weeks	17 weeks
48.4 (-20.1-77.8)	20+ weeks		~29 weeks								
239	<a href="#">Widdifield et al*</a> (April 14, 2022)	Canada	Test-negative case control	36,145 individuals with rheumatoid arthritis	Alpha, Delta^	Included	BNT162b2	Documented infection	82 (78-85)	7+	~44 weeks
						mRNA-1273		86 (80-90)			
						BNT162b2 or mRNA-1273	Documented infection	83 (80-86)			
							Severe outcomes	92 (88-95)			
				7863 individuals with ankylosing spondylitis		BNT162b2	Documented infection	88 (82-93)			
						mRNA-1273		93 (83-97)			
						BNT162b2 or mRNA-1273	Documented infection	89 (83-93)			
							Severe outcomes	97 (83-99)			
				47,199 individuals with psoriasis		BNT162b2	Documented infection	82 (79-85)			
						mRNA-1273		87 (82-91)			
						BNT162b2 or mRNA-1273	Documented infection	84 (81-86)			
							Severe outcomes	92 (86-95)			
				31,311 individuals with inflammatory bowel disease		BNT162b2	Documented infection	82 (79-85)			
						mRNA-1273		87 (82-91)			
						BNT162b2 or mRNA-1273	Documented infection	79 (74-82)			
							Severe outcomes	94 (88-97)			
238	<a href="#">Sanchez Ruiz et al*</a> (April 2022)	France	Retrospective cohort		Delta specifically^	Excluded	BNT162b2	Documented infection	11.2 (0-61.1)	14+	
							Symptomatic disease	88.4 (59.9-96.7)			

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated	
				72 LTCF residents in southern France				Severe disease	93.5 (67.2-98.7)			
237	<a href="#">Lind et al</a> (April 25,2022)  <i>[Update to April 20, 2022 preprint]</i>	USA	Test-negative case control	10,676 casesand 92,011 controls	Omicron specifically^	Excluded	BNT162b2 or mRNA-1273	Documented infection	28.5 (20-36.2)	14-140	~40 weeks	
									15.3 (10.4-20)	≥150		
									36.1 (7.1-56.1)	14-140		
									34 (18.5-46.5)	≥150		
			1:1 Matched case control						30.7 (20.6-39.6)	14-140		
									20 (14-25.6)	≥150		
									14.3 (-43.1-48.7)	14-140		
									18.8 (-9- 39.5)	≥150		
236	<a href="#">Gram et al</a> (April 20,2022)	Denmark	Retrospective cohort	4,056,935 individuals aged 12-59 years	Omicron^	Excluded	BNT162b2 or mRNA-1273	Documented infection	39.8 (38.4-41.2)	14-30	~56 weeks	
									13.2 (12.5-13.9)	>120		
								Hospitalization	62.4 (46.3-73.6)	14-30		
									65.9 (62-69.4)	>120		
					Delta^			Documented infection	92.2 (91.8-92.6)	14-30		
									64.9 (64-65.8)	>120		
								Hospitalization	99.1 (98-99.6)	14-30		
									91.6 (89.5-93.2)	>120		
				1,688,168 adults aged ≥60 years	Omicron^			Documented infection	39.9 (26.4-50.9)	14-30		
									4.7 (0.2-8.9)	>120		
								Documented infection	82.2 (75.3-87.1)	14-30		
									49.8 (46.5-52.8)	>120		
					Delta^			Hospitalization	97.7 (95.2-98.9)	31-60		
									86.2 (84.2-87.9)	>120		
								Documented infection	91 (88.5-92.9)	14-30		
									71.5 (54.7-82.1)	>120		
				Alpha^	Hospitalization			96.4 (92.6-98.3)	14-30			
								90.5 (67-97.2)	>120			
235	<a href="#">Vokó et al</a> (April 18,2022)	Hungary	Retrospective cohort		6,193,552 individuals aged 18-64 years  Note: VE for persons aged 65-100 years are also aavailable from publication; estimates are relatively similar	Delta^	Included	BNT162b2	Documented infection	70.3 (69.2-71.3)	14-120	~47 weeks
										0.6 (-2.3-3.4)	>240	
				Hospitalization					82.6 (80.1-84.7)	14-120		
									69.6 (64.9-73.6)	>240		
				Death					87.4 (81.5-91.5)	14-120		
									73.6 (61.1-82.1)	>240		
				mRNA-1273				Documented infection	76.9 (73.3-80.0)	14-120		
									22.6 (6.1-36.2)	>240		
								Hospitalization	84.9 (75.4-90.8)	14-120		
									42.5 (-4.0, 68.2)	>240		
								Death	77.7 (30.7-92.8)	14-120		
									100 (CI omitted)	>240		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated		
				across age groups.			AZD1222	Documented infection	39.2(36.4-41.9)	14-120			
									-14 (-20.5- -7.9)	>240			
								Hospitalization	76.2 (70.6-80.7)	14-120			
									48.8 (38.2-57.6)	>240			
								Death	90.1 (73.5-96.3)	14-120			
									57.1 (35.2-71.6)	>240			
							Sputnik V	Documented infection	38.3 (31.8-44.3)	14-120			
									-4.6 (-12.5-2.9)	>240			
								Hospitalization	90.4 (78.5-95.7)	14-120			
									78.7 (69.1-85.4)	>240			
								Death	89.3 (79.9-94.3)	121-180			
									79.1 (59.8-89.2)	>240			
							Ad26.COV2.S	Documented infection	39.3 (36.1-42.4)	14-120			
									35.9 (32.5-39.2)	181-240			
								Hospitalization	43.2 (32.9-52)	14-120			
									59.4 (50.1-67.0)	181-240			
								Death	59.8 (35.2-75.1)	14-120			
									76.1 (56.7-86.8)	181-240			
							BBIBP-CorV	Documented infection	10.9 (6.7-15)	14-120			
									-19.9 (-31.9- -9)	>240			
								Hospitalization	53.8 (43.9-61.9)	14-120			
									40.9 (24.4-53.8)	>240			
								Death	67.4 (39.2-82.5)	14-120			
									50.7 (21.4-69.1)	>240			
234	<a href="#">Richardson et al*</a> (June 19, 2022)  [Update to April 17, 2022 preprint]	Mexico	Prospective cohort	43,925 childcare workers	Non-VOC, Alpha, Gamma and Delta <sup>††</sup>	Excluded	CanSino	Documented infection	48 (32-61)	14-60	~33 weeks		
									-3 (-26-16)	>120			
								Hospitalization	92 (23-99)	14-60			
									24 (-263-84)	>120			
								Death	95 (53-100)	61-120			
									93 (22-99)	>120			
					Alpha and Gamma <sup>††</sup> Delta <sup>^</sup>			Documented infection	53 (23-71)	14+			
								Documented infection	18 (8-28)				
									Hospitalization	74 (38-89)			
								Death	94 (67-99)				
									233	<a href="#">Nasreen et al</a> (April 13, 2022)		Canada	Test-negative case control
98 (95-99)	≥112	~7 weeks											
AZD1222	96 (88-96)		7-55										
			97 (91-99)	≥56									
AZD1222+any mRNA	99 (98-100)		14+										



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
232	<a href="#">Cerqueira-Silva</a> (April 13, 2022)	Brazil	Test-negative case control	423,068 cases and 816,924 controls 18+ years	Omicron ^	Previously infected only	BNT162b2	Symptomatic infection	51.9 (50.0-53.8)	14-69	~59 weeks
									26.2 (22.8-29.4)	140+	
								Hospitalization	59.6 (36.6-74.2)	14-69	
								53.6 (30.2-69.1)	140+		
							AZD1222	Symptomatic infection	25.5 (1.0-29.7)	14-69	
									17 (14.4-19.6)	140+	
								Hospitalization	41 (-8.1-67.8)	14-69	
								55.4 (44.6-64.1)	140+		
							Ad26.COV2.S	Symptomatic infection	16.2 (12.4-19.8)	14+	
								Hospitalization	39.5 (8.3-69)		
			CoronaVac			Symptomatic infection	23.4 (18.2-28.3)	14-69			
							12.3 (9.4-15.1)	140+			
						Hospitalization	34.1 (-28.9-66.3)	14-69			
							34.4 (18.3-47.3)	140+			
			Matched case control			Previously infected only	BNT162b2	Symptomatic infection	54.1 (52.1-55.9)	14-69	
									30.6 (27.3-33.7)	140+	
							Hospitalization	53.6 (-6.4- 79.8)	14-69		
								55.1 (-1.9-80.2)	140+		
							AZD1222	Symptomatic infection	27.2 (22.9-31.3)	14-69	
									15.9 (13.2-18.5)	140+	
							Hospitalization	67.5 (-7.9-90.2)	14-69		
								63.2 (39.0-77.8)	140+		
							Ad26.COV2.S	Symptomatic infection	16.9 (13.2-20.5)	14+	
								Hospitalization	45.4 (-19.6-75.1)		
			CoronaVac			Symptomatic infection	27.3 22.3-31.9)	14-69			
							14.3 (11.4-17.0)	140+			
						Hospitalization	21.4 (-148.4-75.1)	14-69			
							66.4 (37.6-81.9)	140+			
231	<a href="#">Dale et al*</a> (April 12, 2022)	USA	Outbreak investigation	40 cases and 69 controls, 27+ years	Delta specifically^	Excluded	BNT162b2 or mRNA-1273	Documented infection	51(-27-81)	14+	~25 weeks
								Symptomatic infection	67(-7-90)		
								Hospitalization	61(-59-90)		
								Death	80(-10-96)		
230	<a href="#">Plumb et al</a> (April 12,2022)	USA	Test-negative case control	11,283 hospitalized adults	Omicron ^	Included	BNT162b2	Hospitalization	37.3 (25.8-46.9)	14+	~55 weeks
							mRNA-1273		35.9 (21.7-47.4)		
					Delta^		BNT162b2		50.0 (39.0-59.0)		
							mRNA-1273		44.0 (29.9-55.2)		
229		Chile				Included	BNT162b2		85.3 (73.5-91.8)	14+	~53 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">Institute of public health</a> (April 12, 2022)		Test-negative case control	2,181 cases and 979 controls	Lambda, Gamma and Delta <sup>^</sup>		CoronaVac	Hospitalization with SARI	59.5 (49-67.9)		
228	<a href="#">Kildegaard et al*</a> (April 11, 2022)	Denmark	Retrospective cohort	404,975 adolescents aged 12-17 years	Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	93 (93-94)	0-59	~13 weeks
227	<a href="#">Kim et al</a> (April 10, 2022)	USA	Test-negative case control	2,208 cases and 1639 controls 18+ years	<b>Omicron specifically<sup>^</sup></b>	Included	BNT162b2 or mRNA-1273	Symptomatic disease	45 (14-66)	14-149	~58 weeks
					Delta specifically <sup>^</sup>				11 (-21-35)	150+	~48 weeks
									89 (78-94)	14-149	
									58 (44-68)	150+	
226#	<a href="#">Buchan et al</a> (April 7, 2022)	Canada	Test-negative case control	9,202 cases and 19,953 controls 12-17 years old	<b>Omicron specifically<sup>^</sup></b>	Included	BNT162b2	Symptomatic disease	51 (38-61)	7-59	~41 weeks
									29 (17-38)	180+	
								Severe disease	76 (-10-95)	7-59	
									88 (77-94)	180+	~32 weeks
				502 cases and 19,930 controls aged 12-17 years	Delta specifically <sup>^</sup>			Symptomatic disease	97 (94-99)	7-59	
									90 (79-95)	180+	
225	<a href="#">Paraguay Ministry of Health and Social Welfare</a> (March 22, 2022)	Paraguay	Test-negative case-control	2953 patients ≥ 16 years with severe acute respiratory infection	Gamma and Delta <sup>^</sup>	Excluded	BBV152 AZD1222 Hayat vax Sputnik v BNT162b2	Hospitalization with SARI	27.7 (-10.2-52.6) 85.8 (70.6-93.1) 56.4 (15.5-77.6) 77.0 (30.8-92.3) 95.4 (65.7-99.4)	14+	~38 weeks
224	<a href="#">Kwon et al*</a> (April 6, 2022)	USA	Test-negative case control	440 solid organ transplant recipients; 1684 patients with other immunocompromising conditions; 8301 immunocompetent individuals	Alpha and Delta <sup>^</sup>	Included	BNT162b2 or mRNA-1273	Hospitalization in solid organ transplant recipient (SOTR)	29 (-19-58)	14+	~37 weeks
								Hospitalization in immunocompromised adults	72 (64-79)		
								Hospitalization in immunocompetent adults	88 (87-90)		
								Supplemental oxygen/oxygen support in SOTR	31 (-27-63)		
								Supplemental oxygen/oxygen support in immunocompromised	73 (64-80)		
								Supplemental oxygen/oxygen support in immunocompetent	90 (89-92)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
223	<a href="#">Yoon et al*</a> (April 6, 2022)	USA	Prospective cohort	3241 HCWs	Omicron specifically^ Delta specifically^	Excluded	BNT162b2 or mRNA-1273	Documented infection	46 (25-61) 65 (49-76)	14+	~21 weeks
222	<a href="#">Florentino et al</a> (April 5, 2022)	Brazil	Test-negative case control	447,882 tests among adolescents aged 12-17	Omicron^ Delta^	Included	BNT162b2	Symptomatic disease	62.8 (60.9-64.7) 13.9 (10.9-16.9)	14-27 98+	2 weeks ~21 weeks
		Scotland		375,385 tests among adolescents aged 12-17	Omicron^ Delta^			Severe disease	75.4 (57.3-85.9) 84.9 (75.2-90.8)	14-27 98+	2 weeks ~21 weeks
								Symptomatic disease	85.8 (83.9-87.5) 40.3 (31.9-47.7)	14-27 56-69	2 weeks ~8 weeks
								Symptomatic disease	78.3 (75.3-80.9) 31.3 (4.8-50.5)	14-27 98+	2 weeks ~15.5 weeks
								Symptomatic disease	89.3 (78-94.8) 78.4 (53.8-89.9)	14-27 56-69	2 weeks ~8 weeks
221	<a href="#">Ranzani et al</a> (April 1, 2022)	Brazil	Test-negative case control	1,339,986 matched pairs of adults	Omicron^ Delta^	Included	CoronaVac	Symptomatic disease	26.9 (25.1-28.6) 8.1 (7-9.1)	14-59 180+	~6 weeks ~55 weeks
								Hospitalization or death	49.9 (30.7-63.7) 57 (53.5-60.2)	14-59 180+	~6 weeks ~55 weeks
								Symptomatic disease	51 (49.6-52.4) 33.5 (31.7-35.3)	14-59 180+	~6 weeks ~55 weeks
								Hospitalization or death	86.7 (83.8-89.2) 57.3 (53.4-60.9)	14-59 180+	~6 weeks ~55 weeks
220	<a href="#">Nordstrom et al*</a> (March 31, 2022)	Sweden	Retrospective cohort	6,530,128 individuals	Non-VOC, Alpha, Delta^	Previously infected only	BNT162b2 or mRNA-1273 AZD1222	Documented infection	68 (63-72) 25 (-37-59)	14+	~38 weeks
219	<a href="#">Pardo-Seco et al*</a> (March 29, 2022)	Spain	Test-negative case control	2,280,288 adults (18+ y) in Galicia	Non-VOC, Alpha <sup>††</sup>	Excluded	BNT162b2	Documented infection	90.8 (88.6-92.7)	14+	~7.5 weeks
218	<a href="#">Starrfelt et al</a> (March 30, 2022)	Norway	Retrospective cohort	4,301,995 adults (18+ y)	Delta^	Excluded	BNT162b2	Documented infection	77.7 (76.8-78.5) 8.2 (3.4-12.8)	2-9 weeks >33 weeks	~7 weeks ~43 weeks
								Hospitalization	97.5 (95.6-98.6) 63.9 (54.3-71.5)	2-9 weeks >33 weeks	~7 weeks ~43 weeks
							mRNA-1273	Documented infection	86.6 (85.6-87.6) 28.6 (9.6-43.6)	2-9 weeks >33 weeks	~7 weeks ~43 weeks
								Hospitalization	95.3 (91.5-97.4) 91.1 (84.9-94.8)	18-25 weeks 26-33 weeks	~23 weeks ~31 weeks
							Heterologous mRNA	Documented infection	84.1 (83.2-85) 40.7 (23.9-53.8)	2-9 weeks 18-25 weeks	~7 weeks ~23 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated		
217	<a href="#">Marra et al*</a> (March 30, 2022)	Brazil	Retrospective cohort	13,813 HCWs (aged 18+)	Gamma^	Excluded	CoronaVac	Documented infection	51.3 (34.6-63.7)	14+	~23 weeks		
							AZD1222		88.1 (82.8-91.7)		~15 weeks		
216	<a href="#">Price et al*</a> (March 30, 2022)	USA	Test-negative case control	2812 children aged 5-18	Omicron^	Included	BNT162b2	Hospitalization (12-18 years)	40 (9-60)	14+	~42 weeks		
									43 (-1-68)	14-160	~20 weeks		
									38 (-3-62)	161-314	~42 weeks		
					Delta^			Hospitalization (5-11 years)	68 (42-82)	14+	~11 weeks		
								Hospitalization (12-18 years)	92 (89-95)	14+	~42 weeks		
									93 (89-95)	14-160	~20 weeks		
									92 (80-97_	161-314	~42 weeks		
215	<a href="#">Hansen et al</a> (March 30, 2022)	Denmark	Retrospective cohort	3,090,833 participants aged 12+	Omicron^	Excluded	BNT162b2	Documented infection	37 (35.6-38.3)	14-30	~2 weeks		
									9.8 (9.2-10.4)	121+	~30 weeks		
								Hospitalization	50.5 (33.9-63)	14-30	~2 weeks		
									51.6 (47.2-55.6)	121+	~30 weeks		
							mRNA-1273		Documented infection	37.9 (34.4-41.2)	14-30	~2 weeks	
										13.2 (12.3-14.2)	121+	~30 weeks	
214	<a href="#">Natarajan et al</a> (March 29, 2022)	USA	Test-negative case control	80,287 ED/UC encounters and 25,244 hospitalizations among adults with COVID-19 like illness	Omicron^	Included	Ad26.COV2.S	Emergency Dept/ Urgent Care Visits	24 (18-29)	14+	40 weeks		
								Hospitalization	31 (21-40)				
213	<a href="#">Wang et al</a> (March 25, 2022)	USA	Test-negative case control	249,070 patients	Omicron^	Included	Any mRNA vaccine	Documented infection	26 (22-30)	14-179	~23.5 weeks		
									7 (4-10)	180+	54 weeks		
					Delta^				70 (68-72)	14-179	~23.5 weeks		
									53 (52-55)	180+	54 weeks		
212	<a href="#">Veneti et al</a> (March 25,2022)	Norway	Retrospective cohort	117,681	Omicron^	Excluded	BNT162b2	Documented infections	53.1 (42.6-61.7)	7-34	~12 weeks		
									23.3 (2.7–39.5)	≥63			

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
				children aged 16-17 years	Delta^				89.9 (82.8-94.1)	7-34	
									80.3 (60.0-90.3)	≥63	
211	<a href="#">Tenforde et al (March 25, 2022)</a>	USA	Case-control	7,544 hospitalised patients	<b>Omicron^</b>	Included	BNT162b2 & mRNA-1273	Invasive mechanical ventilation or in-hospital death	79 (66-87)	14+	~45 weeks
					Delta^				88 (86-90)		
					Alpha, Delta, Omicron^				92 (90-94)	14-150	
									84 (80-87)	>150	
210	<a href="#">Stowe et al (April 1, 2022)</a>	UK	Test-negative case control	115,720 cases and 294,265 controls	<b>Omicron^</b>	Included	BNT162b2	Hospitalisation with ARI in 18-64 year olds	73.8 (62.5-81.7)	14-174	~43 weeks
									65.1 (51.3-74.9)	175+	
								Hospitalisation with ARI in 65+ year olds	87.6 (79.4-92.5)	14-174	
									65.4 (56.6-72.5)	175+	
							AZD1222	Hospitalisation with ARI in 18-64 year olds	59 (31.9-75.3)	14-174	
									53 (41.7-62)	175+	
								Hospitalisation with ARI in 65+ year olds	71.2 (50-83.4)	14-174	
									53.1 (43.4-61.2)	175+	
209	<a href="#">Horne et al* (July 20, 2022)</a>  <i>[Published version of March 23, 2022 preprint]</i>	UK	Retrospective cohort	2,041,550 aged 18-39 years	Alpha, Delta, Omicron^	Excluded	BNT162b2	Documented infection	76 (75-77)	21-42	~30 weeks
									-53 (-118- -7)	161-182	
								Hospitalization	96 (94-98)	21-42	
									82 (71-90)	133-154	
				1,161,649 aged 40-64 years			BNT162b2	Documented infection	73 (69-77)	21-42	
									-3 (-15-7)	161-182	
							AZD1222	Documented infection	21 (18-24)	21-42	
									-99 (-105- -94)	161-182	
								Hospitalization	95 (93-96)	21-42	
									86 (83-88)	161-182	
								Death	55 (-5-81)	105-126	
									41 (-7-68)	161-182	
				1,318,688 aged 18-64 years and clinically vulnerable			BNT162b2	Documented infection	34 (30-39)	21-42	
									4 (-1-8)	161-182	
								Hospitalization	95 (94-97)	49-70	
									91 (88-93)	161-182	
								Death	96 (91-98)	77-98	
									92 (86-96)	161-182	
							AZD1222	Documented infection	34 (30-39)	21-42	
									-45 (-50- -40)	161-182	
								Hospitalization	92 (88-95)	21-42	
									75 (71-78)	161-182	
								Death	92 (88-95)	77-98	
									87 (81-92)	161-182	
				2,072,308 aged 65+ years			BNT162b2	Documented infection	81 (74-86)	21-42	
									15 (8-22)	161-182	
								Hospitalization	91 (86-95)	21-42	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
207	Altarawneh et al* (June 15, 2022)  [Update to March 31, 2022 study]	Qatar	Test-negative case control	158,484 individuals, all ages	Omicron BA.1 specifically^	Previously infected only	BNT162b2	Death	80 (76-82)	161-182	44 weeks
									98 (93-99)	21-42	
									88 (84-91)	161-182	
							AZD1222	Documented infection	53 (41-62)	21-42	
									-21 (-30- -13)	161-182	
								Hospitalization	88 (85-90)	21-42	
						Excluded	BNT162b2		75 (71-79)	161-182	
								Death	90 (84-94)	21-42	
									83 (77-88)	161-182	
							mRNA-1273	Symptomatic infection	51.7 (43.5-58.7)	14+	
								Hospitalization and death	96.2 (37.7-99.8)		
								Symptomatic infection	44.3 (30.4-55.4)		
						Omicron BA.2 specifically^	BNT162b2	Hospitalization and death	100 (-51.5-100)		
								Symptomatic infection	-4.9 (-16.4-5.4)		
								Hospitalization and death	96.8 (71.1-99.6)		
							mRNA-1273	Symptomatic infection	-2.7 (-16.8-9.7)		
								Hospitalization and death	88.8 (-1.7-98.8)		
								Symptomatic infection	55.1 (50.9-58.9)		
						Omicron specifically	BNT162b2	Hospitalization and death	97.8 (82.6-99.7)		
								Symptomatic infection	47.9 (40.8-54.1)		
								Hospitalization and death	100 (55.4-100)		
							mRNA-1273	Symptomatic infection	-1.1 (-7.1-4.6)		
								Hospitalization and death	76.8 (58-87.1)		
								Symptomatic infection	-7.3 (-15.6-0.3)		
						Previously infected only	BNT162b2	Hospitalization and death	84.8 (47.9-95.6)		
								Symptomatic infection	55.5 (51.8-59)		
							mRNA-1273	Hospitalization and death	94.3 (81.3-98.3)		
								Symptomatic infection	52 (45.8-57.4)		
						Excluded	BNT162b2	Hospitalization and death	100 (CI omitted)		
								Symptomatic infection	-0.2 (-5.5-4.9)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
								Hospitalization and death	73.5 (60.5-82.2)		
							mRNA-1273	Symptomatic infection	2.2 (-4.6-8.5)		
								Hospitalization and death	66.3 (38.3-81.6)		
206	<a href="#">Can et al</a> * (March 19, 2022)	Turkey	Retrospective cohort	4067 HCWs	Alpha^	Excluded	CoronaVac	Documented infection	39 (20-64)	14+	13 weeks
205	<a href="#">Rearte et al</a> * (March 15, 2022)	Argentina	Test-negative case control	95,519 cases and 141,811 controls	Alpha, Gamma and Delta <sup>††</sup>	Excluded	AZD1222	Documented infection	68.5 (67-69)	21+	~26 weeks
								Death	93.7 (93.2-94.3)		
							BBIBP-CorV	Documented infection	43.6 (42-45)		
								Death	85 (84-86)		
							Sputnik-V	Documented infection	64 (63-65)		
								Death	93.1 (92.6-93.5)		
204	<a href="#">Jara et al</a> * (May 23, 2022) [Published version of March 15, 2022 preprint]	Chile	Retrospective cohort	490,064 children aged 3-5 years	Omicron specifically^	Excluded	CoronaVac	Documented infection	37.9 (36.1-39.6)	14+	~12 weeks
								Hospitalization	65.2 (50.4-75.6)		
								ICU admission	68.8 (18-88.1)		
203	<a href="#">Baum et al</a> (July 6, 2022) [Update to March 13, 2022 preprint]	Finland	Retrospective cohort	896,220 older adults (aged 70+)	Non-VOC, Alpha, Delta, Omicron^	Excluded	BNT162b2	Hospitalization	93 (89-95)	14-90	~56 weeks
									69 (63-74)	181+	
								ICU admission	98 (92-99)	14-90	
									79 (65-87)	181+	
							mRNA-1273	Hospitalization	93 (82-97)	14-90	
									73 (59-83)	181+	
								ICU admission	100 (CI omitted)	14-90	
									93 (46-99)	181+	
							AZD1222	Hospitalization	81 (49-93)	14-90	
									48 (17-68)	181+	
								ICU admission	78 (2-95)	14-90	
									64 (-14-89)	181+	
					Delta^		BNT162b2	Hospitalization	90 (78-96)	14-90	~48.5 weeks
									79 (71-84)	181+	
							mRNA-1273		92 (42-99)	14-90	
									87 (70-94)	181+	
							AZD1222		79 (67-87)	91-180	
									23 (-76-67)	181+	
					Omicron^		BNT162b2	Hospitalization	91 (83-95)	14-90	~56 weeks
									58 (48-66)	181+	
							mRNA-1273		79 (43-92)	14-90	
									60 (34-75)	181+	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
							AZD1222		37 (-154-85) 51 (12-73)	91-180 181+	
202	<a href="#">Shrotri et al (March 12, 2022)</a>	UK	Prospective cohort	15,518 long-term care facility residents	Alpha and Delta^	Excluded	BNT162b2 & mRNA-1273	Documented infection	25.5 (-57.5-64.7) 26.3 (-21.7-55.4)	14-83 84+	45 weeks
								Hospitalization	88.8 (16.8-98.5) 65.1 (33.6-81.6)	14-83 84+	
								Deaths	100 66.1 (26-84.4)	14-83 84+	
							AZD1222	Documented infection	62.1 (12.1-83.6) 13.6 (-33.2-43.9)	14-83 84+	
								Hospitalization	82.7 (46.4-94.4) 48.7 (12.5-70)	14-83 84+	
								Deaths	91.7 (65.1-98) 61.1 (26.2-79.5)	14-83 84+	
				19,515 staff			BNT162b2 & mRNA-1273	Documented infection	60.7 (44.2-72.4) 45.1 (31.3-56.2)	14-83 84+	
								Hospitalization	100 92.1 (69.3-97.9)	14-83 84+	
							AZD1222	Documented infection	29 (-10.3-54.3) 36.9 (20.6-49.9)	14-83 84+	
								Hospitalization	100 (CIs omitted) 89.6 (64.4-96.9)	14-83 84+	
201#	<a href="#">Fowlkes et al (March 11, 2022)</a>	USA	Prospective cohort	1052 children aged 5-11 years, 312 children aged 12-15 years	Omicron specifically ^  Delta specifically ^	Excluded	BNT162b2	Documented infection 5-11 years	31 (9-48) 59 (24-78) 59(22-79) 62 (-28-89)	14-82 14+ 14-149 ≥150	~29 weeks
								Documented infection, 12-15 years	81 (51-93) 87(49-97) 60 (-35-88)	14+ 14-149 ≥150	
								Documented infection, 12-15 years			
200	<a href="#">Ashmawy et al (March 11, 2022)</a>	Egypt	Ambispective cohort	1,228 HCWs	Delta^	Included	BBIBP-CorV	Symptomatic infection	67 (43-80) 46 (24-62)	14+	~29 weeks
								Hospitalization	65 (-8-88)		
199	<a href="#">Oliveira et al* (March 3, 2022)</a>	USA	Matched-case control	186 case participants and 356 matched control	Delta^	Excluded	BNT162b2	Documented infection	91 (33-99) 83 (34-95)	1-4 wk 13-17 wk	~11 weeks
								Symptomatic infection	93 (81-97)	14+	



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
				participants aged 12 to 18 years				Asymptomatic infections	85 (57-95)	14+	
198	<a href="#">Oliver et al*</a> (March 9,2022)	Canada	Retrospective cohort	13,579 individuals in hemodialysis	Alpha <sup>^</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	69 (58-78)	7+	~22 weeks
								Severe disease	83 (70-90)		
								Hospitalization	82 (69-90)		
								Deaths	85 (59-95)		
197	<a href="#">Perry et al*</a> (March 3, 2022)	UK	Retrospective cohort	1,262,689 adults aged 50 or older in Wales	Alpha, Delta <sup>^</sup>	Included	BNT162b2	Documented infection	50 (44-55)	>6	~26.5 weeks
								Hospitalization	88 (81-93)		
							AZD1222	Documented infection	25 (15-33)		~18 weeks
								Hospitalization	81 (71-88)		
196	<a href="#">Wright et al*</a> (February 25, 2022)	USA	Case control	9667 cases and 38,668 controls (18 years or older)	Alpha, <sup>††</sup> Delta <sup>^</sup>	Included	BNT162b2	Severe disease	87.9 (86.7-89)	14+	~40 weeks
							mRNA-1273		92.9 (92-93.7)		
							Ad26.COV2.S		73 (68.8-76.6)		
195	<a href="#">Klein et al</a> (March 1,2022)	USA	Test-negative case control	39,217 ED and UC encounters and 1,699 hospitalizations among persons aged 5–17 years	Omicron <sup>^</sup>	Unknown	BNT162b2	ED or UC encounters in 5-11 years	51 (30–65)	14-67	~33 weeks
								ED or UC encounters in 12-15 years	45 (30-57)	14-149	
								ED or UC encounters in 16-17 years	-2 (-25-17)	150+	
								ED or UC encounters in 16-17 years	34 (8-53)	14-149	
									-3 (-30-18)	150+	
					Delta <sup>^</sup>	Unknown	BNT162b2	ED or UC encounters in 12-15 years	92 (89-94)	14-149	~33 weeks
								ED or UC encounters in 16-17 years	79 (68-86)	150+	
								Hospitalizations in 5-11 years	85 (81-89)	14-149	
								Hospitalizations 12-15 years	77 (67-84)	150+	
					Omicron or Delta <sup>^</sup>			Hospitalizations 16-17 years	74 (-35-95)	14-67	
								Hospitalizations 12-15 years	92 (79-97)	14-149	
								Hospitalizations 16-17 years	73 (43-88)	150+	
									94 (87-97)	14-149	
									88 (72-95)	150+	
194	<a href="#">Šmíd et al</a> (February 25, 2022)	Czech Republic	Retrospective cohort	8,173,828 individuals, all ages	Omicron <sup>^</sup>	Included	BNT162b2	Documented infection	49 (48-50)	14-74	~54 weeks
									11 (10-12)	135+	
								Hospitalisation	46 (28-60)	14-74	
									34 (24-42)	135+	
							mRNA-1273	Documented infection	48 (44-52)	14-74	
									20 (17-22)	135+	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated			
								Hospitalisation	51 (-20-80)	14-74				
									31 (9-49)	135+				
							AZD1222	Documented infection	51 (23-69)	75-135				
									5 (1-9)	135+				
							Hospitalisation	-139 (-861-41)	75-135					
								13 (-8-30)	135+					
							Ad26.COV2.S	Documented infection	47 (45-49)	14-74				
									35 (33-38)	135+				
							Hospitalisation	28 (-22-57)	14-74					
								38 (8-58)	135+					
							Delta^	Included	BNT162b2	Documented infection		82 (81-83)	14-74	~54 weeks
												54 (53-55)	135+	
					Hospitalisation	80 (72-85)			14-74					
						81 (79-82)			135+					
					mRNA-1273	Documented infection			71 (65-76)	14-74				
									68 (66-69)	135+				
					Hospitalisation	100 (CI omitted)			14-74					
						82 (78-85)			135+					
					AZD1222	Documented infection	65 (57-72)	75-135						
							45 (43-48)	135+						
Hospitalisation	80 (62-89)	75-135												
	68 (64-71)	135+												
Ad26.COV2.S	Documented infection	60 (57-63)	14-74											
		54 (50-57)	135+											
Hospitalisation	54 (39-65)	14-74												
	61 (51-69)	135+												
193	<a href="#">Cura-Bilbao et al* (February 2, 2022)</a>	Spain	Prospective cohort	925,915 residents of Aragon, Spain	Non-VOC, Alpha <sup>††</sup>	Excluded	BNT162b2	Documented infection	70 (65.3-74.1)	7+	~16 weeks			
mRNA-1273		70.3 (52.2-81.5)	14+											
192	<a href="#">Shen et al* (February 23, 2022)</a>	USA	Retrospective cohort	5,536 immuno-suppressed individuals	Non-VOC, Alpha, <sup>††</sup> Delta^	Excluded	BNT162b2	Documented infection	41 (9-62)	14+	~36 weeks			
mRNA-1273		48 (18-67)												
Ad26.COV2.S		66 (-30-91)												
191	<a href="#">Mallow et al* (February 9, 2022)</a>	USA	Test-negative case control	13,203 emergency department patients (aged 18+)	Non-VOC, Alpha, <sup>††</sup> Delta^	Unknown	BNT162b2	Emergency department visit	73.9 (66.3-79.8)	14+	~31 weeks			
mRNA-1273		78 (68.1-84.9)												
190	<a href="#">Wu et al (January 10,2022)</a>	China	Retrospective cohort	1,462 close contacts	Delta^	Excluded	BBIBP-CorV	Symptomatic disease	50.5 (3.8-74.6)	14+	~24 weeks			
39.3 (-20.4-69.4)	≤3 mos.													
82 (-25.7-97.4)	4-6 mos.													

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
								Pneumonia	54.7 (-3.4-80.2)	14+	
									39.6 (-35.4-73.1)	≤3 mos.	
							CoronaVac	Symptomatic disease	39.1 (-0.9-63.3)	14+	
									45.5 (-5.9-71.9)	≤3 mos.	
									29.8 (-41.1-65.1)	4-6 mos.	
								Pneumonia	64.9 (22.8-84.0)	14+	
	73.8 (17.9-91.6)	≤3 mos.									
								47.4 (-44.3-80.8)	4-6 mos.		
189	<a href="#">Filon et al*</a> (February 15, 2022)	Italy	Retrospective cohort	4251 HCWs	Non-VOC and Alpha <sup>††</sup>	Excluded	BNT162b2	Documented infection (March)	95 (92-98)	7+	~16 weeks
								Documented infection (April)	95 (92-98)		
								Documented infection (May)	80 (70-84)		
187	<a href="#">Halasa et al*</a> (June 22, 2022)  [Update to February 15, 2022 preprint]	USA	Test-negative case control	537 case-infants and 512 control-infants< 6 months hospitalized in 20 pediatric hospitals	Delta, <b>Omicron^</b>	Included	BNT162b2 & mRNA-1273	Hospitalization in infants with maternal vaccination anytime during pregnancy up to 14 days before delivery	52 (33-65)	14+	~33 weeks
					<b>Omicron^</b>			Hospitalization in infants with maternal vaccination in first 20 weeks of pregnancy	38 (3-60)		
								Hospitalization in infants with maternal vaccination from 21 weeks up to 14 days before delivery	69 (50-80)		
								Hospitalization in infants with maternal vaccination anytime during pregnancy up to 14 days before delivery	38 (8-58)		
								Hospitalization in infants with maternal vaccination in first 20 weeks of pregnancy	25 (-26-56)		
								Hospitalization in infants with maternal vaccination from 21 weeks up to 14 days before delivery	57 (25-75)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
					Delta <sup>^</sup>			Hospitalization in infants with maternal vaccination anytime during pregnancy up to 14 days before delivery	80 (60-90)		
								Hospitalization in infants with maternal vaccination in first 20 weeks of pregnancy	68 (19-87)		
								Hospitalization in infants with maternal vaccination from 21 weeks up to 14 days before delivery	88 (68-96)		
186	<a href="#">Jara et al</a> (February 15, 2022)	Chile	Prospective cohort	1,976,344 children aged 6-16 years	Delta <sup>^</sup>	Excluded	CoronaVac	Documented infection (6-16 years)	74.8 (74.1-75.5)	14+	~28 weeks
								Hospitalization (6-16 years)	91.3 (88.1-93.6)		
								ICU admission (6-16 years)	93.8 (85.7-97.3)		
							BNT162b2	Documented infection (12-16 years)	84.4 (83.7-85.0)		~30 weeks
								Hospitalization (12-16 years)	93.5 (90.4-95.6)		
								ICU admission (12-16 years)	98.0 (89.9-99.6)		
185	<a href="#">Ferdinands et al</a> (February 11, 2022)	USA	Test-negative case control	241,204 ED/UC encounters and 93,408 hospitalizations	Omicron <sup>^</sup>	Included	BNT162b2 & mRNA-1273	ED or UC encounters	69 (62-75) 37 (34-40)	< 2 mos ≥5 mos	~25 weeks
					Delta <sup>^</sup>			Hospitalization	71 (51-83) 54 (48-59)	< 2 mos ≥5 mos	
								ED or UC encounters	92 (91-94) 77 (76-78)	< 2 mos ≥5 mos	
								Hospitalization	94 (92-96) 82 (82-83)	< 2 mos ≥5 mos	
184	<a href="#">Goldin et al*</a> (February 8, 2022)	Israel	Retrospective cohort	43,596 residents of long-term care facilities (65+ years)	Non-VOC, Alpha <sup>††</sup>	Excluded	BNT162b2	Documented infection	81.2 (78.6-83.5)	7+	~16.5 weeks
								Death	85.3 (80.4-88.9)	7+	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated	
183	<a href="#">Hayek et al*</a> (January 27, 2022)	Israel	Retrospective cohort	155,305 households with 400,733 children	Alpha^	Excluded	BNT162b2	Documented infection	94.4 (93.2-95.4)	7+	~12 weeks	
182	<a href="#">ECDC</a> (January 20, 2022)	Belgium, Croatia, Czechia, France, Greece, Malta, Portugal and Spain	Test-negative case control	1893 hospitalised patients	Alpha^	Excluded	BNT162b2	Hospitalization	94 (88-97)	14+	~28 weeks	
181	<a href="#">Butt et al*</a> (February 9, 2022)	USA	Test-negative case control	4,229 cases and controls on haemodialysis	Delta^	Excluded	BNT162b2 mRNA-1273	Documented infection	68.9 (61.9-74.7) 66.7 (58.9-73.0)	14+	~31 weeks	
180	<a href="#">Cerqueira-Silva et al*</a> (February 9, 2022)	Brazil	Test-negative case control	7,747,121 individuals	Gamma and Delta^	Excluded	CoronaVac	Documented infection	55 (54.3-55.7) 34.7 (33.1-36.3)	14-30 >180	~30 weeks	
							Severe disease	82.1 (81.4-82.8) 72.6 (71.0-74.2)	14-30 >180			
							Hospitalization	82.1 (81.4-82.8) 72.4 (70.7-73.9)	14-30 >180			
							Death	82.7 (81.7-83.6) 74.8 (72.2-77.2)	14-30 >180			
179#	<a href="#">Chemaitelly et al*</a> (June 2, 2022)  <i>[Published version of March 13, 2022 preprint]</i>	Qatar	Test-negative case control	2,706,008 individuals	Omicron BA.1 specifically^  Omicron BA.2 specifically^  Omicron specifically^	Included	BNT162b2 mRNA-1273 BNT162b2 mRNA-1273 BNT162b2 mRNA-1273 BNT162b2 mRNA-1273	Symptomatic disease	46.6(33.4-57.2) -17.8(-28.2- -8.2) 71.0 (24.0- 89.0) -10.2 (-23.1-1.3) 51.7 (43.2-58.9) -12.1 (-19.1-5.5) 35.9 (-5.9-61.2) -20.4 (-30.2-1.2)	1-3 mo 7+ mo. 1-3 mo 7+ mo. 1-3 mo 7+ mo. 1-3 mo 7+ mo.	~58 weeks	
							Symptomatic disease	51.7(43.2-58.9) -9.0 (-14.5- -3.7) 43.2(15-62.1) -13.7(-21.3- -6.6)	1-3 mo 7+ mo. 1-3 mo 7+ mo.			
							Severe, critical or fatal	70.4 (45.0-84.0)) 77.5 (67.8-84.3) 87.1 (40.2-97.2) 68.4 (46.1-81.5)	1-6 mo 7+ mo. 1-6 mo 7+ mo.			
178	<a href="#">Lauring et al*</a> (March 9, 2022)	USA	Test-negative case control	5582 COVID-19 cases and 5962 test-negative and	Omicron specifically^	Excluded	BNT162b2 & mRNA-1273	Hospitalization	65 (51-75) 85 (83-87)	14+ ≤150	~3 weeks ~27 weeks	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[February 7,2022]</a>			syndrome negative controls	Delta specifically^		BNT162b2 & mRNA-1273		90 (85-93)	>150	
							BNT162b2		82 (80-84)	14+-	
							mRNA-1273		88 (86-90)		
					Alpha specifically^		BNT162b2		82 (77-86)		~44 weeks
							mRNA-1273		90 (85-93)		
177	<a href="#">Suryatma et al (March 11,2022)</a> <a href="#">[Update to February 3 preprint]</a>	Indonesia	Test-negative case control	14,168 adults aged ≥18	Non-VOC, Alpha <sup>††</sup>	Excluded	CoronaVac	Documented infection	66.7 (58.1-73.5)	14+	~24 weeks
								Hospitalization	71.1 (62.9-77.6)		
								Death	87.4 (65.1-95.4)		
176	<a href="#">Sritipsukho et al* (February 3,2022)</a>	Thailand	Test-negative case control	1,118 cases and 2,235 controls	Delta^	Excluded	AZD1222	Documented infection	83 (70-90)	14+	~13 weeks
							CoronaVac		60 (49-69)		
							CoronaVac + AZD1222		74 (43-88)		
175	<a href="#">Roberts et al (January 31,2022)</a>	USA	Test-negative case control	74,060 adults	Non-VOC, Alpha, Delta <sup>††</sup>	Included	BNT162b2	Documented infection (Overall)	83 (81-84) 60 (58-62)	<3 mos. ≥3 mos.	~48 weeks
								Documented infection (Jan-March)	80 (74-85) 80.5 (74-86)	<3 mos. ≥3 mos.	
								Documented infection (Oct-Dec)	75 (64-81) 60 (55-62)	<3 mos. ≥3 mos.	
								Severe disease (Overall)	88 (80-91) 75 (70-80)	<3 mos. ≥3 mos.	
								Severe disease (Jan-March)	90 (49-99) 90 (50-99)	<3 mos. ≥3 mos.	
								Severe disease (Oct-Dec)	69 (22-88) 78 (70-82)	<3 mos. ≥3 mos.	
							mRNA-1273	Documented infection (Overall)	88 (85-90) 65 (62-68)	<3 mos. ≥3 mos.	
								Documented infection (Jan-March)	89 (73-95) 89 (74-93)	<3 mos. ≥3 mos.	
								Documented infection (Oct-Dec)	82 (69-91) 68 (64-69)	<3 mos. ≥3 mos.	
								Severe disease (Overall)	85 (75-90) 72 (65-78)	<3 mos. ≥3 mos.	
								Severe disease (Jan-March)	70 (0-95) 70 (0-93)	<3 mos. ≥3 mos.	
								Severe disease (Oct-Dec)	91 (5-99) 80 (72-88)	<3 mos. ≥3 mos.	
174	<a href="#">Lytras et al* (June 14, 2022)</a>	Greece	Retrospective cohort	9100 COVID-19 intubations and 14755 COVID-19	Delta^	Included	BNT162b2	Intubation (age 15-59)	98.1 (97.5-98.6) 95.5 (94.3-96.5)	14+ 6 mos	~ 48 weeks
								Intubation	96.7 (95.9-97.4)	14+	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Published version of January 29, 2022 preprint]</a>			deaths in Greece aged ≥15 years				(age 60-79)	92 (91.0–92.9)	6 mos	
								Intubation (age 80+)	94.2 (92.0–95.7)	14+	
								Death (age 15-59)	85.9 (83.5–88.0)	6 mos	
								Death (age 60-79)	96.5 (94.8–97.6)	14+	
								Death (age 80+)	93.8 (91.0–95.7)	6 mos	
								Death (age 60-79)	94.1 (92.7–95.2)	14+	
								Death (age 80+)	89.4 (87.9–90.8)	6 mos	
								Intubation (age 15-59)	91 (88.4–93.0)	14+	
								Intubation (age 60-79)	84 (82.2–85.6)	6 mos	
								Intubation (age 80+)	99.4 (98.2–99.8)	14+	
								Death (age 15-59)	97.3 (93.1–98.9)	6 mos	
								Death (age 60-79)	98.9 (97.3–99.5)	14+	
							mRNA-1273	Intubation (age 60-79)	95.1 (93–96.5)	6 mos	
								Intubation (age 80+)	97.9 (90.2–99.5)	14+	
								Death (age 15-59)	90.6 (67–97.3)	6 mos	
								Death (age 60-79)	99.3 (94.7–99.9)	14+	
								Death (age 80+)	98.3 (88.3–99.8)	6 mos	
								Death (age 60-79)	98.4 (95.5–99.5)	14+	
								Death (age 80+)	96.2 (93.6–97.7)	6 mos	
								Death (age 60-79)	96.7 (87.9–99.1)	14+	
								Death (age 80+)	92 (80–96.8)	6 mos	
							AZD1222	Intubation (age 15-59)	97.8 (95.3–99)	14+	
								Intubation (age 60-79)	92.4 (84–96.4)	6 mos	
								Intubation (age 80+)	97.2 (95.3–98.3)	14+	
								Death (age 15-59)	90.3 (87.4–92.5)	6 mos	
								Death (age 60-79)	97.8 (91.7–99.4)	14+	
								Death (age 80+)	92.4 (72.7–97.9)	6 mos	
								Death (age 60-79)	97.5 (89.7–99.4)	14+	
								Death (age 80+)	94.5 (77.2–98.7)	6 mos	
								Death (age 60-79)	95.4 (91.2–97.6)	14+	
								Death (age 80+)	89.8 (85.2–93.0)	6 mos	
							Ad26.COV2.S	Intubation (age 15-59)	92.6 (84.2–96.5)	14+	
								Intubation (age 60-79)	83.4 (69.6–90.9)	6 mos	
								Intubation (age 80+)	85.0 (73.9–91.4)	14+	
								Intubation (age 60-79)	91.7 (84.4–95.6)	6 mos	
								Intubation (age 80+)	79.6 (65.2–88.0)	14+	
								Death	88.7 (78.7–94)	6 mos	
								Intubation (age 60-79)	85.0 (62.3–94.0)	14+	
								Intubation (age 80+)	91.7 (75.5–97.2)	6 mos	
								Death	81.7 (57.5–92.1)	14+	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
								(age 15-59)	90.7 (77.2-96.2)	6 mos	
								Death (age 60-79)	69.1 (43.2-83.2)	14+	
								Death (age 80+)	84.3 (67.9-92.3)	6 mos	
								Death (age 80+)	61.9 (43.2-74.4)	14+	
								Hospitalization: Immunocompromised	80.6 (59.7-90.7)	6 mos	
173	<a href="#">Tenforde et al*</a> (January 28, 2022)	USA	Test-negative case control	2952 hospitalized adults (18+ y)	Delta <sup>^</sup>	Included	BNT162b2 or mRNA-1273	Hospitalization: Immunocompromised	69 (57-78)	14+ up to <7 days pose dose 3	~47 weeks
								Hospitalization: Non-immunocompromised	82 (77-86)		
172	<a href="#">Belayachi et al</a> (January 27, 2021)	Morocco	Test-negative case control	25,768 Moroccan patients	Non-VOC, Alpha, Delta <sup>††</sup>	Included	BBIBP-CorV	Severe hospitalisation	73 (71-76)	1-273	~39 weeks
									88 (84-91)	1-30	
									64 (59-69)	150+	
171#	<a href="#">Willet et al</a> (January 26, 2021)	Scotland	Test-negative case control	6166 Omicron cases and 4911 Delta cases	Omicron specifically <sup>^</sup>	Included	BNT162b2	Documented infection	26.0 (13.9-36.4)	14+	~11 weeks
							mRNA-1273		23.7 (4.4-39.4)		
							AZD1222		11.4 (-18.8-34.6)		
					Delta specifically <sup>^</sup>		BNT162b2		83.5 (78.6-87.3)		
							mRNA-1273		87.8 (79.8-92.7)		
							AZD1222		78.9 (66.6-86.7)		
170	<a href="#">Spensley et al*</a> (January 26, 2022)	UK	Prospective cohort	1121 end stage kidney disease patients receiving in-center haemodialysis	Omicron specifically <sup>^</sup>	Included	BNT162b2	Documented infection	17 (-62-57)	14+	~52.5 weeks
							AZD1222		-4 (-97-43)		
169	<a href="#">Botton et al*</a> (January 24, 2022)	France	Retrospective cohort	4,053,569 elderly adults (aged 75+)	Non-VOC, Alpha <sup>††</sup>	Unknown	BNT162b2 & mRNA-1273	Hospitalization	86 (83-89)	7+	~7 weeks
168	<a href="#">Bedston et al*</a> (January 21, 2022)	UK	Prospective cohort	93,292 HCWs	Alpha <sup>^</sup>	Excluded	BNT162b2	Documented infection	86 (74-91)	2-5 weeks	~37 weeks
									45 (39-51)	26+ weeks	
167	<a href="#">Thompson et al</a> (January 21, 2022)	USA	Test-negative case control	222,772 ED encounters and 87,904 hospitalization	Omicron <sup>^</sup>	Unknown	BNT162b2 & mRNA-1273	ED or UC encounters	52 (46-58)	14-179	~32 weeks
									38 (32-43)	≥180	
								Hospitalisation	81 (65-90)	14-179	
									57 (39-70)	≥180	
					Delta <sup>^</sup>			ED or UC encounters	86 (85-87)	14-179	
									76 (75-77)	≥180	
								Hospitalisation	90 (89-90)	14-179	
									81(80-82)	≥180	
166	<a href="#">Amodio et al*</a> (March 11, 2022)	Italy	Retrospective cohort	3,966,976 adults aged ≥ 18 years	Alpha, Delta <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	81.3 (80.3-82.3)	2 months	~37 weeks
									57.8 (55.4-60.2)	8 months	



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Published version of January 13, 2022 preprint]</a>							Severe disease	96.1 (94.5-97.7)	2 months	
									90.3 (86.2-94.4)	8 months	
								Death or intubation	93.4 (91.2-95.6)	2 months	
									83.7 (75.1-92.3)	8 months	
165#	<a href="#">Tartof et al*</a> (April 22, 2022)  <a href="#">[Update to January 18, 2022 preprint]</a>	USA	Test-negative case control	11,123 patients with ED or hospital encounter in Southern California	Omicron specifically^	Included	BNT162b2	ED admission	47 (40-54)	7+	~47 weeks
									64 (51-73)	7 to <3 mos	
									31 (16-43)	≥9 mos	
								Hospitalisation	62 (53-69)	7+	
									68 (48-80)	7 to <3 mos	
									41 (21-55)	≥9 mos	
					Delta specifically^			ED admission	61 (55-66)	7+	
									78 (69-85)	7 to <3 mos	
									57 (45-66)	≥9 mos	
								Hospitalisation	76 (69-82)	7+	
									78 (55-89)	7 to <3 mos	
									73 (58-83)	≥9 mos	
164	<a href="#">Young-Xu et al</a> (March 13, 2022) <a href="#">[Update to January 18 preprint]</a>	USA	Matched test-negative case control	24,581 veterans 18 or older as cases and 372,636 veterans as controls	Omicron specifically^	Excluded	BNT162b2 & mRNA-1273	Documented infection	7 (3-10)	14+	~~48 weeks
								Hospitalization	44(26-58)		
								Death	75(52-87)		
					Delta specifically^			Documented infection	55(51-58)		
								Hospitalization	75(70-80)		
								Death	93(85-97)		
163	<a href="#">Suah et al*</a> (March 21, 2022)  <a href="#">[Update to January 16, 2022 preprint]</a>	Malaysia	Retrospective cohort	9,926,361 vaccinated individuals aged ≥15, and unvaccinated controls	Delta^	Excluded	BNT162b2	Documented infection: Vaccinated April to June	79.3 (76.1-82.1)	9-26 weeks	~26 weeks
								Documented infection: Vaccinated July to August	90.8 (89.4-92.1)	2-13 weeks	
							CoronaVac	Documented infection: Vaccinated April to June	30.4 (18.8-40.3)	9-26 weeks	
								Documented infection: Vaccinated July to August	74.5 (70.6-78)	2-13 weeks	
162	<a href="#">Gazit et al*</a> (November 24, 2021)	Israel	Retrospective cohort	4024 adult household members of SARS-CoV-2 index cases	Alpha^	Excluded	BNT162b2	Documented infection	80.3 (73.5-85.4)	7+	~7.5 weeks
161	<a href="#">Olson et al*</a> (January 12, 2022)	USA	Case control	445 case patients and 777 control	Delta^	Unknown	BNT162b2	Hospitalization	94 (90-96)	14+	~18 weeks
								ICU admission	98 (93-99)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
			Test-negative case control	patients aged 12-18 years				Hospitalization	95 (91-97)		
								ICU admission	98 (94-100)		
160	<a href="#">Chiew et al (January 8, 2022)</a>	Singapore	Retrospective cohort	307,587 adolescents aged 12-18	Delta <sup>^</sup>	Unknown	BNT162b2	Documented infection	59 (55-63)	14+	~20 weeks
									78 (70-84)	14-30	~2 weeks
									54 (45-62)	120+	~20 weeks
								Symptomatic infection	62 (57-66)	14+	
									80 (70-86)	14-30	~2 weeks
									53 (5-77)	120+	~20 weeks
159#	<a href="#">Tseng et al* (February 21, 2022)</a>  [update from January 21 preprint]	USA	Test-negative case control	26,683 cases and 109,662 controls among Kaiser Permanente Southern California members aged 18+	Omicron specifically <sup>^</sup>	Included	mRNA-1273	Documented infection	13.9 (10.5-17.1)	14+	~47.5 weeks
									44 (35.1-51.6)	14-90	~11 weeks
									5.9 (0.4-11.0)	>270	~47.5 weeks
								Hospitalization	84.5 (23-96.9)	14+	
					Delta specifically <sup>^</sup>			Documented infection	63.6 (59.9-66.9)	14+	
									80.2 (68.2-87.7)	14-90	~11 weeks
									61.3 (55-66.7)	>270	~47.5 weeks
								Hospitalization	99 (93.3-99.9)	14+	
158	<a href="#">Zambrano et al (January 7, 2022)</a>	USA	Test-negative case control	102 MIS-C case-patients and 181 hospitalized controls aged 12-18 years	Delta <sup>^</sup>	Included	BNT162b2	MIS-C	86 (70-93)	14+	~23 weeks
						Excluded			91 (78-97)	28+	
									90 (75-96)		
157	<a href="#">Prunas et al (January 5, 2022)</a>	Israel	Matched Case-control	11,822 cases and 226,201 controls aged 12-16 years	Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	85 (84-86)	14-89	~25 weeks
									58 (52-64)	150-180	
								Symptomatic disease	90 (89-91)	14-89	
									65 (58-71)	150-180	
			Test negative case control					Documented infection	84 (82-85)	14-89	
									50 (43-57)	150-180	
156	<a href="#">Petráš et al* (December 22, 2021)</a>	Czech Republic	Retrospective cohort	11,016 staff of three hospitals in Prague	Alpha, Delta <sup>++</sup>	Excluded	BNT162b2	Documented infection: Overall	88.3 (83.2-91.8)	>14	~30 weeks
								Symptomatic disease: Overall	91.7 (85.7-95.2)		
					Alpha <sup>++</sup>			Documented infection: February 2021	96.2 (91.6-98.7)		4 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
					Delta <sup>††</sup>			Documented infection: June-Aug 2021	65 (<0-96.6)		~30 weeks
155	<a href="#">Cerqueira-Silva et al*</a> (March 31, 2022) (Update to December 27, 2021 preprint]	Brazil	Test negative case control	22,566 cases and 68,426 test-negative individuals aged 18+ with prior SARS-CoV-2 infection	Non-VOC, Gamma, Delta <sup>^</sup>	All participants had confirmed prior infection	CoronaVac	Symptomatic reinfection	39.4 (36.1-42.6)	14+	~37 weeks
									40.5 (36.4-44.3)	14-90	~11 weeks
									38 (33.1-42.5)	>90	~37 weeks
								Hospitalization or death	81.3 (75.3-85.8)	14+	
									86.6 (79.8-90.3)	14-90	~11 weeks
									74.4 (63.3-82.2)	>90	~37 weeks
							AZD1222	Symptomatic reinfection	56 (51.4-60.2)	14+	
									55.5 (50.5-60.1)	14-90	~11 weeks
									56.8 (46.6-65.1)	>90	~37 weeks
								Hospitalization or death	89.9 (83.5-93.8)	14+	
									86.6 (77.6-92.0)	14-90	~11 weeks
									95.1 (84.8-98.4)	>90	~37 weeks
							BNT162b2	Symptomatic reinfection	64.8 (54.9-72.4)	14+	
									64.2 (54.2-72)	14-90	~11 weeks
									100 (CI omitted)	>90	~37 weeks
								Hospitalization or death	89.7 (54.3-97.7)	14+	
									88.8 (50-97.5)	14-90	~11 weeks
									100 (CI omitted)	>90	~37 weeks
							Ad26.COVS.2	Symptomatic reinfection	44 (31.5-54.2)	14+	
									46.1 (32.7-56.7)	14-90	~11 weeks
									30.6 (-12.4-57.1)	>90	~37 weeks
								Hospitalization or death	57.7 (-2.6-82.5)	14+	
									60.2 (-10.8-85.7)	14-90	~11 weeks
									41 (-240.9-89.9)	>90	~37 weeks
154#	<a href="#">Buchan et al</a> (January 28, 2022)	Canada	Test negative case control	16,087 Omicron-positive cases, 4261 Delta-	Omicron specifically <sup>^</sup>	Excluded	Any mRNA vaccine	Symptomatic disease	36 (24-45)	7-59	~34 weeks
									2 (-17-17)	240+	
								Severe outcomes	55 (-106-90)	7-59	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Updated version of previous January 1<sup>st</sup> preprint]</a>			positive cases, and 114,087 test-negative controls aged ≥18 years	Delta <sup>^</sup>		Any mRNA vaccine	Symptomatic disease	86(-12-98)	240+	
									89 (86-92)	7-59	
									80 (74-84)	240+	
								Severe outcomes	94(84-98)	7-59	
									95(85-99)	240+	
153	<a href="#">Chung et al</a> *(January 1,2022)	USA	Test negative case control	3,384 individuals aged ≥12 years	Non-VOC, Alpha, Delta <sup>^</sup>	Included	BNT162b2 mRNA-1273	Symptomatic disease	66(56-73) 81(73-86)	14+	~34 weeks
152	<a href="#">Lutrick et al</a> (December 31,2021)	USA	Prospective cohort	243 individuals aged 12-17 years	Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	92(79-97)	14+	~17 weeks
151#	<a href="#">Collie et al*</a> (December 29, 2021)	South Africa	Test negative case control	211,610 PCR tests of individuals In Gauteng Province	Omicron specifically <sup>^</sup> Delta <sup>^</sup>	Included	BNT162b2	Hospitalization	69 (48-81) 93 (90-94)	14+	~24 weeks ~19 weeks
150	<a href="#">Mendola et al*</a> (23 December, 2021)	Italy	Retrospective cohort	2,478 HCWs 18+ years at a public hospital	Alpha <sup>††</sup>	Excluded	BNT162b2	Documented infection	89 (78-95)	8-98	~12 weeks
149	<a href="#">Alali et al*</a> (December 7, 2021)	Kuwait	Retrospective cohort	3,246 HCWs 20+ years at a secondary hospital	Alpha <sup>††</sup>	Excluded	AZD1222	Symptomatic disease	94.5 (89.4 – 97.2)	14+	~20 weeks
148	<a href="#">Ostropolets et al</a> (December 25, 2021)	USA	Retrospective cohort	179,666 patients of Columbia University Medical Center	Non-VOC, Alpha, Delta <sup>††</sup>	Excluded	BNT162b2 mRNA-1273 Ad26.COV2.S	Documented infection Hospitalization Documented infection Hospitalization Documented infection Hospitalization	94 (91-95) 95 (92-97) 97 (94-98) 96 (92-99) 81 (50-94) 92 (58-100)	14+	52 weeks
147	<a href="#">Amir et al</a> (December 21, 2021)	Israel	Quasi-experimental	348,468 individuals aged 16-18 and 361,050 individuals aged 12-14	Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection: 12-14 years Documented infection: 16-18 years	92 (91.1-92.8) 89.8 (80-93.8)	14-60	~6.5 weeks
146	<a href="#">Katikireddi et al*</a> (December 20, 2021)	Scotland	Retrospective cohort	2,534,527 adults (aged 18+)	Delta <sup>^</sup>	Excluded	AZD1222	Hospitalization or death	83.7 (79.7-87.0) 53.6 (48.4-58.3)	14-27 140-153	~20 weeks
145	<a href="#">Kissling et al*</a> (May 26,2022)	Croatia, France, Ireland, Netherlands,	Test negative case control	2,725 cases and 11,557 controls aged 30+	Delta <sup>^</sup>	Included	BNT162b2	Symptomatic disease (30-59 years) Symptomatic disease (60+ years)	87 (83–89) 65 (56–71) 65 (37-80) 64 (44-77)	14-29 90+ 30-59 90+	~30 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Published version of December 23, 2021 preprint]</a>	Portugal, Romania, Spain, and the UK					mRNA-1273	Symptomatic disease (30-59 years)	98 (93–100)	14-29	
							AZD1222		90 (76–96)	60-89	
									72 (52–83)	14-29	
									65 (48–76)	60-89	
							Ad26.COV2.S		50 (36–62)	30–59	
									52 (33–66)	60-89	
144#	<a href="#">Hansen et al (December 23, 2021)</a>	Denmark	Retrospective cohort	41,684 Danish residents aged ≥12 years	Omicron specifically <sup>^</sup>	Excluded	BNT162b2	Documented infection	55.2 (23.5-73.7)	15-44	21 weeks
							mRNA-1273		-76.5 (-95.3, -59.5)	105-164	
									36.7 (-69.9-76.4)	15-44	
									-39.3 (-61.6, -20)	105-164	
					Delta specifically <sup>^</sup>		BNT162b2		86.7 (84.6-88.6)	15-44	
							mRNA-1273		53.8 (52.9-54.6)	105-164	
									88.2 (83.1–91.8)	15-44	
									65.0 (63.6- 66.3)	105-164	
143	<a href="#">Ioannou et al (December 21, 2021)</a>	USA	Target trial emulation study	4,199,742 individuals	Non-VOC and Alpha <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection (March 31 <sup>st</sup> 2021)	65 (63–68)	7+	~28 weeks
								Documented infection (June 30 <sup>th</sup> 2021)	69 (67–70)		
								Death (March 31 <sup>st</sup> 2021)	89 (84–92)		
								Death (June 30 <sup>th</sup> 2021)	86 (82–89)		
142	<a href="#">Lewis et al (December 21, 2021)</a>	USA	Test negative case control	3,619 adults	Alpha and Delta <sup>††</sup>	Included	BNT162b2 & mRNA-1273	Hospitalization with no underlying conditions	96 (93-98)	14+	~30 weeks
								Hospitalization with one underlying conditions	93 (89-95)		
								Hospitalization with 2 underlying conditions	87 (92-91)		
								Hospitalization with 3+ underlying conditions	83 (72-88)		
141	<a href="#">Tartof et al* (February 14, 2021)</a>  <a href="#">[Updated version of previous December 21<sup>st</sup> preprint]</a>	USA	Retrospective matched cohort	3,133,075 adults ≥ 18 years	Non-VOC, Alpha and Delta <sup>††</sup>	Included	BNT162b2	Documented infection	85 (83-86)	7-36	~48 weeks
									49 (46-51)	217+	
								Hospitalization	90 (86-92)	7-36	
									88 (85-90)	217+	
140#		South Africa	Retrospective matched cohort	477,234 HCWs	Beta, Delta, Kappa <sup>^</sup>	Included	Ad26.COV2.S	Hospitalization	67 (62-71)	28+	16 weeks
								ICU/CCU admission	75 (69-82)		
								Death	83 (75-89)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">Bekker et al*</a> (March 19, 2022)  [Published version of December 20, 2021]				Beta <sup>^</sup>			Hospitalization	62 (42-76)		
								ICU/CCU admission	49 (8-77)		
								Death	86 (57-100)		
					Delta <sup>^</sup>			Hospitalization	67 (62-71)		
								ICU/CCU admission	78 (71-88)		
								Death	82 (74-89)		
139	<a href="#">Abu-Raddad et al*</a> (January 21, 2022)  Published version of December 16, 2021	Qatar	Test negative case control	107,099 test-positive cases and 658,564 test-negative controls	Beta and Delta <sup>^</sup>	Excluded	mRNA-1273	Documented infection	85.3 (83.5-86.9) -29.5 (-84-8.8)	30+ 240+	~35 weeks
								Symptomatic disease	94.4 (92.8-95.6) 20 (-29-59.3)	30+ 240+	
								Asymptomatic disease	79.9 (75.5-83.4) -28.4 (-129.3-28.1)	30+ 240+	
								Hospitalization and death	97.2 (92.4-99) 61 (-225.5-95.3)	30+ 180+	
138	<a href="#">McLean et al*</a> (February 18, 2022)  Published version of pre-print from December 16, 2021	USA	Prospective cohort	1,518 individuals aged ≥12 years	Non-VOC, Alpha and Delta <sup>††</sup>	Included	BNT162b2 mRNA-1273	Symptomatic and asymptomatic infections	50 (21-69) 65 (37-81)	14+	~52 weeks
							BNT162b2 mRNA-1273	Symptomatic infections	54 (26-71) 65 (38-81)		
						Excluded	BNT162b2 mRNA-1273	Symptomatic and asymptomatic infections	51 (22-70) 66 (38-82)		
					Delta specifically <sup>^</sup>	Excluded	BNT162b2 mRNA-1273	Symptomatic and asymptomatic infections	52 (20-71) 59 (24-78)		
137	<a href="#">Castillo-Arregoces et al</a> (December 16, 2021)	Colombia	Retrospective matched cohort	2,828,294 individuals aged 60+	Mu <sup>^</sup>	Excluded	BNT162b2	Hospitalization without death	83 (78.4-86.6)	14+	32 weeks
								Post-hospitalization death	94.8 (93.3 – 96)		
								Death	88.3 (84.1-91.4)		
							AZD1222	Hospitalization without death	90.8 (85.5-94.2)		
								Post-hospitalization death	97.5 (95.8-98.5)		
								Death	93.9 (89.3-96.6)		
							Ad26.COV2.S	Hospitalization without death	60.9 (36.8-75.8)		
								Post-hospitalization death	85.8 (77.1-91.2)		
								Death	95.5 (82.0- 98.9)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
							CoronaVac	Hospitalization without death	47.3 (41.9-52.3)		
								Post-hospitalization death	72.1 (70.1-73.9)		
								Death	64.9 (61.2-68.9)		
136	<a href="#">Young-Xu et al*</a> (December 15, 2021)  <i>Updated analysis of reference #45</i>	USA	Test negative case control	71,190 male veterans aged 65+ in the Veterans Health Administration	Non-VOC and Alpha <sup>††</sup> (pre-Delta) <sup>^</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	94.5 (90.7-96.7)	14-43	4 weeks
					Alpha, Delta <sup>††</sup> (rising Delta) <sup>^</sup>				87.9 (85.9-89.5)	74-103	12 weeks
					Delta <sup>^</sup>				92.1 (87.2-95.1)	14-43	4 weeks
									67.3 (63.2-70.9)	134-163	20 weeks
									62.0 (45.6-73.5)	14-43	4 weeks
									24.8 (18.8-30.4)	224-253	32 weeks
135	<a href="#">Florea et al*</a> (April 28, 2022)  <i>Updated interim analysis of reference #86</i>	USA	Prospective cohort	927,004 matched pairs of adult (18+) Kaiser Permanente members in Southern California	Non-VOC, Alpha, Delta <sup>††</sup>	Included	mRNA-1273	Documented infection	82.8 (82.2-83.3)	14+	~35 weeks
									88.0 (86.8-89.1)	14-60	~6.5 weeks
									75.5 (70.4-79.7)	180-240	~35 weeks
								Hospitalization	96.1 (95.5-96.6)	14+	
									95.9 (93.5-97.4)	14-60	~6.5 weeks
									94.5 (90.9-96.7)	180-240	~35 weeks
					Delta <sup>^</sup>			Death in hospital	97.2 (94.8-98.4)	14+	
								Documented infection	86.5 (84.8-88.0)	14+	~15 weeks
134	<a href="#">Machado et al</a> (December 14, 2021)	Portugal	Retrospective cohort	1,884,932 adults aged 65+	Alpha and Delta <sup>^</sup>	Excluded	BNT162b2 and mRNA-1273	Symptomatic infection in 65-79 years old	79 (76-83)	14-41	~29 weeks
									39 (29-48)	98+	
								Symptomatic infection in 80+ years old	72 (61-79)	14-41	
									34 (29-48)	124+	
								Hospitalization in 65-79 years old	95 (90-97)	14-41	
									93 (86-96)	70+	
								Hospitalization in 80+ years old	83 (68-91)	14-41	
									63 (37-78)	124+	
								Death in 65-79 years old	95 (88-98)	14-41	
									93 (87-96)	70+	
								Death in 80+ years old	87 (71-93)	14-41	
									75 (64-82)	124+	
							AZD1222	Symptomatic infection in 65-79 years old	95 (90-97)	14-41	
									93 (86-96)	70+	
								Hospitalization in 65-79 years old	89 (52-94)	14+	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
								Death in 65-79 years old	95 (90-97)		
133	<a href="#">Berec et al*</a> (July 8, 2022)  <i>[Published version of December 12<sup>th</sup> preprint]</i>	Czech Republic	Retrospective cohort	6,287,356 individuals ≥ 12 years	Alpha and Delta^	Included	BNT162b2	Documented infection	87 (86-87)	0-2 mos.	~35 weeks
									53 (52-54)	7-8 mos.	
								Hospitalization	90 (89-91)	0-2 mos.	
									75 (73-76)	7-8 mos.	
								Death	92 (90-93)	0-2 mos.	
									83 (81-86)	7-8 mos.	
							mRNA-1273	Documented infection	90 (89-91)	0-2 mos.	
									65 (63-67)	7-8 mos.	
								Hospitalization	94 (92-96)	0-2 mos.	
									81 (78-84)	7-8 mos.	
								Death	96 (91-98)	0-2 mos.	
									88 (82-92)	7-8 mos.	
							AZD1222	Documented infection	83 (80-85)	0-2 mos.	
									55 (54-56)	5-6 mos.	
								Hospitalization	87 (81-91)	0-2 mos.	
									70 (68-72)	5-6 mos.	
								Death	93 (77-98)	0-2 mos.	
									82 (78-85)	5-6 mos.	
Ad26.COV2.S	Documented infection	68 (66-70)	0-2 mos.								
		67 (65-69)	5-6 mos.								
	Hospitalization	68 (60-75)	2 months								
		67 (62-72)	5-6 mos.								
	Death	68 (42-82)	2 months								
		68 (53-78)	5-6 mos.								
132	<a href="#">Powell et al*</a> (March 21, 2022)  <i>[Update to February 18, 2022 preprint]</i>	UK	Test-negative case control	617,259 eligible tests for 12-15-year-olds and 225,670 for 16-17-year-olds	Omicron specifically^	Excluded	BNT162b2	Symptomatic disease(12-15 years)	73(66.4-78.3)	14+	~33 weeks
									Symptomatic disease(16-17 years)	71.3(69.3-73.1)	
					22.6(14.5-29.9)			70+			
					Symptomatic disease(12-15 years)			87.2(73.7-93.8)	14+		
								Symptomatic disease(16-17 years)	93.1 (91.6-94.4)	14-34	
					83.7(72-90.5)				70+		
131	<a href="#">Bajema et al*</a> (December 10, 2021)  <i>Updated analysis of reference #94</i>	USA	Test-negative case control	755 cases and 1,141 controls	Non-VOC, Alpha, Delta <sup>††</sup>	Excluded	BNT162b2	Hospitalization	86 (77.6-91.3)	14-119	~36 weeks
							mRNA-1273		75.1 (64.6-82.4)	120+	
									89.6 (80.1-94.5)	14-119	
									86.1 (77.7-91.3)	120+	



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated	
130#	<a href="#">UKHSA</a> (January 27 2022)  <i>[Update to Jan 14, 2022 briefing]</i>  <i>[March 2, 2022 publication by Andrews et al with VE estimated till January 12, 2022 can be <a href="#">accessed here</a>]</i>	England	Test-negative case control	760,647 Omicron cases, 236,023 Delta cases, and test negative controls aged 18+	Omicron specifically^	Excluded	BNT162b2	Symptomatic Infection	65.8 (64.4-67.2)	2-4 weeks	~32 weeks	
							AZD1222		9.4 (7.8-11.1)	25+ weeks		
									49.8 (40.7-57.5)	2-4 weeks		
									-1 (-2.4-0.3)	25+ weeks		
							mRNA-1273		76 (72-79)	2-4 weeks		
									13 (3-22)	25+ weeks		
							BNT162b2		90.9 (89.6-92)	2-4 weeks		
							AZD1222		62.7 (61.6-63.7)	25+ weeks		
					Delta specifically^			82.8 (74.5-88.4)	2-4 weeks			
							mRNA-1273	43.5 (42.4-44.5)	25+ weeks			
								94.5 (90.5-96.9)	2-4 weeks			
								80.4 (67.3-88.2)	25+ weeks			
							Omicron specifically^	BNT162b2	Hospitalization	73.6 (40.7-88.3)		2-4 weeks
								AZD1222		34.9 (17.7-48.4)		25+ weeks
										55.8 (34.1-70.3)		20-24 weeks
										32.7 (19.7-43.6)		25+ weeks
Delta specifically^	BNT162b2	94.1 (81.6-98.1)	2-4 weeks									
		95.3 (93.9-96.5)	25+ weeks									
	AZD1222	92.9 (91.3-94.2)	20-24 weeks									
		90.6 (89.3-91.8)	25+ weeks									
129	<a href="#">Yassi et al</a> (December 6, 2021)	Canada	Retrospective cohort	21,242 HCWs in Vancouver, BC	Non-VOC, Alpha, Delta <sup>††</sup>	Unknown	BNT162b2 & mRNA-1273	Documented infection	74.1 (62.5-82.1)	7+	~40.5 weeks	
			Test-negative case control						82.8 (74.0-88.6)			
128	<a href="#">Muhsen et al*</a> (October 28, 2021)	Israel	Prospective cohort	9162 HCWs (aged 16-65 y) working in long-term care facilities	Alpha^	Excluded	BNT162b2	Documented infection	89 (83-93)	>14	~11 weeks	
127	<a href="#">Wu et al*</a> (December 2, 2021)	USA	Retrospective cohort	29,152 matched pairs of cancer patients in the Veterans Affairs health system	Non-VOC, Alpha <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	58 (39-73)	14+	15 weeks	
126	<a href="#">Vokó et al*</a> (November 24, 2021)	Hungary	Retrospective cohort	3.7 million Hungarian residents aged 16+	Alpha^	Included	BNT162b2	Documented infection	84.0 (83.3-84.7)	14+	~19 weeks	
								Death	90.3 (88.9-91.5)			
							Sinopharm	Documented infection	72.8 (71.2-74.4)		~10.5 weeks	
								Death	86.0 (83.7-87.9)			

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
							Sputnik V	Documented infection	88.1 (86.5-84.9)		~11 weeks
								Death	97.8 (95.5-98.9)		
							AZD1222	Documented infection	73.7 (71.1-76.0)		~11.5 weeks
								Death	85.8 (73.5-92.4)		
							mRNA-1273	Documented infection	88.2 (85.8-90.3)		~15 weeks
								Death	93.8 (90.3-96.1)		
125	<a href="#">Hall et al*</a> (February 16, 2022)  <i>[Update to December 1, 2021 preprint]</i>	United Kingdom	Prospective cohort	35,768 HCWs (18+ years) undergoing routine asymptomatic testing	Non-VOC, Alpha, Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	Dose interval <6 weeks: 89 (78-94)	14-73	~8 weeks
									Dose interval <6 weeks: 53 (28-69)	194-265	~36 weeks
									Dose interval 6+ weeks: 85 (72-92)	14-73	~8 weeks
									Dose interval 6+ weeks: 51 (22-69)	194-239	~32 weeks
							AZD1222	Documented infection	58 (23-77)	14-73	~8 weeks
									72 (39-87)	134-220	~29 weeks
124	<a href="#">Thiruvengadam et al</a> (November 25, 2021)	India	Test-negative case control	2766 cases and 2377 controls	Delta <sup>^</sup>	Excluded	AZD1222	Documented infection	63.1 (51.5-72.1)	14+	~10 weeks
123	<a href="#">Desai et al</a> (November 23, 2021)*	India	Test-negative case control	1068 matched case-control HCW pairs	Delta <sup>^</sup>	Included	BBV152	Symptomatic disease	50 (33-62)	14+	~4 weeks
									46 (22-62)	28+	
									57 (21-76)	42+	
						Excluded			47 (29-61)	14+	
122	<a href="#">Paixao et al*</a> (April 5, 2022)  <i>[Update to November 12 preprint]</i>	Brazil	Test-negative case control	Pregnant women aged 18-49	Gamma and Delta <sup>††</sup>	Included	CoronaVac	Symptomatic disease	41.0 (27.0-52.2)	14+	~25 weeks
								Severe disease	85.4 (59.4-94.8)		
121	<a href="#">Ng et al*</a> (November 1, 2021)	Singapore	Retrospective cohort	1204 household contacts of 301 index cases	Delta index cases, specifically	Unknown	BNT162b2 & mRNA-1273	Documented infection	61.6 (37.5-80.4)	15+	~16.5 weeks
								Symptomatic infection	67.9 (41.3-87.8)		
								Severe disease	100 (CI omitted, no events among vaccinated)		
120	<a href="#">Al Hosani et al*</a> (March 18, 2022) <i>[Published version of</i>	United Arab Emirates	Retrospective cohort	176,640 individuals aged 15+	Non-VOC and Alpha <sup>^</sup>	Included	BBIBP-CorV	Hospitalization	79.8(78-81.4)	14+	~34 weeks
								ICU admissions	92.2(89.7-94.1)		
								Deaths	97.1(83-99.9)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">October 27, 2021 preprint</a>										
119	<a href="#">Poukka et al* (January 31, 2022)</a>  <a href="#">[Published version of November 8, 2021]</a>	Finland	Retrospective cohort	427,905 HCWs aged 16-69 years	Non-VOC, Alpha, Delta^	Excluded	BNT162b2	Documented infection	83 (80-85)	14-90	~11 weeks
									55 (45-64)	181+	~29.5 weeks
								Hospitalization	99 (97-100)	14-90	~11 weeks
									98 (89-100)	181+	~38 weeks
							mRNA-1273	Documented infection	84 (68-92)	14-90	~11 weeks
									69 (-124-96)	91-180	~24 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	181+	~34 weeks
							Heterologous mRNA	Documented infection	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	181+	~29.5 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	181+	~38 weeks
							AZD1222	Documented infection	89 (73-95)	14-90	~11 weeks
									63 (-166-95)	91-180	~24 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	181+	~25 weeks
							Heterologous AZD1222 + mRNA	Documented infection	80 (72-86)	14-90	~11 weeks
									62 (30-79)	91-180	~24 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	181+	~25 weeks
					Non-VOC, Alpha^		BNT162b2 & mRNA-1273 (homologous or heterologous)	Documented infection	77 (71-82)	14-90	~11 weeks
									55 (34-69)	91-180	~24 weeks
								Hospitalization	95 (64-99)	14-90	~11 weeks
									100 (CI omitted)	91-180	~24 weeks
							AZD1222	Documented infection	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	91-180	~24 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	91-180	~24 weeks
							Heterologous AZD1222 + mRNA	Documented infection	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	91-180	~24 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks
							BNT162b2 & mRNA-1273 (homologous or heterologous)	Documented infection	85 (81-88)	14-90	~11 weeks
									56 (46-65)	181+	~29.5 weeks
								Hospitalization	100 (97-100)	14-90	~11 weeks
									98 (88-100)	181+	~38 weeks
					Delta^		AZD1222	Documented infection	88 (71-95)	14-90	~11 weeks
									62 (-177-95)	91-180	~24 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
							Heterologous AZD1222 + mRNA	Documented infection	100 (CI omitted)) 80 (72-86) 63 (33-80)	181+ 14-90 91-180	~25 weeks ~11 weeks ~24 weeks
								Hospitalization	100 (CI omitted) 100 (CI omitted)	14-90 181+	~11 weeks ~25 weeks
118	<a href="#">Embi et al*</a> (December 30, 2021)  [Updated version of Embi et al November 5, 2021]	USA	Test-negative case control	20,101 immunocompromised and 69,116 immunocompetent adults (18+) in nine states	Non-VOC, <sup>††</sup> Alpha, <sup>††</sup> Delta <sup>^</sup>	Included	BNT162b2	Hospitalization: immunocompromised	71 (65-76)	14+	~33 weeks
								Hospitalization: immunocompetent	88 (86-89)		
							mRNA-1273	Hospitalization: immunocompromised	81 (76-85)		
								Hospitalization: immunocompetent	93 (92-94)		
					Non-VOC, Alpha <sup>††</sup>		BNT162b2 & mRNA-1273	Hospitalization: immunocompromised	76 (69-81)		
								Hospitalization: immunocompetent	91 (90-93)		
					Delta <sup>^</sup>			Hospitalization: immunocompromised	79 (74-83)		
								Hospitalization: immunocompetent	90 (89-91)		
117	<a href="#">Sheikh et al*</a> (October 20, 2021)	Scotland	Retrospective cohort	1,563,818 adults	Alpha and Delta <sup>^</sup>	Unknown	BNT162b2	Death in 40-59 years	95 (79-99)	14+	~25 weeks
								Death in ≥ 60 years	87 (77-93)		
							AZD1222	Death in 40-59 years	88 (76-93)		
								Death in ≥ 60 years	90 (84-94)		
					Delta specifically <sup>^</sup>		BNT162b2	Death	90 (83-94)		
							AZD1222		91 (86-94)		
116	<a href="#">Reis et al*</a> (October 20, 2021)	Israel	Retrospective cohort	94,354 vaccinated adolescents aged 12-18 matched with 94,354 controls	Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	90 (88-92)	7-21	~12 weeks
								Symptomatic disease	93 (88-97)		
115	<a href="#">Nordström et al*</a> (October 18, 2021)	Sweden	Retrospective cohort	541,071 vaccinated individuals and 180,716 unvaccinated	Delta <sup>^</sup>	Excluded	BNT162b2	Symptomatic disease	78 (78-79)	14+	~11 weeks
							mRNA-1273		87 (84-88)		
							AZD1222		50 (41-58)		
							AZD1222/ BNT162b2		67 (59-73)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
				matched individuals			AZD1222/ mRNA-1273		79 (62-88)		
114#	<a href="#">Skowronski et al*</a> (April 19, 2022)  <i>[Update to Oct 26, 2021 preprint]</i>	Canada	Test-negative case control	707,566 specimens in British Columbia including 44,964 cases (estimates also available for Quebec, but not included here)	Non-VOC, Alpha, Delta, Gamma^	Excluded	BNT162b2	Documented infection	89 (89-89)	14+	~38 weeks
									93 (92-94)	14-27	
									80 (75-83)	252-279	
								Hospitalization	97 (97-98)	14+	
									98 (96-99)	14-27	
									96 (86-99)	252-279	
							mRNA-1273	Documented infection	90 (89-90)	14+	
									95 (94-96)	14-27	
									55 (40-66)	252-279	
								Hospitalization	97 (97-98)	14+	
									99 (95-100)	14-27	
									95 (65-99)	252-279	
							AZD1222	Documented infection	74 (72-76)	14+	
									77 (57-87)	14-27	
									67 (48-80)	168-195	
								Hospitalization	95 (94-97)	14+	
									97 (71-97)	28-55	
									91 (35-99)	168-195	
							Heterologous mRNA	Documented infection	90 (89-90)	14+	
									95 (91-97)	14-27	
									96 (73-99)	168-195	
								Hospitalization	98 (97-98)	14+	
									96 (75-100)	14-27	
									96 (92-98)	140-167	
							Heterologous AZD1222 + mRNA	Documented infection	89 (88-89)	14+	
									94 (89-97)	14-27	
									82 (78-85)	140-167	
								Hospitalization	99 (99-100)	14+	
									93 (48-99)	14-27	
									98 (91-99)	140-167	
					Delta specifically^		BNT162b2	Documented infection	89 (89-89)	14+	
									93 (93-94)	14-27	
									79 (75-83)	252-279	
							Hospitalization	98 (97-98)	14+		
								98 (95-99)	14-27		
								94 (87-97)	196-223		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated	
							mRNA-1273	Documented infection	90 (89-90)	14+		
									95 (94-96)	14-27		
									55 (41-66)	196-223		
								Hospitalization	97 (97-98)	14+		
									98 (94-100)	14-27		
									95 (80-99)	196-223		
							AZD1222	Documented infection	73 (72-75)	14+		
									70 (39-86)	14-27		
									67 (48-80)	168-195		
								Hospitalization	95 (93-97)	14+		
									89 (67-97)	28-55		
									91 (34-99)	168-195		
							Heterologous mRNA	Documented infection	90 (89-90)	14+		
									94 (90-97)	14-27		
									96 (73-99)	168-195		
								Hospitalization	98 (97-98)	14+		
									97 (93-99)	28-55		
									96 (92-98)	140-167		
							Heterologous AZD1222 + mRNA	Documented infection	88 (88-89)	14+		
									94 (88-97)	14-27		
									82 (77-85)	140-167		
								Hospitalization	99 (99-100)	14+		
									91 (33-99)	14-27		
									98 (91-99)	140-167		
					Alpha specifically^		BNT162b2	Documented infection	96 (92-98)	14+		
								Hospitalization	96 (83-99)			
							mRNA-1273	Documented infection	95 (84-98)			
							AZD1222	Documented infection	75 (33-91)			
							Heterologous mRNA	Documented infection	96 (73-99)			
							Gamma specifically^	BNT162b2	Documented infection			92 (88-95)
									Hospitalization			95 (82-98)
								mRNA-1273	Documented infection			95 (85, 98)
AZD1222	Documented infection	91 (63-98)										
Heterologous mRNA	Documented infection	94 (76-99)										
Heterologous AZD1222 + mRNA	Documented infection	96 (69-99)										
113	<a href="#">Lin et al*</a>	USA	Retrospective cohort		Alpha and Delta^	Unknown	BNT162b2	Symptomatic disease	94.5 (94.1-94.9)	1.25 months	~27 weeks	
								67.8 (65.9-69.7)	7.25 months			

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated									
	<a href="#">(March 10, 2022)</a>  <a href="#">[Update to October 26, 2021 preprint]</a>			10,600,823 cases registered in North Carolina							~32 weeks									
								Hospitalization	96.4 (95.1-97.4)	1.25 months										
									92.4 (89.7-94.4)	7.25 months										
								Death	98 (95.5-99.1)	1.25 months										
									95.5 (92.2-97.4)	7.25 months										
								mRNA-1273	Symptomatic disease	95.9 (95.5-96.2)		1 month								
							77.8 (75.9-79.6)		7 months											
							Hospitalization	97.2 (96.1-98)	1 months											
								94.9 (92.4-96.6)	7 months											
							Death	98.6 (97.3-99.3)	1 months											
								96.0 (92.8-97.8)	7 months											
							Ad26.COV2.S	Symptomatic disease	71.4 (68.3-74.2)	2 mo	~22 weeks									
64.0 (60.3-67.4)	6 mo																			
Hospitalization	85.8 (74.9-91.9)	2 mo																		
	81.7 (68.6-89.3)	6 mo																		
Death	82.2 (46.3-94.1)	2 mo																		
	71.2 (40.8-86)	6 mo																		
112	<a href="#">Nordstrom et al*</a> (February 4, 2022)  <a href="#">[Published version of October 25 preprint]</a>	Sweden	Retrospective cohort	842,974 pairs of vaccinated and unvaccinated Swedish individuals	Delta^	Excluded	BNT162b2	Symptomatic disease	92 (92-93)	15-30	~30 weeks									
								23 (-2 – 41)	210+											
							mRNA-1273		96 (94-97)	15-30										
								59 (18-79)	180+											
							AZD1222		68 (52-79)	15-30										
								-19 (-97 – 28)	120+											
							AZD1222 and any mRNA vaccine		89 (79-94)	15-30										
								66 (41-80)	120+											
							111	<a href="#">Ranzani et al*</a> (February 9, 2022)  <a href="#">[Update to (October 20, 2021 preprint)]</a>	Brazil	Test-negative case control		10,077 individuals residing in a favela in Rio De Janeiro	Gamma and Delta^	Excluded	AZD1222	Documented infection	59 (33.1-74.8)	14+	~31 weeks	
																Symptomatic disease	65.1 (40.9-79.4)			
110	<a href="#">Chin et al*</a> (October 20, 2021)	USA	Retrospective cohort	827 propensity matched incarcerated men	Delta^	Included	mRNA-1273	Documented infection	56.6 (42.0-67.5)	14+	~27 weeks									
								Symptomatic disease	84.2 (56.4-94.3)											
								Documented infection	80.5 (52.8-92.0)											
						Previously infected only														
								Excluded	Documented infection			49.5 (31.5-62.7)								

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
109	<a href="#">Irizarry et al (November 17, 2021)</a>  <i>[Updated version of Robles-Fontan et al (October 20, 2021)]</i>	Puerto Rico	Retrospective cohort	87,704 PCR confirmed infections for individuals 12 years or older	Non-VOC, Alpha, Beta and Delta^^	Unknown	BNT162b2	Hospitalization (45-74y)	92 (90.8-93)	14+	~20 weeks
								Hospitalization (75-84y)	93.3 (91.3-95)		
								Hospitalization (85+y)	97.1 (95.8-98)		
								Death (45-74y)	86 (81-89)		
								Death (75-84y)	87 (80-92)		
								Death (85+y)	95.2 (91.5-97)		
							mRNA-1273	Hospitalization (45-74y)	82 (78-85)		
								Hospitalization (75-84y)	91.5 (89-94)		
								Hospitalization (85+y)	97.2 (96-98)		
								Death (45-74y)	69 (52-79)		
								Death (75-84y)	87 (79-92)		
								Death (85+y)	96.2 (93.9-98)		
							Ad26.COV2.S	Hospitalization (45-74y)	96.1 (95-97)		
								Hospitalization (75-84y)	98 (96.7-99)		
								Hospitalization (85+y)	99.2 (98.6-99.5)		
								Death (45-74y)	93.8 (90-96)		
								Death (75-84y)	96.6 (91.7-98)		
								Death (85+y)	99.3 (98.6-99.6)		
							BNT162b2	Documented infection <sup>xx</sup>	87 (85-89)	14+	~18 weeks
									57 (53-60)	144+	
								Hospitalisation	92 (85-95)	14+	
									80 (73-85)	144+	
							mRNA-1273	Death	97 (86-100)	14+	
									86 (75-92)	144+	
								Documented infection <sup>xx</sup>	90 (88-91)	14+	
									73 (70-76)	144+	
								Hospitalisation	95 (89-97)	14+	
									90 (84-94)	144+	
								Death	99 (89-100)	14+	
									93 (81-97)	144+	
							Ad26.COV2.S	Documented infection <sup>xx</sup>	62 (54-68)	14+	~22 weeks
									36 (30-42)	144+	
								Hospitalisation	81 (60-91)	14+	
									67 (53-76)	144+	
								Death	78 (16-94)	14+	



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
									72 (49-85)	144+	
							BNT162b2	Documented infection <sup>xx</sup>	56 (53-59)	at day 137	~20 weeks
							mRNA-1273		71 (68-74)	at day 139	~18 weeks
							Ad26.COV2.S		27 (17-37)	at day 158	~22 weeks
108	<a href="#">Olson et al*</a> (October 19, 2021)	USA	Test-negative case control	179 case patients and 285 controls aged 12-18 years	Delta <sup>^</sup>	Unknown	BNT162b2	Hospitalization (12-15y)	91 (74-97)	14+	~12 weeks
								Hospitalization (16-18y)	94 (78-99)		
107	<a href="#">Arregoces et al</a> (October 19, 2021)	Colombia	Matched-pair cohort study	3,346,826 adults aged 60+ in Colombia	Mu <sup>^</sup>	Excluded	BNT162b2	Hospitalization	90.3 (87.1-92.7)	14+	~9 weeks
								Post-hospitalization death	98.5 (97.8-98.9)		
								Death without prior hospitalization	89.2 (85.6-91.9)		
							CoronaVac	Hospitalization	67.2 (63.7-70.4)		~11 weeks
								Post-hospitalization death	77.1 (75.5-78.6)		
								Death without prior hospitalization	69.8 (66.7-72.6)		
							AZD1222	Hospitalization	75.4 (48.2-88.3)		~7 weeks
								Post-hospitalization death	96.3 (88.4-98.8)		
								Death without prior hospitalization	88.7 (64.8-96.4)		
							Ad26.COV2.S	Hospitalization	80(19.9-95.0)		~4 weeks
								Death without prior hospitalization	75(0.0-93.8)		
106	<a href="#">Ranzani et al</a> (October 18, 2021)	Brazil	Test-negative case control	11,817 adults In Mato-Grosso do Sul	Gamma <sup>^</sup>	Excluded	Ad26.COV2.S	Symptomatic disease	50.9 (35.5-63.0)	28+	~10 weeks
								Hospitalization	72.9 (35.1-91.1)		
								ICU Admission	92.5 (54.9-99.6)		
								Death	90.5 (31.5-99.6)		
105	<a href="#">Liu et al*</a> (May 24, 2022)  [Published version of October 7, 2021 preprint]	USA	Test-negative case control	10,283 matched adult residents (18+) of New York City	Alpha, Delta <sup>^</sup>	Excluded	BNT162b2 & mRNA-1273	Overall: Documented infection	59 (52-65)	14+	~35 weeks
								Immunocompromised: Documented infection	57 (45-66)		
104		USA	Test-negative case control		Delta specifically <sup>^</sup>	Excluded	mRNA-1273	Documented infection	86.7 (84.3-88.7)	14+	~25 weeks
									94.1 (90.5-96.3)	14-60	~6.5 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">Bruxvoort et al* (December 15, 2021)</a>  [Update to October 1, 2021 preprint]			8,153 cases and matched controls among Kaiser Permanente patients (aged 18+) in Southern California					80.0 (70.2-86.6)	151-180	~23.5 weeks
					Non-Delta specifically^			Hospitalization	97.5 (92.7-99.2)	14+	~25 weeks
								Documented infection	98.6 (97.3-99.3)	14-60	~6.5 weeks
									88.7 (73.2-95.2)	121-150	~19.5 weeks
								Documented infection	98.4 (96.9-99.1)	14+	~25 weeks
Documented infection	95.5 (90.9-97.8)	14+									
103	<a href="#">Martinez-Baz et al (September 30, 2021)</a>	Spain	Prospective cohort	30,240 close contacts of 12,263 index cases	Non-VOC, Alpha and Delta^	Excluded	BNT162b2	Documented infection	69 (66-72) 70 (67-73) 63 (58-68)	14+ <90 ≥ 90	~31 weeks ~11 weeks ~18 weeks
								Symptomatic disease Hospitalization	72 (69-75) 93 (88-96)	14+	~31 weeks
							mRNA-1273	Documented infection	82 (78-86) 67 (50-78)	14+ ≥ 90	~28 weeks ~15 weeks
								Symptomatic disease Hospitalization	85 (80-89) 98 (82-100)	14+	~28 weeks
							AZD1222	Documented infection	54 (48-60) 54 (47-60)	14+ <90	~16 weeks ~11 weeks
								Symptomatic disease Hospitalization	56 (48-63) 95 (79-99)	14+	16 weeks
							Ad26.COV2.S	Documented infection	50 (42-57) 52 (44-59) 28 (-8-53)	14+ <90 ≥ 90	~23 weeks ~11 weeks ~10 weeks
								Symptomatic disease Hospitalization	54 (45-62) 74 (43-88)	14+	~23 weeks
							1 dose of AZD1222+ 1 dose of BNT162b2	Documented infection	86 (70-93) 85 (69-93) 91 (71-97) 95 (79-99)	14+ <90 14+	~21 weeks ~11 weeks ~21 weeks
					Alpha^ specifically		BNT162b2	Documented infection	71 (61-78) 86 (56-95) 38 (-42-73) 77 (27-93)	14+	~31 weeks ~28 weeks 16 weeks ~23 weeks
						mRNA-1273					
						AZD1222					
						Ad26.COV2.S					
					Delta^ specifically		BNT162b2	Documented infection	67 (59-74) 77 (64-85) 55 (39-67)	14+	~31 weeks ~28 weeks 16 weeks
						mRNA-1273					
						AZD1222					

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
							Ad26.COV2.S		42 (18-59)		~23 weeks
							1 dose of AZD1222+ 1 dose of BNT162b2		86 (45-97)		~21 weeks
102#	<a href="#">Eyre et al*</a> (January 5, 2022)  [Update to Sept 29, 2021 preprint]	England	Retrospective cohort	146,243 household contacts of 108,498 index cases	Alpha^ specifically	Included	BNT162b2	Documented infection	85 (79-89)	14+	~20.5 weeks
							AZD1222		60 (41-73)		~8 weeks
					Delta^ specifically	Included	BNT162b2	Documented infection	81 (77-84)		~29 weeks
							AZD1222		58 (55-62)		~16 weeks
101	<a href="#">Glatman-Freedman et al</a> (September 27, 2021)	Israel	Retrospective cohort	Adolescents aged 12-15 y	Delta^	Excluded	BNT162b2	Documented infection	91.5 (88.2-93.9)	8-28	2 weeks
100	<a href="#">Meyer et al</a> (September 23, 2021)	Germany	Retrospective cohort	252 residents and staff of a nursing home Non-household close contacts	Alpha^	Unknown	BNT162b2	Documented infection	45 (0-69)	7+	~11 weeks
								Symptomatic disease	68 (36-84)		
								Hospitalization	88 (37-98)		
99	<a href="#">Pilishvili et al*</a> (September 22, 2021)	USA	Test-negative case control	1482 HCPs as cases and 3449 HCPs as control	Alpha <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Symptomatic disease	88.9 (84.7-92.0)	14+	~14 weeks
									96.3 (92.5-98.2)	15-28	
									80.7 (61.0-90.4)	85-98	
							BNT162b2	Symptomatic disease	88.8 (84.6-91.8)	7+	
							mRNA-1273		96.3 (91.3-98.4)		
97	<a href="#">Self et al*</a> (September 17, 2021)	USA	Test-negative case control	1,682 case-patients and 2,007 control-patients ≥18 years without immunocompromising conditions	Alpha and Delta <sup>††</sup>	Excluded	BNT162b2	Hospitalization	88 (85-91)	14+	~20 weeks
									91 (88-93)	14-120	
									77 (67-84)	>120	
							mRNA-1273		93 (91-95)	14+	
									93 (90-95)	14-120	
									92 (87-96)	>120	
							Ad26.COV2.S		71 (56-81)	14+	
									68 (49-80)	>28	
96	<a href="#">Glatman-Freedman et al*</a> (September 16, 2021)	Israel	Retrospective longitudinal cohort	All Israeli residents aged 16+	Alpha^	Excluded	BNT162b2	Documented infection	97.3 (96.7-97.8)	22-28	2 weeks
								Symptomatic disease	97.9 (97.4-98.3)		
								Hospitalization	99.0 (98.4-99.3)		
								Severe/critical disease	99.2 (98.6-99.5)		
								Death	98.6 (97.0-99.3)		
95#		England				Excluded	BNT162b2	Symptomatic disease	94.9 (93.6-95.9)	14-63	~33.5 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">Andrews et al*</a> (January 12,2022)  <i>[Update to September 14, 2021 preprint]</i>		Test-negative case control	1,706,743 symptomatic cases and 3,763,690 test-negative control patients among adults (16+)	Alpha specifically^				94.8 (88.4-97.7)	70+	~33.5 weeks
								Hospitalization	97.7 (90.8-99.4)	14-63	~33.5 weeks
								Death	96.6 (94.4.-96.5)	14+	~33.5 weeks
							AZD1222	Symptomatic disease	82.1 (79.4-84.5)	14+	~20.5 weeks
									82.4 (79.6-84.7)	14-63	~8 weeks
									76.2 (49.8-88.7)	70+	~20.5 weeks
								Hospitalization	95.1 (86.7-98.2)	14-63	~20.5 weeks
									100 (CI omitted, no deaths among vaccinated)	70+	~20.5 weeks
								Death	100 (CI omitted, no deaths among vaccinated)	14+	~20.5 weeks
							BNT162b2	Symptomatic disease	83.3 (83.1-83.5)	14+	~33.5 weeks
									89.8 (89.6-90)	14-63	~8 weeks
									69.7 (68.7-70.5)	140+	~33.5 weeks
								Hospitalization	96.6 (96.2-96.9)	14+	~33.5 weeks
									98.4 (97.9-98.8)	14-63	~8 weeks
					92.7 (90.3-94.6)				140+	~33.5 weeks	
					Death			95.6 (94.4-96.6)	14+	~33.5 weeks	
								98.2 (95.9-99.2)	14-63	~8 weeks	
								90.4 (85.1-93.8)	140+	~33.5 weeks	
					AZD1222		Symptomatic disease	64.2 (63.9-64.5)	14+	~20.5 weeks	
								66.7 (66.3-67)	14-63	~8 weeks	
								47.3 (45-49.6)	140+	~20.5 weeks	
							Hospitalization	92.5 (92-93)	14+	~20.5 weeks	
								95.2 (94.6-95.6)	14-63	~8 weeks	
								77 (70.3-82.3)	140+	~20.5 weeks	
							Death	93.2(91.7-94.5)	14+	~20.5 weeks	
								94.1 (91.8-95.8)	14-63	~8 weeks	
								78.7 (52.7-90.4)	140+	~20.5 weeks	
					mRNA-1273		Symptomatic disease	94.8 (94.4-95.2)	14+	~7 weeks	
								93.8(93.4-94.1)	14-63		
								85.6(83.8-87.2)	70-104		
							Hospitalization	100 (CI omitted, no events among vaccinated)	14-63	~7 weeks	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
94	<a href="#">Bajema et al (September 10,2021)</a>	USA	Test-negative case control	388 case-patients and 787 controls from 5 Veterans Affair Medicals Centers	Alpha, Delta, Non-VOC <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Hospitalization	86.1 (76.5-91.8)	<104 days	~13 weeks
								Hospitalization	87.2 (78.2-92.5)	≥104 days	~28.5 weeks
								BNT162b2	Hospitalization	83.4 (74.0-89.4)	14+
					mRNA-1273		Hospitalization	91.6 (83.5-95.7)	~26.5 weeks		
					Alpha <sup>^</sup>		BNT162b2 & mRNA-1273	February-June: Hospitalization	84.1 (74.1-90.2)	~23 weeks	
								July-August: Hospitalization	89.3 (80.1-94.3)	~28.5 weeks	
93	<a href="#">Polinski et al* (March 17,2022)</a>  <i>[Published version of previous September 10,2021 preprint]</i>	USA	Retrospective Cohort	2,076,065 individuals ≥18 years	Alpha <sup>††</sup>	Excluded	Ad26.COV2.S	Documented infection	76(75-77)	14+	~14 weeks
								Hospitalization	81(78-82)		
								Immunocompromised: Documented infection	64 (59-68)		
					Delta <sup>^</sup>			Immunocompromised: Hospitalization	67 (57-74)		
								June-August: Documented infection	74(71-77)		
								June-August: Hospitalization	81(75-86)		
92	<a href="#">Grannis et al (September 10,2021)</a>	USA	Test-negative	32,867 events from 187 hospitals and 221 emergency departments/urgent care visits	Delta <sup>^</sup>	Included	BNT162b2	Hospitalization	80 (73-85)	14+	4 weeks
								Emergency/Urgent care visit	77 (74–80)		
							mRNA-1273	Hospitalization	95 (92-97)		
								Emergency/Urgent care visit	92 (89-93)		
							Ad26.COV2.S	Hospitalization	60 (31-77)		
								Emergency/Urgent care visit	65 (56-72)		
91	<a href="#">Dagan et al* (September 7,2021)</a>	Israel	Prospective Cohort	10,861 vaccinated pregnant females matched with 10,861 controls	Alpha <sup>^</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	96 (89-100)	7-56	~11 weeks
								Symptomatic infection	97 (91-100)		
								Hospitalization	89 (43-100)		
90	<a href="#">Thompson et al* (September 8, 2021)</a>	USA	Test-negative case control	58,904 adults aged 50+ with Covid-like illness who were hospitalized or visited emergency/	Non-VOC, Alpha <sup>^††</sup>	Excluded	BNT162b2	Hospitalization	87 (85-90)	14+	~22 weeks
								Emergency department or urgent care visit	89 (85-91)		20 weeks
							mRNA-1273	Hospitalization	91 (89-93)		
								Emergency department or urgent care visit	92 (89-94)		
							Ad26.COV2.S	Hospitalization	68 (50-79)		14 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
				urgent care facilities			BNT162b2 & mRNA-1273	Emergency department or urgent care visit	73 (59-82)	14+	~22 weeks
								Hospitalization, patients with ≥ 1 chronic respiratory condition	90 (88-92)		
								Hospitalization, patients with ≥ 1 chronic non-respiratory condition	88 (86-90)		
								Hospitalization, overall	88 (84-92)	14-27	~2 weeks
									86 (74-93)	112+	~22 weeks
								Emergency department or urgent care visit	92 (88-95)	14-27	~2 weeks
									86 (74-93)	112+	~22 weeks
89	<a href="#">Iliaki et al*</a> (October 18, 2021) [Update to September 6 preprint]	USA	Retrospective Cohort	4,317 HCWs	Alpha <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	95.2(80.0-98.8)	14+	~10 weeks
88	<a href="#">Tande et al*</a> (September 6, 2021)	USA – Mayo Clinic, Minnesota	Retrospective Cohort	Asymptomatic screening of 46,008 patients: pre-surgical, pre-op PCR tests	Non-VOC <sup>^††</sup>	Included	BNT162b2 & mRNA-1273	Asymptomatic infection (January-March)	91 (72-98)	14+	~10 weeks
					Alpha <sup>^††</sup>			Asymptomatic infection (April-May)	71 (53-83)		~19 weeks
					Delta <sup>^††</sup>			Asymptomatic infection (June-August)	63 (44-76)		~32 weeks
87	<a href="#">Barlow et al</a> (September 3, 2021)	USA	Test-negative case control	500 matched pairs aged 15 years and above	Delta <sup>^</sup>	Excluded	BNT162b2 and mRNA-1273	Documented infection	74(65-82)	14+	~4 weeks
							Ad26.COV2.S		51(-2 – 76)		
86	<a href="#">Bruxvoort et al*</a> (November 24, 2021)	USA	Matched prospective cohort	352,878 vaccinated 352,878	Delta and Alpha <sup>^</sup>	Included	mRNA-1273	Documented infection	87.4 (85.6-89.1)	14+	~20 weeks
								Asymptomatic infection	72.7 (57.6-82.4)		
								Symptomatic infection	88.3 (86.5-89.9)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Update to September 2, 2021 Preprint]</a>			unvaccinated individuals				Hospitalization	95.8 (92.5-97.6)		
								Death	97.9 (84.5-99.7)		
85	<a href="#">Giansante et al* (September 2, 2021)</a>	Italy	Retrospective cohort	9839 staff and HCWs	Delta and Alpha^	Excluded	BNT162b2 and mRNA-1273	Documented infection	84.8 (73.2-91.4)	14+	~16 weeks
				Only 7190 HCWs				Symptomatic infection	87.1 (69.3-94.6)		
								Documented infection	84.4 (69.7-92.0)		
								Symptomatic infection	86.5 (62.9-95.1)		
84	<a href="#">Katz et al* (December 10, 2021)</a>  <a href="#">[Published version of September 2 pre-print]</a>	Israel	Prospective cohort	1,250 HCWs from six Israeli hospitals	Alpha^	Included	BNT162b2	Documented infection	94.5(82.5-98.2)	14+	~18 weeks
								Symptomatic infection	97 (72-99.7)	7+	
83	<a href="#">Nunes et al* (September 23, 2021)</a>	Portugal	Retrospective cohort	1,880,351 older adults (65+) in Portugal	Alpha^ (Feb-Mar) then Delta^ (May-onward)	Excluded	BNT162b2 and mRNA-1273	Hospitalization, 65-79 y	94 (88-97)	14+	~14.5 weeks
								Death, 65-79 y	96 (92-98)		
								Hospitalization, 80+ y	82 (72-89)	14+	~22.5 weeks
								Death, 80+ y	81 (74-87)	14+	
82#	<a href="#">Chemaitelly et al* (October 6, 2021)</a>  <a href="#">[Update to Aug 27 preprint]</a>  <i>Note: See Duration of Protection Table for further context</i>	Qatar	Test-negative case control	142,300 cases and 848,240 controls among residents of Qatar (12+)	Alpha^ then Beta^ (Jan-Jun), then Delta^ (Jul-Sep)	Included	BNT162b2	Documented infection	73.2 (71.3-75.0) 22.3 (-1.7-40.7)	28-63 175+	7 weeks ~32 weeks
								Symptomatic infection	72.5 (69.6-75.1) 27.8 (-1.4-48.7)	28-63 175+	7 weeks ~32 weeks
								Asymptomatic infection	66.9 (61.9-71.3) -33.3 (-181.8-36.9)	28-63 175+	7 weeks ~32 weeks
								Severe, critical, or fatal disease	96.8 (93.9-98.3) 55.6 (-44.3-86.3)	28-63 175+	7 weeks ~32 weeks
					Alpha specifically^		BNT162b2	Documented infection	88.6 (79.2-93.7) 80.0 (-71.2-97.7)	28-63 147+	7 weeks ~32 weeks
					Beta specifically^		BNT162b2	Documented infection	63.9 (52.6-72.5) 40.0 (-151.1-85.7)	28-63 147+	7 weeks ~32 weeks
					Delta specifically^		BNT162b2	Documented infection	73.3 (63.6-80.4) 17.9 (-12.9-40.3)	28-63 147+	7 weeks ~32 weeks
81	<a href="#">Goldberg et al (October 27, 2021)</a>	Israel	Retrospective cohort	9,395,923 adults (16+) in Israel	Delta^	Excluded	BNT162b2	Documented infection, 16-39 y fully vaccinated	80 (75-84)	55-98	13 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Update to Aug 25 preprint]</a>  Note: See Duration of Protection Table for further context							May 2021 (~2 mos prior)			
								Documented infection, 16-39 y fully vaccinated Jan 2021 (~6 mos prior)	55 (50-60)	168-203	28 weeks
								Documented infection, 40-59 y fully vaccinated May 2021 (~2 mos prior)	83 (75-88)	55-98	13 weeks
								Documented infection, 40-59 y fully vaccinated Jan 2021 (~6 mos prior)	57 (53-61)	168-203	28 weeks
								Documented infection, 60+ y fully vaccinated May 2021 (~2 mos prior)	82 (70-89)	55-98	13 weeks
								Documented infection, 60+ y fully vaccinated Jan 2021 (~6 mos prior)	57 (52-62)	168-203	28 weeks
								Severe disease, 40-59 y fully vaccinated Mar 2021 (~4 mos prior)	98(94-99)	109-159	22 weeks
								Severe disease, 40-59 y fully vaccinated Jan 2021 (~6 mos prior)	93 (86-97)	168-203	28 weeks
								Severe disease, 60+ y fully vaccinated Mar 2021 (~4 mos prior)	92 (87-95)	109-159	22 weeks
								Severe disease, 60+ y fully vaccinated Jan 2021 (~6 mos prior)	85(81-88)	168-203	28 weeks
80#	<a href="#">Tartof et al*</a> (October 16, 2021)  <a href="#">[Update to Aug 23 preprint]</a>	USA	Retrospective cohort	3,436,957 members (12+) of Kaiser Permanente Southern California	Epsilon (Jan-Mar), Alpha (Apr-May), Delta (Jun-Jul)^	Included	BNT162b2	Documented infection	73 (72-74)	7+	~29 weeks
									88 (86-89)	7-36	~3 weeks
									47 (43-51)	157+	~29 weeks
								Hospitalization	90 (89-92)	7+	~29 weeks
									87 (82-91)	7-36	~3 weeks



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated	
				healthcare system	Delta specifically^				88 (82-92)	157+	~29 weeks	
								Documented infection	75 (71-78)	7+	~29 weeks	
									93 (85-97)	7-36	~3 weeks	
									53 (39-65)	127+	~29 weeks	
					Hospitalization			93 (84-96)	7+	~29 weeks		
								Documented infection	91 (88-92)	7+	~29 weeks	
									97 (95-99)	7-36	~3 weeks	
									67 (45-80)	127+	~29 weeks	
Hospitalization	95 (90-98)		~29 weeks									
79	<a href="#">Prasad et al</a> (August 19,2021)	USA	Retrospective cohort	3,104 surgery patients and 7,438 propensity-matched controls	Non-VOC††	Included	BNT162b2 or mRNA-1273	Post-operative documented infection	91 (56-99)	14+	~8 weeks	
78	<a href="#">Pouwels et al*</a> (October 14, 2021)  <i>[Update to Aug 18 preprint]</i>	UK	Prospective cohort	384,543 individuals aged 18 years or older	Alpha^ (December - May)	Included	BNT162b2	Documented infection	78 (68-84)	14+	~28 weeks	
								Ct<30	94 (91-96)			
							AZD1222	Documented infection	79 (56-90)			
								Ct<30	86 (71-93)			
				358,983 individuals	Delta^ (May - August)		BNT162b2	Documented infection	80 (77-83)			
								Ct<30	84 (82-86)			
							AZD1222	Documented infection	67 (62-71)			
								Ct<30	70 (65-73)			
77	<a href="#">Tenforde et al*</a> (November 4, 2021)  <i>[Update to Aug 18 MMWR]</i>	USA	Test-negative case control	4513 hospitalized adults (18+)	Alpha and Delta^	Included	BNT162b2	Hospitalization, all	81 (77-84)	14+	~30 weeks	
									85 (82-88)	14-120	~15 weeks	
									64 (51-73)	120+	~30 weeks	
							mRNA-1273	Hospitalization, all	89 (86-92)	14+	~28 weeks	
									91 (87-93)	14-120	~15 weeks	
									85 (77-91)	120+	~28 weeks	
					Alpha specifically^ Delta specifically^		BNT162b2 or mRNA-1273	Hospitalization, Immunocompetent	90 (87-91)	14+	~30 weeks	
								Hospitalization, Immunocompromised	51 (31-65)			
							BNT162b2 or mRNA-1273	Hospitalization, all	90 (84-94)			
								Hospitalization, all	86 (79-90)			
76	<a href="#">Chin et al*</a> (January 27, 2022)	USA	Retrospective cohort	60,707 incarcerated	Non-VOC^	Excluded	BNT162b2 or mRNA-1273	Documented infection, all	97 (88-99)	14+	~5 weeks	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Published version of August 18, 2021 preprint]</a>			people in California prisons				Documented infection, cohort at moderate/high risk for severe COVID-19	92 (74-98)		
							mRNA-1273	Documented infection, all	96 (67-99)		
75	<a href="#">Nanduri et al (August 18, 2021)</a>	USA	Retrospective cohort	10,428,783 residents of skilled nursing facilities	Non-VOC and Alpha <sup>††</sup> (Pre-Delta circulation) ^	Unknown	BNT162b2	Documented infection	74.2 (69–78.7)	14+	~16 weeks
							mRNA-1273		74.7 (66.2–81.1)		
					Alpha <sup>††</sup> (Delta circulating but not dominant) ^		BNT162b2	Documented infection	66.5 (58.3–73.1)		~22 weeks
							mRNA-1273		70.4 (60.1–78.0)		
					Delta <sup>^</sup>		BNT162b2	Documented infection	52.4 (48–56.4)		~28 weeks
							mRNA-1273		50.6 (45–55.7)		
74#	<a href="#">Tang et al* (November 2, 2021)</a>  <a href="#">[Update to Aug 11 preprint]</a>	Qatar	Test-negative case control	Cases with confirmed Delta (~2800 per analysis) or Beta infection and matched controls (~11,200) among residents of Qatar of all ages	Delta specifically <sup>^</sup>	Included	BNT162b2	Documented infection	50.6 (45.4–55.3)	14+	~25 weeks
							mRNA-1273		72.0 (66.1–76.9)		
							BNT162b2	Severe, critical, or fatal disease	94.1 (85.9–97.6)		
							mRNA-1273		96.1 (71.4–99.5)		
							BNT162b2	Symptomatic COVID-19	44.4 (37.0–50.9)		
							mRNA-1273		73.9 (65.9–79.9)		
							BNT162b2	Asymptomatic COVID-19	46.0 (32.3–56.9)		
							mRNA-1273		53.6 (33.4–67.6)		
					Beta specifically <sup>^</sup>		BNT162b2	Documented infection	74.3 (70.3–77.7)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
							mRNA-1273		80.8 (69.0-88.2)		
							BNT162b2	Severe, critical, or fatal disease	92.7 (81.5-97.1)		
							mRNA-1273		100.0 (CI omitted due to zero events among vaccinated)		
73	<a href="#">Chemaitelly et al (August 9, 2021)</a>	Qatar	Retrospective cohort	782 kidney transplant recipients	Alpha and Beta^	Excluded	BNT162b2 and mRNA-1273	Documented infection	46.6 (0.0-73.7)	14+	~17 weeks
									66.0 (21.3-85.3)	42+	
									73.9 (33-89.9)	56+	
								Severe infection	72.3 (0.0-90.9)	14+	
									85.0 (35.7-96.5)	42+	
									83.8 (31.3-96.2)	56+	
72	<a href="#">Puranik et al (August 9, 2021)</a>	USA	Retrospective cohort	77,607 adults	Alpha and Delta ^	Excluded	BNT162b2	Documented infection	76 (69-81)	14+	~ 26 weeks
								Hospitalization	85 (73-93)		
								ICU admission	87 (46-98.6)		
							mRNA-1273	Documented infection	86 (81-90.6)		
								Hospitalization	91.6 (81-97)		
								ICU admission	93.3 (57-99.8)		
71	<a href="#">de Gier et al* (August 5, 2021)</a>	Netherlands	Retrospective cohort	184,672 household and other close contacts (aged 18+) of 113,582 index cases (aged 18+)	Alpha^	Unknown	AZD1222	Documented infection among household contacts (adj. for vaccination status of index case)	87 (77-93)	7+	~15 weeks
							BNT162b2		65 (60-70)		
							mRNA-1273		91 (79-97)		
							Ad26.COV2.S		12 (-71-54)	14+	
70	<a href="#">Lefèvre et al (July 31, 2021)</a>	France	Retrospective cohort	378 LTCF residents	Beta specifically^	Included	BNT162b2	Documented infection	49 (14-69)	7+	~16 weeks
								Hospitalization and death	86 (67-94)		
69	<a href="#">Alali et al (July 29, 2021)</a>	Kuwait	Retrospective cohort	3,246 HCWs	Alpha^	Excluded	BNT162b2	Documented infection	94.5 (89.4-97.2)	7+	~18 weeks
68	<a href="#">Gram et al* (December 17, 2021)</a>  <i>[Published version of July 28 pre-print]</i>	Denmark	Retrospective cohort	5,542,079 adults	Alpha^	Excluded	Heterologous: AZD1222 (1 <sup>st</sup> dose) BNT162b2 or mRNA-1273(2 <sup>nd</sup> dose)	Documented infection	88 (83-92)	14+	~20 weeks
67	<a href="#">Amirthalingam et al (December 10, 2021)</a>	UK	Test-negative case control		Alpha^	Excluded	BNT162b2	Documented infection, 80 y+	77 (56-88)	14+, dose interval 19-29 days	~16 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Published version of July 28 pre-print]</a>			750 participants aged 50-89 years					90 (83-94)	14+, dose interval 65-84 days	
								Documented infection, 65-79 y	77 (66-85)	14+, dose interval 19-29 days	
									89 (86-92)	14+, dose interval 65-84 days	
								Documented infection, 50-64 y	88 (67-96)	14+, dose interval 19-29 days	
									92 (91-94)	14+, dose interval 65-84 days	
							AZD1222	Documented infection, 80 y+	96(68-99)	14+, dose interval 45-64 days	
									82 (68-89)	14+, dose interval 65-84 days	
								Documented infection, 65-79 y	73 (25-90)	14+, dose interval 30-44 days	
									74 (69-79)	14+, dose interval 65-84 days:	
								Documented infection, 50-64 y	55 (34-69)	14+, dose interval 30-44 days	
									77 (74-79)	14+, dose interval 65-84 days	
66	<a href="#">Kissling et al (July 22,2021)</a>	UK, France, Ireland, Netherlands, Portugal, Scotland, Spain, Sweden	Test-negative	592 cases and 4,372 controls aged 65+	Alpha^	Excluded	BNT162b2	Symptomatic COVID-19	87(74-93)	14+	~16 weeks
65#	<a href="#">Carazo et al*</a>	Canada				Excluded	BNT162b2	Documented infection	85.5 (80.4-89.3)	7+	~20 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">(August 30, 2021)</a> <a href="#">[Update to July 22 preprint]</a>		Test-negative case control	5316 cases and 53,160 test negative controls among HCWs	Non-VOC and Alpha <sup>^</sup>		mRNA-1273	Symptomatic COVID-19	92.2 (87.8-95.1)		
								Documented infection	84.1 (34.9-96.1)	7+	
					Alpha specifically <sup>^</sup>	Excluded	BNT162b2 and mRNA-1273	Documented infection	92.6 (87.1-95.8)	7+	
					Non-VOC specifically <sup>^</sup>	Excluded	BNT162b2 and mRNA-1273	Documented infection	86.5 (56.8-95.8)		
64	<a href="#">Hitchings et al</a> (October 28, 2021) <a href="#">[Update to July 22 preprint]</a>	Brazil	Test-negative case control	30,680 matched pairs of adults aged 60+ in Sao Paulo, Brazil	Gamma <sup>^</sup>	Included (except in previous 90 days)	AZD1222	Symptomatic COVID-19	77.9 (69.2-84.2)	14+	~9.5 weeks
								Hospitalization	87.6 (78.2-92.9)		
								Death	93.6 (81.9-97.7)		
63	<a href="#">Kim et al*</a> (September 8, 2021) <a href="#">[Update to July 22 preprint]</a>	USA	Test-negative case control	812 US adults aged 16+ with COVID-19-like illness	Non-VOC and Alpha <sup>††</sup>	Unknown	BNT162b2 and mRNA-1273	Symptomatic COVID-19	91 (83-95)	14+	~18.5 weeks
62#	<a href="#">Lopez Bernal et al*</a> (July 21, 2021)	UK	Test-negative case control	19,109 cases and 171,834 test negative controls aged 16+	Alpha specifically <sup>^</sup>	Excluded	BNT162b2	Symptomatic COVID-19	93.7 (91.6-95.3)	14+	~17 weeks
							AZD1222	Symptomatic COVID-19	74.5 (68.4-79.4)		
					Delta specifically <sup>^</sup>		BNT162b2	Symptomatic COVID-19	88.0 (85.3-90.1)		
							AZD1222	Symptomatic COVID-19	67.0 (61.3-71.8)		
61	<a href="#">Butt et al*</a> (July 20, 2021)	USA	Test-negative case control	54,360 propensity-matched pairs of veterans	Original and Alpha <sup>††</sup>	Excluded	BNT162b2 and mRNA-1273	Documented infection	97.1 (96.6-97.5)	7+	~6.5 weeks
							BNT162b2	Documented infection	96.2 (95.5-96.9)		
							mRNA-1273	Documented infection	98.2 (97.5-98.6)		
60	<a href="#">Layan et al*</a> (March 03, 2022) <a href="#">[Published version of July 16, 2021 preprint]</a>	Israel	Prospective cohort	215 index cases and 687 household contacts (HHCs) from 210 Israeli households	Original and Alpha <sup>†</sup>	Included	BNT162b2	Documented infection among HHCs vaccinated and not isolated (relative to HHCs not vaccinated and not isolated)	79 (56-92)	7+	~12 weeks
59	<a href="#">Balicer et al*</a> (September 7, 2021)	Israel	Prospective Cohort	21722 pregnant women	Original and Alpha <sup>^</sup>	Excluded	BNT162b2	Documented infection	96 (89-100)	7-56	~18 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">[Update to July 12 preprint]</a>							Symptomatic COVID-19	97 (91-100)		
								Hospitalization	89 (43-100)		
58	<a href="#">Butt et al*</a> (October 7, 2021)  <a href="#">[Update to June 22 preprint]</a>	Qatar	Retrospective cohort	814 pregnant women	Alpha and Beta <sup>^</sup>	Excluded	BNT162b2  mRNA-1273	Documented infection	87.7 (43.5-97.3)  100.0 (0-100.0)	14+	~17 weeks
57	<a href="#">Prunas et al*</a> (January 27, 2022)  <a href="#">[Update to July 16, 2021 preprint]</a>	Israel	Retrospective cohort	2,472,502 Israeli individuals from 1,327,647 households	Original and Alpha <sup>†</sup> (pre-Delta <sup>^</sup> )  Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection among household contacts	89.4 (88.7-90)  58.3 (45.8-67.9)  72 (65.9-77)  40.2 (37.6-42.6)	10-90  90+  10-90  90+	~11 weeks  ~26.5 weeks  ~11 weeks  ~26.5 weeks
56	<a href="#">Whitaker et al*</a> (January 2, 2022)  <a href="#">[Update to July 9, 2021 preprint]</a>	UK	Prospective cohort	5,591,142 patients reporting to 718 English general practices	Alpha <sup>^</sup>	Included	BNT162b2   AZD1222	Symptomatic COVID-19: Ages 16-64 Symptomatic COVID-19: Ages 65+ Immunosuppressed Symptomatic COVID-19: Ages 16-64 Symptomatic COVID-19: Ages 65+ Symptomatic COVID-19: Immunosuppressed	48.6 (-61.5-83.7) 84.7 (77.7-89.5) 59.6 (-35.5-86.3) 67.9 (-1.1-89.8) 81.7 (59.6-91.7) 60.0 (-63.6-90.2)	14-69	~8 weeks
55	<a href="#">John et al*</a> (July 13, 2021)	USA	Retrospective cohort	40,074 patients with cirrhosis within Veterans Health Administration, propensity matched	Original and Alpha <sup>††</sup>	Excluded	BNT162b2 and mRNA-1273	Documented infection Hospitalization COVID-19 related death	78.6 (25.5-93.8) 100.0 (99-100) 100.0 (99-100)	7+	~10 weeks
54	<a href="#">Bertollini et al</a> (July 13, 2021)	Qatar	Prospective cohort	10,092 matched pairs of Qatari adults arriving at an international airport.	Original, Alpha and Beta <sup>^</sup>	Included	BNT162b2 and mRNA-1273	Documented infection	78 (72-83)	14+	~4 weeks

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
52#	<a href="#">Chemaitelly et al*</a> (July 9, 2021)	Qatar	Test-negative case-control	25,034 matched pairs of adults	Alpha specifically^	Unknown	mRNA-1273	Documented infection	100.0 (CI omitted since there were no events among vaccinated persons)	14+	13 weeks
				52,442 matched pairs of adults	Beta specifically^	Unknown	mRNA-1273	Documented infection	96.0 (90.9-98.2)		
				4,497 matched pairs of adults	Alpha and Beta^	Unknown	mRNA-1273	Severe, critical or fatal disease	89.5 (18.8-98.7)		
								Symptomatic infection	98.6 (92.0-100)		
			Retrospective cohort	2520 vaccinated and 73,853 unvaccinated, antibody-negative controls	Alpha specifically^	Excluded	mRNA-1273	Documented infection	100.0 (82.5-100.)	14+	13 weeks
					Beta specifically ^	Excluded	mRNA-1273	Documented infection	87.8 (73.4-95.5)		
51#	<a href="#">Tenforde et al*</a> (August 6, 2021) [Update to July 8 preprint]	USA	Test-negative case-control	1212 hospitalized adults from 18 hospitals	Original and Alpha^	Included	BNT162b2/ mRNA-1273	Hospitalization	86.6 (79.0-91.4)	14+	~2 weeks
							BNT162b2		84.7 (74.1-91.0)		
							mRNA-1273		88.9 (78.7-94.)		
					Alpha^	Included	BNT162b2/ mRNA-1273		92.1 (82.3-96.5)		
50	<a href="#">Jara et al</a> (July 7, 2021)	Chile	Prospective cohort	10,187,720 adults	Alpha and Gamma^	Excluded	CoronaVac	Documented infection	65.9 (65.2-66.6)	14+	8 weeks
								Hospitalization	87.5 (86.7-88.2)		
								ICU admission	90.3 (89.1-91.4)		
								Death	86.3 (84.5-87.9)		
49#	<a href="#">Nasreen et al*</a> (February 7, 2022)  [Published version of September 30 preprint]	Canada	Test-negative Case Control	682,071 symptomatic community-dwelling individuals (age 16+) in Ontario	Non-VOC specifically^	Excluded Unknown	BNT162b2	Symptomatic infection	92 (87-95)	14+	~28 weeks
							mRNA-1273	Hospitalization or death	97 (88-99)		~25 weeks
								Symptomatic infection	98 (83-100)		
								Hospitalization or death	100 (no CI provided)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated	
					Alpha specifically^		AZD1222	Symptomatic infection	100 (no CI provided)		~3 weeks	
								Hospitalization or death	100 (no CI provided)			
							BNT162b2	Symptomatic infection	88 (86-90)		~28 weeks	
								Hospitalization or death	96 (94-97)			
								mRNA-1273	Symptomatic infection		92 (87-95)	~25 weeks
									Hospitalization or death		95 (92-97)	
					AZD1222		Symptomatic infection	87 (47-97)	~3 weeks			
							Hospitalization or death	92 (41-99)				
							BNT162b2	Symptomatic infection	86 (0-98)		~28 weeks	
								Hospitalization or death	92 (39-99)			
					mRNA-1273			Symptomatic infection	100 (no CI provided)		~25 weeks	
								Hospitalization or death	100 (no CI provided)			
					AZD1222		Symptomatic infection	100 (no CI provided)	~3 weeks			
							BNT162b2	Symptomatic infection	90 (76-96)		~28 weeks	
								Hospitalization or death	94 (59-99)			
					mRNA-1273			Symptomatic infection	100 (no CI provided)		~25 weeks	
							Hospitalization or death	100 (no CI provided)				
							AZD1222	Symptomatic infection	100 (no CI provided)		~3 weeks	
								Hospitalization or death	100 (no CI provided)			
					Delta specifically^		BNT162b2	Symptomatic infection	92 (89-94))		~28 weeks	
								Hospitalization or death	98 (96-99)			
							mRNA-1273	Symptomatic infection	94 (90-97)		~25 weeks	
								Hospitalization or death	98 (93-100)			
							AZD1222	Symptomatic infection	88 (68-96)		~3 weeks	



No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
								Hospitalization or death	90 (67-97)		
48	<a href="#">Baum et al* (November 18, 2021)</a>  <i>[Update to June 28 preprint]</i>	Finland	Prospective cohort	Two study cohorts: 901,092 Finnish elderly aged 70 years and 774,526 chronically ill aged 16-69 years	Original and Alpha <sup>^</sup>	Excluded	BNT162b2 & mRNA-1273 (elderly cohort)	Documented infection	75 (65-82)	7+	16 weeks
								Hospitalization	93 (70-98)		
							BNT162b2 & mRNA-1273 (Chronically ill cohort)	Documented infection	77 (65-85)		
								Hospitalization	90 (29-99)		
47	<a href="#">Saciuk et al* (December 30, 2021)</a> <i>[Update to June 27, 2021 preprint]</i>	Israel	Retrospective cohort	1.6 million members of Maccabi HealthCare HMO ≥16	Original and Alpha <sup>^</sup>	Excluded	BNT162b2	Documented infection	93.0 (92.6-93.4)	7+	14 weeks
								Hospitalization	93.4 (91.9-94.7)	7+	
								Death	91.1 (86.5-94.1)	7+	
46	<a href="#">Pawlowski et al.* (June 17, 2021)</a> <i>[Update to Feb. 18, 2021 preprint]</i>	USA – Mayo Clinic	Retrospective Cohort	68,266 – propensity matched on, zip, # of PCRs, demographics	Original & Alpha <sup>¥</sup>	Excluded	BNT162b2	Documented Infection	88.0 (84.2-91.0)	≥14	~17 weeks (120 days)
								Hospitalization	88.3 (72.6-95.9)	≥14	
								ICU Admission	100.0 (18.7-100)	≥14	
							mRNA-1273	Documented Infection	92.3 (82.4-97.3)	≥14	
								Hospitalization	90.6 (76.5-97.1)	≥14	
								ICU Admission	100.0 (17.9-100)	≥14	
45	<a href="#">Young-Xu et al (October 6, 2021)*</a> <i>[Update to Jul 14 preprint]</i>	USA	Test negative case control	77014 veterans aged 65+ within Veterans Health Administration	Original and Alpha <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	94 (92-95)	7+	~8 weeks
								Hospitalization	89 (81-93)		
								Death	98.5 (86.6-99.8)		
								Asymptomatic infection	69.7 (47.7-82.5)		
								Hospitalization	88.4 (74.9-94.7)		
								Deaths	97.0 (91.7-98.9)		
43#	<a href="#">Stowe et al (June 14, 2021)</a>	UK	TND Case-control	Patients seeking emergency care services with subsequent hospitalization	Alpha specifically <sup>^</sup>	Included	BNT162b2	Hospitalization	95 (78-99)	14+	~20 weeks (but most much less)
							AZD1222		86 (53-96)		
					Delta specifically <sup>^</sup>		BNT162b2		96 (86-99)		
							AZD1222		92 (75-97)		
42#	<a href="#">Sheikh et al (June 14, 2021)</a>	Scotland	TND	Scottish population	Alpha <sup>^</sup>	Unknown	BNT162b2	Documented infection	92 (90–93)	14+	
						Unknown	AZD1222	Documented infection	73 (66–78)	14+	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
					Delta <sup>^</sup>	Unknown	BNT162b2	Documented infection	79 (75–82)	14+	~20 weeks (but most much less)
						Unknown	AZD1222	Documented infection	60 (53–66)	14+	
41	<a href="#">Flacco, Maria et al* (June 10, 2021)</a>	Italy	Retrospective cohort	245,226 individuals	Original and Alpha <sup>††</sup>	Excluded	BNT162b2	Documented infection	98 (97-99)	14+	~14 weeks
39	<a href="#">Emborg et al. (June 2, 2021)</a> [Update of Houston-Melms below]	Denmark	Cohort	46,101 long-term care facility (LTCF) residents, 61,805 individuals 65 years and older living at home but requiring practical help and personal care (65PHC), 98,533 individuals ≥85 years of age (+85), 425,799 health-care workers (HCWs), and 231,858 individuals with comorbidities that predispose for severe COVID-19 disease (SCD)	original & Alpha <sup>††</sup>	Excluded	BNT162b2	Hospitalization	99 (96-100)	14+	
								Death	98 (87-100)	14+	
								Documented infection	82 (79-84)	>7	
38	<a href="#">Thompson et al* [updated on June 30, 2021]</a>	USA	Cohort	3975 health care personnel, first responders, and other essential and frontline workers in 8 locations in US	Original	Excluded	BNT162b2	Documented infection	93 (78-98)	≥14	13 weeks
							mRNA-1273	Documented infection	82 (20-96)	≥14	
36	<a href="#">Khan et al (May 31, 2021)</a>	USA	Retrospective cohort	14,697 IBD patients in VA hospitals	Unknown	Included	BNT162b2 & mRNA-1273	Documented infection	69 (44-83)	7+	
35	<a href="#">Martinez-Bas et al* (May 27, 2021)</a>	Spain	Prospective Cohort	20,961 close contacts of confirmed cases	Alpha	Excluded	BNT162b2	Hospitalization/death	49 (-36-81)	7+	
								Documented infection	65 (56-73)	14+	12 weeks
								Symptomatic infection	82 (73-88)		
								Hospitalization	94 (60-99)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated	
34#	<a href="#">Chung et al.*</a> (Aug 20, 2021) <i>[Update to July 26 preprint]</i>	Canada	Test negative design case control	Adults (16+) in Ontario: 53,270 cases 270,763 controls	Non-VOC^	Excluded	BNT162b2	Symptomatic infection	91 (88-93)	7+	15 weeks	
								Hospitalization and Death	96 (82-99)	0+		
							mRNA-1273	Symptomatic infection	94 (86-97)	7+		
								Hospitalization and Death	96 (74-100)	0+		
					Alpha specifically^		BNT162b2 & mRNA-1273	Symptomatic infection	90 (85-94)	7+		0+
								Hospitalization and Death	94 (59-99)	0+		
					Beta or Gamma specifically^		BNT162b2 & mRNA-1273	Symptomatic infection	88 (61-96)	7+		0+
								Hospitalization and Death	100	0+		
33	<a href="#">PHE</a> (May 20, 2021)	UK	Test-negative case control	≥65 years	Alpha	Excluded	BNT162b2	Symptomatic infection	90 (82-95)	≥14		
							AZD1222	Symptomatic infection	89 (78-94)	≥14		
32#	<a href="#">Ranzani et al.*</a> (Aug 20, 2021) <i>[update to Jul 21 preprint]</i>	Brazil	Test-negative case control	22,177 70+ year olds in Sao Paulo	Gamma^	Included	Coronavac	Symptomatic infection	46.8 (38.7-53.8)	≥14	~10.5 weeks	
								Hospitalization	55.5 (46.5-62.9)			
								Death	61.2 (48.9-70.5)			
31	<a href="#">Ismail et al.</a> (May 12, 2021)	UK	Screening method	13,907 ≥70	Alpha	Included	BNT162b2	Hospitalization in 80+	93 (89-95)	≥14		
30	<a href="#">Pilishvili et al.*</a> (May 14, 2021)	US	Test-negative case control	HCP at 33 U.S. sites across 25 U.S. states	Unknown	Excluded	BNT162b2 & mRNA-1273	Symptomatic infection	94 (87-97)	≥7		
29	<a href="#">Lopez-Bernal et al.*</a> (May 13, 2021) <i>[Update to Mar 1 preprint]</i>	UK	Test-negative case control	156,930 UK population over age 70	Alpha^	Included	BNT162b2 AZD1222	Over 80 years: Symptomatic infection	79 (68-86)	≥7		
28	<a href="#">Angel et al.*</a> (May 6, 2021)	Israel	Retrospective cohort	6710 HCWs at a single tertiary care center in	Alpha <sup>†</sup>	Excluded	BNT162b2	Symptomatic	97 (94-99)	>7 days		
								Asymptomatic	86 (69-97)			
27#	<a href="#">Abu-Raddad et al.*</a> (July 8, 2021)	Qatar	Test-negative case-control	Qatari adults	Alpha specifically^	Unknown	BNT162b2	CC Alpha documented infection	90 (86-92)	≥14		
								CC Alpha severe/fatal infection	100 (82-100)			

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
					Beta specifically^	Unknown	BNT162b2	CC Beta documented infection	75 (71-79)		
					CC Beta severe/fatal infection			100 (74-100)			
			Retrospective cohort	Qatari adults	Alpha specifically^			Cohort documented infection Alpha	87 (82-91)		
					Beta specifically^			Cohort documented infection Beta	72 (66-77)		
26	<a href="#">Haas et al. *</a> (May 5, 2021) <i>[Update to Mar 24 preprint]</i>	Israel	Retrospective cohort	Israeli population ≥16 years	Alpha^	Excluded	BNT162b2	Documented infection	95.3 (94.9-95.7)	≥7 days	
								Asymptomatic infection	91.5 (90.7-92.2)		
								Symptomatic infection	97.0 (96.7-97.2)		
								Hospitalization	97.2 (96.8-97.5)		
								Severe/ critical hospitalization	97.5 (97.1-97.8)		
								Death	96.7 (96.0-97.3)		
25	<a href="#">Corchado-Garcia et al. *</a> (November 2, 2021)  <i>[Update to April 30 preprint]</i>	USA	Retrospective cohort	97,787 adults in the Mayo Clinic Network	Alpha and Delta^	Excluded	Ad26.COVS.2	Documented infection	74.2 (64.9-81.6)	≥15	
24	<a href="#">Fabiani et al. *</a> (Apr 29, 2021)	Italy	Retrospective cohort	9,878 HCWs	Unknown	Excluded	BNT162b2	Documented infection	95 (62-99)	≥7 days	
								Symptomatic infection	94 (51-99)		
22	<a href="#">Tenforde et al. *</a> (Apr 28, 2021)	USA	Test-negative case-control	Hospitalized adults ≥65 years	Original and Alpha <sup>‡</sup>	Unknown	BNT162b2 & mRNA-1273	Hospitalization	94 (49-99)	≥14 days	
21	<a href="#">Goldberg et al. *</a> (March 30, 2022)  <i>[Update to Apr 24, 2021 preprint]</i>	Israel	Prospective cohort	5,600,000+ individuals ≥16 years	Alpha^	Excluded	BNT162b2	Documented infection	94.5 (94.3-94.7)	≥14 days	~8 weeks
								Hospitalization	95.8 (95.2-96.2)		
								Severe disease	96.3 (95.7-96.9)		
								Death	96 (94.9-96.9)		
20	<a href="#">Pritchard et al. *</a>	UK	Prospective cohort		Alpha & Original^	Excluded	BNT162b2	Documented infection	80 (74-85)	≥0 days	
								Symptomatic disease	95 (91-98)		

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
	<a href="#">(Jun 9, 2021)</a> <i>[Update to Apr 23 preprint]</i>			373,402 individuals ≥16 years			AZD1222	Documented infection	79 (65-88)		
								Symptomatic disease	92 (78-97)		
18	<a href="#">Hall et al.*</a> (Apr 23, 2021) <i>[Update to Feb 21 preprint]</i>	UK – SIREN study	Prospective Cohort (Person-time)	23,324 healthcare workers	Alpha <sup>^</sup>	Excluded	BNT162b2	Documented infection	86 (76-97)	≥7	
17	<a href="#">Mason et al.*</a> (October 18, 2021) <i>[Update to Apr 22 preprint]</i>	UK - England	Case-control	170,226 80-83-year-olds	Alpha <sup>^</sup>	Excluded	BNT162b2	Documented infection	70 (55- 80)	35-41	
								Hospitalization	75 (52-87)	35-41	
								Emergency visit	79(60-90)		
16	<a href="#">Bjork et al.*</a> (September 29, 2021) <i>[Update to Apr 21 preprint]</i>	Sweden	Retrospective cohort	805,741 Swedish adults aged 18-64 years	Original & Alpha <sup>^</sup>	Unknown	BNT162b2	Documented infection	86 (72-94)	≥7	4 weeks
14	<a href="#">Andrejko et al.*</a> (Jul 20, 2021) <i>[update to May 25 preprint]</i>	USA	Test-negative case control	1023 California adults ≥18 years	B.1.427/ B.1.429 & Alpha <sup>^</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection	87.4 (77.2-93.1)	≥15	~14 weeks
								Asymptomatic infection	68.3 (27.9-85.7)	≥15	
								Symptomatic infection	91.3 (79.3-96.3)	≥15	
								Hospitalization	100	≥15	
							BNT162b2	Documented infection	87.0 (68.6-94.6)	≥15	
							mRNA-1273	Documented infection	86.2 (68.4-93.9)	≥15	
13	<a href="#">Regev-Yochay et al.*</a> ( July 7,2021) <i>[Update to April 9 preprint]</i>	Israel	Prospective cohort	3578 HCWs in one Israeli health system	Alpha <sup>¶</sup>	Included	BNT162b2	Asymptomatic infection	65 (45-79)	≥11	
								Asymptomatic infection presumed infectious (Ct< 30)	70 (43-84)	≥11	
								Symptomatic infection	90 (84-94)	≥11	
								Symptomatic infection presumed infectious (CT<30)	88 (80-94)	≥11	

No.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Primary Series VE % (95% CI)	Days post Final dose	Max Duration of follow up after fully vaccinated
11	<a href="#">Thompson et al.*</a> (Mar 29, 2021)	USA	Prospective cohort	3,950 healthcare workers in eight US sites	Original <sup>‡</sup>	Excluded	BNT162b2 & mRNA1273	Documented infection	90 (68-97)	≥14	
6	<a href="#">Tande et al.*</a> (Mar 10, 2021)	USA – Mayo Clinic	Retrospective Cohort	Asymptomatic screening of 39,156 patients: pre-surgical, pre-op PCR tests	original <sup>‡</sup>	Included	BNT162b2 & mRNA-1273	Asymptomatic infection	80 (56-91)	>0	
							BNT162b2	Asymptomatic infection	80 (56-91)	>0	
5	<a href="#">Mousten-Helms et al.</a> (Mar 9, 2021)	Denmark	Retrospective Cohort	Long term care facilities in Denmark - 39,040 residents, 331,039 staff	original & Alpha <sup>¶¶</sup>	Excluded	BNT162b2	LTCF Resident: Documented Infection	64 (14-84)	>7	
								LTCF Staff: Documented Infection	90 (82-95)	>7	
3	<a href="#">Dagan et al.*</a> (Feb. 24, 2021)	Israel – Clalit Health System	Retrospective Cohort	596,618 – matched on demographics, residence, clinical characteristics	original & Alpha <sup>^</sup>	Excluded	BNT162b2	Documented infection	92 (88-95)	>7	
								Symptomatic infection	94 (87-98)	>7	
								Hospitalization	87 (55-100)	>7	
								Severe disease	92 (75-100)	>7	
2	<a href="#">Public Health England – Feb.</a> (Feb. 22, 2021)	UK - England	Screening Method	43,294 cases, with England as source population	Alpha <sup>^</sup>	Included	BNT162b2	Over 80 years: Symptomatic infection	88 (84-90)	7	

Purple text indicates new or updated study.

Product Manufacturers: BNT162b2 (Pfizer), mRNA-1273 (Moderna), AZD1222 (Astra-Zeneca), Ad26.COV2.S (Janssen), Coronavac

<sup>‡</sup>Unless noted otherwise, days post 1<sup>st</sup> dose are prior to receiving dose 2.

<sup>‡</sup>Unclear if 1<sup>st</sup> dose VE estimates includes any individuals who received a second dose.

\*Manuscripts with an asterisk (\*) are peer-reviewed publications.

<sup>^</sup>Indicates predominant variant identified by study authors. If no <sup>^</sup> then variants identified through secondary source when possible. Please see additional footnotes.

<sup>¶</sup>The rise of SARS-CoV-2 variant Alpha in Israel intensifies the role of surveillance and vaccination in elderly | medRxiv

<sup>‡</sup>CDC Says More Virulent British Strain Of Coronavirus Now Dominant In U.S. : Coronavirus Updates : NPR

<sup>‡</sup>Coronavirus (COVID-19) Infection Survey, UK - Office for National Statistics

<sup>¶¶</sup>Denmark logs more contagious COVID variant in 45% of positive tests | Reuters

<sup>¶¶</sup>COVID variant first detected in UK now dominant strain in Spain

<sup>EE</sup>Reporte-circulacion-variantes-al-9.04.21-PUBLICADO-FINAL.pdf (minal.cl)

<sup>††</sup>Based on <https://outbreak.info/location-reports>

<sup>††</sup><https://www.gov.uk/government/publications/covid-19-variants-genomically-confirmed-case-numbers/variants-distribution-of-cases-data>

<sup>††</sup>Manuscripts that are cited in the WHO COVID-19 Weekly Epidemiological Updates (see Special Focus Update on SARS-CoV-2 Variants of Interest and Variants of Concern, Table 3, included in every other Weekly Epidemiological Update): <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>.

<sup>xx</sup>VE estimate presented with 99% CIs.

### 1.1 Inclusion criteria for VE studies

Note: All VE studies now must meet these criteria to be in the VE table:

- Published or preprint studies (not press release, presentations, media)
- Must have confidence intervals around VE, except in instances where it is not possible to calculate
- Needs to include persons with & without infection or disease and with and without vaccination (ie a proper comparison group). This excludes case only studies (e.g., impact studies, risk of progression to severe disease (i.e. PHE)).
- No modeled comparison group nor comparison to historical cohort
- The study design should account for confounding and/or VE estimate should be adjusted or state adjustment made no difference
- Outcomes must be lab confirmed, not syndromic
- At least 90% of participants must have documented vaccination status rather than relying on recall
- VE must be for one vaccine, not for >1 vaccine combined (with exception for studies accessing Pfizer + Moderna vaccines and studies of heterologous schedules, but all participants included in a VE estimate should receive same brands of vaccines in the same order)
- No significant bias that likely affects results
- Cannot include day 0-12 in unvaccinated definition
- Cannot compare to early post vaccination to calculate VE (e.g. day 0-12 vs day 12-21)

### 1.2 VE Studies that do not meet criteria are listed below in case of interest:

1. Hunter P and Brainard J. Estimating the effectiveness of the Pfizer COVID-19 BNT162b2 vaccine after a single dose. A reanalysis of a study of 'real-world' vaccination outcomes from Israel. *medRxiv*. Published online 2021:2021.02.01.21250957. doi: 10.1101/2021.02.01.21250957
2. Institut National de Santé Publique du Québec. Preliminary Data on Vaccine Effectiveness and Supplementary Opinion on the Strategy for Vaccination Against COVID-19 in Quebec in a Context of Shortage. Gouvernement du Québec. 2021:Publication No 3111. Available at: <https://www.inspq.qc.ca/sites/default/files/publications/3111-vaccine-effectiveness-strategy-vaccination-shortage-covid19.pdf>.
3. Weekes M, Jones NK, Rivett L, et al. Single-dose BNT162b2 vaccine protects against asymptomatic SARS-CoV-2 infection. *Authorea*. Published online Feb 24, 2021. doi: 10.22541/au.161420511.12987747/v1
4. Aran D. Estimating real-world COVID-19 vaccine effectiveness in Israel using aggregated counts. Published online Mar 4, 2021. Available at: [https://github.com/dviraran/covid\\_analyses/blob/master/Aran\\_letter.pdf](https://github.com/dviraran/covid_analyses/blob/master/Aran_letter.pdf).
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13. Chodick G, Tene L, Rotem Ran S, et al. The Effectiveness of the Two-Dose BNT162b2 Vaccine: Analysis of Real-World Data. *Clin Infect Dis*. Published online May 17, 2021:2021;ciab438. doi: 10.1093/cid/ciab438
14. Lopez Bernal J, Andrews N, Gower C, et al. Effectiveness of BNT162b2 mRNA vaccine and ChAdOx1 adenovirus vector vaccine on mortality following COVID-19. *medRxiv*. Published online 2021:2021.05.14.21257600 doi: 10.1101/2021.05.14.21257218
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## 2. Summary of Study Results for Post-Authorization COVID-19 Booster Dose Vaccine Effectiveness

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated					
107	<a href="#">Cerqueira-Silva et al*</a> (July 18,2022)	Brazil	Test-negative case control	2,471,576 individuals aged 18+	Omicron^	Included	CoronaVac primary + BNT162b2 booster	Symptomatic infection	Unvaccinated	63.6 (62.8-64.3)	14-30	~22 weeks					
								Hospitalization or death		1.7 (0.1-3.2)	>120						
								Death		89.4 (87.8-90.7)	14-30						
										84.1 (83.2-84.9)	>120						
										90.2 (87.6-92.3)	14-30						
									87 (85.9-88.0)	>120							
								Symptomatic infection	Complete vaccination with 2 doses at least 4 months prior	62.9 (62.1-63.7)	14-30						
								Hospitalization or death		-2.9 (-1.3- -4.5)	>120						
	71.2 (67.1-74.9)	14-30															
		59.8 (57.8-61.8)	>120														
106	<a href="#">Hertz et al</a> (July 17,2022)	Israel	Prospective cohort	608 healthcare workers aged 18+	Omicron BA.1^	Excluded	BNT162b2 (4 doses)	Symptomatic disease	Complete vaccination with 3 doses of BNT162b2 at least 3 months prior	45.5 (19-63)	8-30	~11 weeks					
										37 (15-53)	60-90						
105	<a href="#">Link-Gelles et al</a> (July 15,2022)	USA	Test-negative case control	159,432 ED/UC encounters and hospitalizations in adults aged 18+	Omicron BA.1^	Excluded	BNT162b2 or mRNA-1273	ED/UC encounter	Unvaccinated	84 (83-85)	7-119	~20 weeks					
				113,837 ED/UC encounters and hospitalizations in adults aged 18+				Omicron BA.2^		Hospitalization	73 (68-77)		≥120				
											92 (91-93)		7-119				
											85 (81-89)		≥120				
				14,776 ED/UC encounters and hospitalization in adults aged 50+	ED/UC encounter					56 (51-61)	7-119						
					Hospitalization					26 (21-30)	≥120						
											69 (58-76)		7-119				
					52 (44-59)					≥120							
				104	<a href="#">Lee et al*</a> (July 12,2022)		UK	Test-negative case control	230,666 cancer patients aged 18+	Delta^	Included	BNT162b2 primary + BNT162b2 booster	Documented infections	Unvaccinated	59.3 (58.8-59.8)	84+	~12 weeks
													Symptomatic disease		61.9 (61.4-62.4)		
								Hospitalization		81.1 (76.8-84.6)							
								Death		94.6 (92.6-96.1)							



#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							AZD1222 primary + BNT162b2 booster	Documented infections		58.3 (57.7-58.9)		
								Symptomatic disease		63.2 (62.6-63.8)		
								Hospitalization		79.2 (73.9-83.4)		
								Death		94.3 (91.9-96)		
103	<a href="#">Guedalia et al (July 11, 2022)</a>	Israel	Retrospective cohort	82,803 pregnant women aged 16+	<b>Omicron BA.1<sup>^</sup></b>	Excluded	BNT162b2	Hospitalization	Complete vaccination at least 5 months prior	48 (37-57)	0+	~31 weeks
								Hospitalization with moderate disease		92 (26-99)		
								Hospitalization	Unvaccinated	43 (31-53)		
								Hospitalization with moderate disease		97 (72-100)		
								Severe disease		94 (43-99)		
					Delta <sup>^</sup>			Hospitalization	Complete vaccination at least 5 months prior	92 (83-96)		~15.5 weeks
								Hospitalization	Unvaccinated	97 (95-99)		
								Hospitalization with moderate disease		99 (93-100)		
								Severe disease		99 (89-100)		
102	<a href="#">Huang et al (July 8, 2022)</a>	China	Matched case control	612,597 cases aged ≥3 years	<b>Omicron<sup>^</sup></b>	Excluded	Ad5-nCoV	Documented infection	Unvaccinated	16.0 (1.5-28.4)	13-24 weeks	23 weeks
101	<a href="#">Muhsen et al* (July 1, 2022)</a>	Israel	Prospective cohort	18,611 residents of 640 LTCF (aged 60+)	Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	Complete vaccination at least 5 months prior	89 (85-93)	>7	~10 weeks
								Mild/Moderate hospitalization		93 (86-97)		
								Severe hospitalization		90 (76-96)		
								Death		96 (84-99.1)		
100	<a href="#">Tartof et al (June 30, 2022)</a>	USA	Test-negative case control	29,507 hospital admissions and 36,306 ED admissions in individuals aged ≥18 years	<b>Omicron BA.1 specifically<sup>^</sup></b>	Included	BNT162b2	Hospitalization	Unvaccinated	80 (74-84)	<3 mos.	~29 weeks
								ED admissions		76 (69-82)	≥ 3 mo	
										74 (69-78)	<3 mos.	
										65 (56-73)	≥ 3 mo	
					<b>Omicron BA.2 specifically<sup>^</sup></b>			Hospitalization		74 (47-87)	<3 mos.	
										70 (53-81)	≥ 3 mo	
								ED admissions		59 (40-72)	<3 mos.	
										5 (-21-25)	≥ 3 mo	
99	<a href="#">Breznik et al (June 29, 2022)</a>	Canada	Prospective cohort study	997 residents of nursing and retirement	<b>Omicron<sup>^</sup></b>	Included	BNT162b2 or mRNA-1273 (4 doses)	Documented infection	Complete vaccination with 3 doses	81 (70-88)	60-120	~15 weeks

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
				homes in Ontario								
98	<a href="#">Ionescu et al (June 28, 2022)</a>	Canada	Test-negative case control	193,899 tests among adolescents aged 12-17 in Quebec	Omicron <sup>^</sup>	Excluded	BNT162b2	Documented infection	Unvaccinated	60.8 (40.8-74.1)	14+	~26 weeks
				60,903 tests among adolescents aged 12-17 in British Columbia						63.7 (41.1-77.7)		
97	<a href="#">Carazo et al (June 27, 2022)</a>	Canada	Test-negative case control	37,732 cases and 73,507 controls amongst HCWs in Quebec aged 18-59 years	Omicron BA.2 specifically	Excluded	BNT162b2 or mRNA-1273	Documented infection	Unvaccinated, no prior infection	46 (40-52)	14+	~39 weeks
								Symptomatic disease		70 (62-75)		
96	<a href="#">Muhsen et al* (June 23, 2022)</a>	Israel	Retrospective cohort	43,775 residents of LTCF aged 60+	Omicron <sup>^</sup>	Excluded	BNT162b2 (4 doses)	Documented infection	Complete vaccination with 3 doses of BNT162b2 at least 4 months prior	36 (31-40)	14+	~12 weeks
								Mild-moderate hospitalization		66 (57-73)		
								Severe hospitalization		72 (61-80)		
								Death		76 (58-87)		
95	<a href="#">Liu et al (June 21, 2022)</a>	Australia	Prospective cohort study	2,053,123 adults in Sydney (aged 40+)	Omicron <sup>^</sup>	Excluded	BNT162b2	Hospitalization or death among persons 50-69 years old	Complete vaccination with 2 doses 8-89 days prior	49.4 (30.8-63.0)	8+	~13 weeks
94	<a href="#">Ioannou et al (June 16, 2022)</a>	USA	Target trial emulation	490,838 matched pairs of veterans (aged 18+)	Omicron <sup>^</sup>	Excluded	Any mRNA primary + Any mRNA booster	Documented infection	Complete vaccination at least 5 months prior	39 (36.4-41.6)	>10	~15 weeks
								Hospitalization		53.3 (48.1-58)		
								Death		79.1 (71.2-84.9)		
								Documented infection	Complete vaccination 5-9 months prior	36.4 (33.3-39.4)		
								Hospitalization		43.8 (35.2-51.3)		
								Death		78.1 (67.5-85.3)		
								Documented infection	Complete vaccination >9 months prior	46.5 (44.1-48.7)		
								Hospitalization		63.2 (56.4-69)		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
								Death	Complete vaccination at least 5 months prior	81.6 (67.8-89.4)		
							Any mRNA primary + BNT162b2 booster	Documented infection		39 (36.4-41.6)		
								Hospitalization		54 (46.1-60.8)		
								Death		85.5 (73.9-92)		
							Any mRNA primary + mRNA-1273 booster	Documented infection		44.6 (42.5-46.6)		
								Hospitalization		52.9 (45.6-59.2)		
								Death		75.2 (62.9-83.4)		
							BNT162b2 primary + Any mRNA booster	Documented infection		39.6 (36.9-42.1)		
								Hospitalization		53.7 (45.8-60.4)		
								Death		84.8 (73.7-91.2)		
							mRNA-1273 primary + Any mRNA booster	Documented infection		44.3 (42.2-46.3)		
								Hospitalization		53.1 (45.7-59.5)		
								Death		75 (62.3-83.4)		
93	<a href="#">Adams et al (June 14, 2022)</a>	USA	Prospective test-negative case control	3,181 hospitalised patients aged ≥18 years	Omicron specifically^	Included	BNT162b2 primary + BNT162b2 booster	Hospitalization	Unvaccinated	80 (73-85)	7+	~39 weeks
							mRNA-1273 primary + mRNA booster			77 (67-83)		
							BNT162b2 or mRNA-1273			70 (34-86)		
							Ad26.COV2.S primary + Ad26.COV2.S booster			30 (-85-74)		
							Ad26.COV2.S primary + BNT162b2 or mRNA-1273 booster			64 (35-80)		
92	<a href="#">Richterman et al* (June 6, 2022)</a>	USA	Test-negative case control	14,520 tests among healthcare workers	Delta^	Excluded	BNT162b2 primary + BNT162b2 booster	Symptomatic disease	Complete vaccination with 2 doses of BNT162b2 within last 6 months	78 (63-87)	14+	~32 weeks
							mRNA-1273 primary + mRNA booster			96 (82-99)		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated									
					Omicron^		BNT162b2 primary + BNT162b2 booster			50 (42-56)											
							mRNA-1273 primary + mRNA booster			56 (45-65)											
							BNT162b2 primary + BNT162b2 booster			66 (51-76)			<56								
										55 (19-76)			>112								
							Delta^			BNT162b2 primary + BNT162b2 booster	Unvaccinated		93 (78-98)	14+							
										mRNA-1273 primary + mRNA booster			96 (82-99)								
					Omicron^				BNT162b2 primary + BNT162b2 booster	54 (23-73)											
							mRNA-1273 primary + mRNA booster		46 (6-69)												
							BNT162b2 primary + BNT162b2 booster		75 (50-87)	<56											
					55 (5-69)				>112												
					91		<a href="#">Hulme et al (June 6,2022)</a>		UK	Retrospective cohort			6,990,219 adults aged ≥18 years	Delta	Included	BNT162b2 primary + BNT162b2 booster	Documented infection	Complete vaccination with 2 doses of AZD1222 or BNT162b2	49.6 (48.3-50.8)	1-28	~11 weeks
																	Hospitalization		49.7 (47.8-51.5)	29-70	
																			73.8 (68.9-77.9)	1-28	
																			86.1 (81.9-89.4)	29-70	
																	Death		92.6 (86.5-96)	29-70	
AZD1222 primary + BNT162b2 booster	Documented infection	49.2 (48.4-50)	1-28																		
	Hospitalization	54.8 (53.3-56.3)	29-70																		
		78.2 (75.2-80.8)	1-28																		
		Death	83.9 (80-87.1)	29-70																	
	77.4 (66.3-84.9)		1-28																		
	93.5 (87.6-96.6)		29-70																		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
90	<a href="#">Carlsen et al*</a> (June 1, 2022)	Norway	Retrospective cohort study	21,643 newborns	Omicron <sup>^</sup>	Excluded	BNT162b2 or mRNA-1273  (~4% of mothers received AZD1222 as first dose)	Documented infection during an infant's first 4 months of life (born to unvaccinated mothers and mothers vaccinated in 2 <sup>nd</sup> or 3 <sup>rd</sup> trimester)	Unvaccinated	78 (57-88)	14+	~45 weeks
89	<a href="#">Marra et al</a> (May 27, 2022)	Brazil	Retrospective cohort study	11,427 HCWs 18 years and older	Delta <sup>^</sup>	Excluded	CoronaVac primary + BNT162b2 booster  AZD1222 primary + BNT162b2 booster	Documented infection	Complete vaccination with 2 doses CoronaVac  Complete vaccination with 2 doses AZD1222	92.0 (89.1-94.3)  60.5 (44.9-72.4)	14+	~11 weeks
88	<a href="#">Chin et al</a> (May 27, 2022)	USA	Retrospective test-negative case control	15,783 resident and 8,539 staff cases, matched with 180,169 resident and 90,409 staff controls aged 18+	Omicron <sup>^</sup>	Excluded  Included before July 01/2021  Included since July 01/2021	BNT612b2 or mRNA-1273	Documented infection	Unvaccinated with no prior infection	43.2 (42.2-47.4)  61.3 (60.7-64.8)  86.8 (82.1-92.7)	14+	~32 weeks
87	<a href="#">Amir et al</a> (May 25, 2022)	Israel	Retrospective cohort	452,485 children 12-15 years of age	Omicron <sup>^</sup>	Excluded	BNT612b2	Documented infection	Unvaccinated  Complete vaccination with 2 doses 120+ days prior	80.0 (76.7-83.1)  76.2 (72.2-79.6)	14-60	~7 weeks
86	<a href="#">Fano et al*</a> (May 18, 2022)	Italy	Retrospective cohort	946,156 individuals aged 12 +	Alpha, Delta <sup>^</sup>	Excluded	BNT612b2 or mRNA-1273 (3 doses)  AZD1222 primary + BNT162b2 or mRNA-1273 booster  Ad26.COV2.S primary + BNT162b2 or	Documented infection	Unvaccinated	69.1 (67.5-70.7) 50.8 (46.0-55.1) 59.9 (56.4-63.0) 23.4 (12.1-33.3) 52.8 (47.2- 57.9) 26.9 (16.3-36.3)	15-19 75+ 15-19 40+ 15-19 40+	~26 weeks

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							mRNA-1273 booster					
							Heterologous primary (AZD1222+ BNT612b2 or mRNA-1273) + BNT162b2 or mRNA-1273 booster			28.0 (0.0-48.5) 28.8 (12.9-41.8)	10-14 15+	
85	<a href="#">Rennert et al</a> (May 7, 2022)	USA	Propensity matched case control	1,944 students aged 18+ 658 employees aged 18-65	Omicron^	Included	BNT162b2 mRNA-1273 BNT162b2 mRNA-1273	Documented infection	Unvaccinated	42.8 (22.7-57.6) 48.5 (25-64.7) 74.3 (42.1-88.6) 60.4 (32.4-76.8)	7+	~16 weeks
84	<a href="#">Amir et al</a> (May 5, 2022)	Israel	Restrospective cohort	1,178,090 adults aged 60+	Omicron^	Excluded	BNT162b2 (3 doses) BNT162b2 (4 doses)	Hospitalization and death	Complete vaccination with 2 doses of BNT162b2 at least 4 months prior	57.0 (37.5-71.0) 67.8 (59-75.6) 89.2 (88.0-91.0)	0-30 180-210 0-60	~31 weeks
83	<a href="#">Butt et al*</a> (May 3, 2022)	USA	Retrospective cohort	2,384,272 veterans (aged 21+)	Omicron^	Excluded	BNT162b2	Documented infection Hospitalization ICU admission or death	Complete vaccination with 2 doses of BNT162b2 by April 30, 2021	11 (7-14) 30 (23-36) -9 (-22-2) 50 (41-57) 62 (43-75) 45 (18-63) 88 (68-96) 90 (22-99) 79 (-78-98)	>7 <28 >84 >7 <28 >84 >7 28-56 >84	~19.5 weeks
							mRNA-1273	Documented infection Hospitalization ICU admission or death	Complete vaccination with 2 doses of mRNA-1273 by April 30, 2021	27 (24-30) 40 (35-44) -23 (-65-9) 55 (46-61) 55 (38-67) 83 (24-96) 72 (24-90) 86 (-17-98) 50 (-68-85)	>7 <28 >84 >7 <28 >84 >7 <28 28-56	
							BNT162b2 or mRNA-1273	Documented infection Hospitalization	Complete vaccination with 2 doses	19 (17-22) 52 (46-57)	>7 >7	

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated					
					Delta^			ICU admission or death	of BNT162b2 or mRNA-1273 by April 30, 2021	83 (65-92)	>7	~9.5 weeks					
							BNT162b2	Documented infection	Complete vaccination with 2 doses of BNT162b2 by April 30, 2021	73 (70-76)							
								Hospitalization		79 (71-85)							
								ICU admission or death		90 (21-99)							
							mRNA-1273	Documented infection	Complete vaccination with 2 doses of mRNA-1273 by April 30, 2021	74 (70-78)							
								Hospitalization		80 (68-88)							
							BNT162b2 or mRNA-1273	Documented infection	Complete vaccination with 2 doses of BNT162b2 or mRNA-1273 by April 30, 2021	73 (71-76)							
								Hospitalization		80 (73-85)							
								ICU admission or death		94 (52-99)							
							82	<a href="#">Carazo et al</a> (May 3, 2022)	Canada	Test-negative case control	224,007 cases and 472,432 controls among individuals (12+ y) in Quebec	Omicron^	Excluded	BNT162b2 or mRNA-1273	Documented infection	Unvaccinated	73 (72-73)
											Hospitalization	91 (91-92)					
											Documented infection	68 (67-68)					
											Hospitalization	84 (82-91)					
81	<a href="#">Suah et al*</a> (May 2, 2022)	Malaysia	Test-negative case control	319,127 tests	Omicron^	Unknown	BNT162b2	Documented infection	Complete vaccination with 2 doses of BNT162b2 4-6 months prior	52 (50.3-51.9)	14+	~12 weeks					
			306,483 tests	Delta^	89.4 (89.2-89.7)												
80	<a href="#">Kirsebom et al</a> (May 1, 2022)	UK	Test-negative case control	759,450 adults aged 40-64 y	Omicron specifically^	Included	AZD1222	Symptomatic disease	Unvaccinated	51.7 (38.9-61.8)	14-34	~3 weeks					
							AZD1222 + BNT162b2	Symptomatic disease		37.2 (-44.1-72.6)	105+	~20 weeks					
										63.8 (63.0-64.5)	14-34	~3 weeks					
							AZD1222	Symptomatic disease		30.6 (26.8-34.3)	105+	~20 weeks					
										51.6 (20.8-70.4)	14-34	~3 weeks					

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated			
				166,720 adults aged 65+ y	Omicron specifically^					-27.2 (-131.6-30.1)	70-104	~13 weeks			
								Hospitalization		82.3 (64.2-91.3)	7+	~20 weeks			
							AZD1222 + BNT162b2	Symptomatic disease		58.1 (51.6-63.8)	14-34	~3 weeks			
										Hospitalization	23.1 (15.1-30.5)	105+	~20 weeks		
					Delta specifically^		AZD1222	Hospitalization	Unvaccinated	90.9 (88.7-92.7)	7+	~20 weeks			
							AZD1222 + BNT162b2			80.9 (15.6-95.7)	7+	~15 weeks			
79	<a href="#">Sharma et al (April 27, 2022)</a>	USA	Matched case control	221,267 veterans	Omicron^	Excluded	BNT162b2	Documented infection	Complete vaccination with two doses at least ≥5 months prior	30.1 (26.2-33.7)	14+	~27 weeks			
								Hospitalisation		61.4 (55-67.1)					
								Death		78.8 (67.9-87.5)					
								Documented infection	Unvaccinated	47.8 (45.2-50.3)					
										Hospitalisation			81.8 (79.2-84.2)		
										Death			89.6 (85-93.6)		
				187,507 veterans			mRNA-1273	Documented infection	Complete vaccination with two doses at least ≥5 months prior	37.1 (32.2-41.7)					
								Hospitalisation		63.5 (53.7-71.6)					
								Death		75.0 (55.4-88.0)					
								Documented infection	Unvaccinated	61.9 (59.4-64.4)					
										Hospitalisation			87.9 (85.3-90.2)		
										Death			91.4 (86.4-95.6)		
78	<a href="#">Castillo et al (April 21, 2022)</a>	France	Test-negative case control	761,744 cases, 18+ years	Omicron specifically^	Included	BNT162b2 or mRNA-1273  Note: A small proportion(~1%) received an undetermined vaccine product	Symptomatic infection	Unvaccinated without prior infection	64 (63-64)	8-14	~22 weeks			
								Hospitalisation		50 (48-51)	>90				
										90 (87-92)	8-14				
								ICU admission		93 (92-94)	>90				
										96 (92-99)	8-14				
										97 (95-99)	>90				
				166,009 cases, 18+ years	Delta specifically^			95 (89-100)		8-14					
								93 (91-96)		>90					
								84 (79-88)		8-14					
								90 (85-94)		>90					
								98 (98-99)		8-14					
								99 (99-100)		>90					
	ICU admission	99 (98-99)	8-14												



#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
										99 (99-100)	>90	
								Death		98 (96-100)	8-14	
										99 (99-100)	>90	
77	<a href="#">Cerqueira-Silva et al</a> (April 14, 2022)	Brazil	Test-negative case control	4,219,703 adults, 18+ years	Omicron^	Included	AZD1222 + BNT162b2	Symptomatic disease	Unvaccinated	42.8 (42.1-43.5)	2-4 weeks	2 weeks
										4.9 (2.7-7)	13+ weeks	~21 weeks
								Severe disease		89.9 (88.9-90.7)	2-4 weeks	2 weeks
										80.2 (77.9-82.2)	13+ weeks	~21 weeks
							BNT162b2 (3 doses)	Symptomatic disease		35.2 (33.7-36.7)	2-4 weeks	2 weeks
										36.3 (29.9-42.2)	9-12 weeks	10 weeks
								Severe disease		88.3 (85.1-90.7)	2-4 weeks	2 weeks
											82.5 (64-91.5)	9-12 weeks
		Scotland		370,556 adults, 18+ years			AZD1222 + BNT162b2	Symptomatic disease		49 (45.3-52.4)	2-4 weeks	2 weeks
										18.2 (7.2-28)	13+ weeks	~22 weeks
								Severe disease		81.8 (55-92.6)	2-4 weeks	2 weeks
										93.4 (69.6-98.6)	13+ weeks	~22 weeks
							AZD1222 + mRNA-1273	Symptomatic disease		55.3 (50.9-59.3)	2-4 weeks	2 weeks
										26.2 (10.3-39.2)	13+ weeks	~22 weeks
								Severe disease		95.4 (80.9-98.9)	5-8 weeks	6 weeks
											90.2 (-88.4-99.5)	13+ weeks
		BNT162b2 (3 doses)	Symptomatic disease	52.9 (49.3-56.3)			2-4 weeks	2 weeks				
				30.1 (23.5-36.1)			13+ weeks	~22 weeks				
			Severe disease	81.6 (29.9-95.2)			2-4 weeks	2 weeks				

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
										75.7 (33.9-91)	13+ weeks	~22 weeks
							BNT162b2 + mRNA-1273	Symptomatic disease		60.1 (55.3-64.3)	2-4 weeks	2 weeks
										23.4 (3.4-39.3)	13+ weeks	~22 weeks
								Severe disease		32.7 (-184.5-84.1)	2-4 weeks	2 weeks
										93.7 (31.6-99.4)	13+ weeks	~22 weeks
76	<a href="#">Widdifield et al*</a> (April 14, 2022)	Canada	Test-negative case control	36,145 individuals with rheumatoid arthritis	Alpha, Delta^	Included	BNT162b2 or mRNA-1273	Documented infection	Unvaccinated	86 (70-94)	7+	~9.5 weeks
Severe outcomes	88 (48-97)											
Documented infection	82 (20-96)											
Documented infection	96 (72-99)											
Documented infection	76 (47-89)											
75	<a href="#">Lind et al</a> (April 25, 2022)  <i>[Update to April 20, 2022 preprint]</i>	USA	Test-negative case control	10,676 cases and 92,011 controls, 5+ years	Omicron specifically^	Excluded	BNT162b2 or mRNA-1273	Documented infection	Complete vaccination with two doses at least ≥5 months prior	54 (48-60)	14-59	~14 weeks
			1:1 Matched case control							28 (9-43)	90+	
										45.8 (20-63.2)	14+	
										58.5 (52.7-63.5)		
										35.1 (-7.5-60.8)		
74	<a href="#">Gram et al</a> (April 20,2022)	Denmark	Retrospective cohort	2,191,080 individuals aged 12-59 years	Omicron^	Excluded	BNT162b2 or mRNA-1273	Documented infection	Unvaccinated	55.2 (54.7-55.6)	14-30	~24 weeks
								Hospitalisation		49.9 (46.5-53.1)	120+	
										89.8 (87.9-91.3)	14-30	
										33.3 (0.9-55.1)	120+	
					Delta^			Documented infection		89.5 (87.7-91)	14-30	
										83.5 (69.4-91.1)	61-90	
								Hospitalisation		94.8 (85.9-98.1)	14-30	
										68.4 (41.4-83)	31-60	

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated		
				758,187 adults aged ≥60 years	Omicron^			Documented infection		57.6 (55.8-59.4)	14-30			
					Hospitalisation			52.8 (49.3-56)		120+				
					Delta^			Documented infection		94.4 (93-95.5)	14-30			
										77.3 (70.9-82.3)	120+			
										86.0 (83.3-88.3)	14-30			
										81.2 (72.9-87.0)	61-90			
										96.6 (93.9-98.1)	31-60			
										91.4 (79.8-96.4)	91-120			
73	<a href="#">Grewal et al*</a> (July 6, 2022)  <i>[Update to June 1, 2022 preprint]</i>	Canada	Test-negative case control	13,654 cases and 205,862 controls amongst LTCF residents aged 60+ in Ontario	<b>Omicron specifically^</b>	Included	mRNA-1273 (3 doses)	Documented infection	Unvaccinated	44 (38-49)	0+	~34 weeks		
Symptomatic disease	61 (50-69)													
Hospitalization or death	81 (74-86)													
BNT162b2 (3 doses)	Documented infection	32 (24-38)												
	Symptomatic disease	53 (39-63)												
	Hospitalization or death	77 (67-83)												
BNT162b2 primary + mRNA-1273 booster	Documented infection	36 (28-44)												
	Symptomatic disease	57 (40-69)												
	Hospitalization or death	81 (67-89)												
BNT162b2 or mRNA-1273 (any 3 doses)	Documented infection	39 (33-45)	<84											
	Symptomatic disease	37 (31-43)	≥84											
	Hospitalization or death	62 (51-71)	<84											
		55 (45-64)	≥84											
mRNA-1273 (4 doses)	Documented infection	80 (72-86)	<84											
	Symptomatic disease	77 (69-82)	≥84											
	Hospitalization or death	51 (43-58)	≥7	~15 weeks										
3 doses BNT162b2 + 1 dose mRNA-1273 (4 doses)	Documented infection	73 (63-80)												
	Symptomatic disease	88 (82-92)												
	Hospitalization or death	51 (42-58)												
2 doses BNT162b2 + 2 doses mRNA-1273	Documented infection	69 (56-78)												
	Symptomatic disease	87 (78-92)												
	Hospitalization or death	52 (35-64)												

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated	
							(4 doses)	Hospitalization or death		83 (54-94)			
							BNT162b2 or mRNA-1273 (any 4 doses)	Documented infection		49 (43-54)			
								Symptomatic disease		69 (61-76)			
								Hospitalization or death		86 (81-90)			
								Documented infection	Vaccination with third dose ≥84 days ago	19 (12-26)			
										Symptomatic disease			31 (20-41)
										Hospitalization or death			40 (24-52)
72	<a href="#">Vokó et al (April 18,2022)</a>	Hungary	Retrospective cohort	6,193,552 individuals aged 18-64 years  <i>Note: VE for persons aged 65-100 years are also aavailable from publication; estimates are relatively similar across age groups.</i>	Delta^	Included	BNT162b2 (3 doses)	Documented infection	Unvaccinated	82.2 (81.5-82.8)	14-120	~20 weeks	
BNT162b2 + mRNA-1273	85.8 (82.6-88.4)												
BNT162b2 + BBIBP-CorV	24.5 (15.4-32.5)												
BNT162b2 + Ad26.COV2.S	82.4 (78.9-85.3)												
BNT162b2 (3 doses)	Hospitalisation	94.3 (93.3-95.1)											
BNT162b2 + mRNA-1273		93.3 (85.2-97.0)											
BNT162b2 + BBIBP-CorV		76.0 (60.9-85.3)											
BNT162b2 + Ad26.COV2.S		96.8 (90-99)											
BNT162b2 (3 doses)		Death	96.8 (95.2-97.9)										
BNT162b2 + mRNA-1273			95.5 (67.9-99.4)										
BNT162b2 + BBIBP-CorV	100 (CI omitted)												
BNT162b2 + Ad26.COV2.S	100 (CI omitted)												
mRNA-1273 (3 doses)	Documented infection		88.9 (86.9-90.6)										
mRNA-1273 + BNT162b2			87.7 (85.1-88.4)										
mRNA-1273 + BBIBP-CorV		69.5 (52.1-80.5)											

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							mRNA-1273 + Ad26.COV2.S			82.1 (73-88.1)		
							mRNA-1273 (3 doses)	Hospitalisation		96.5 (92.5-98.3)		
							mRNA-1273 + BNT162b2			97.3 (92.7-99)		
							mRNA-1273 + BBIBP-CorV			92.0 (43.0-98.9)		
							mRNA-1273 + Ad26.COV2.S			100 (CI omitted)		
							mRNA-1273 + BBIBP-CorV			Death		
							mRNA-1273 (3 doses)	100 (CI omitted)				
							mRNA-1273 + BNT162b2	100 (CI omitted)				
							mRNA-1273 + Ad26.COV2.S	84.1 (-12.6-97.8)				
							AZD1222 + BNT162b2	Documented infection				
							AZD1222 + mRNA-1273			84.1 (81.2-86.5)		
							AZD1222 + BBIBP-CorV			35.8 (14.2-51.9)		
							AZD1222 + BNT162b2	Hospitalization		95.1 (93.8-96.2)		
							AZD1222 + mRNA-1273			98.5 (93.9-99.6)		
							AZD1222 + BBIBP-CorV			84.7 (38.9-96.2)		
							AZD1222+ BNT162b2	Death		98.4 (96.5-99.3)		
							AZD1222 + mRNA-1273			100 (CI omitted)		
							AZD1222 + BBIBP-CorV			100 (CI omitted)		
							Sputnik + BNT162b2	Documented infection		83.6 (82.8-84.4)		
							Sputnik + mRNA-1273			84.0 (81.5-86.2)		
							Sputnik + BBIBP-CorV			38.9(22.2-52.0)		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							Sputnik + Ad26.COV2.S			47.2 (41.2-52.6)		
							Sputnik + BNT162b2	Hospitalization		98.0 (97.1-98.6)		
							Sputnik + mRNA-1273			97.0 (92.1-98.9)		
							Sputnik + BBIBP-CorV			66.8 (20.1-86.2)		
							Sputnik + Ad26.COV2.S			95.1 (84.8-98.4)		
							Sputnik + BNT162b2			Death		
							Sputnik + mRNA-1273	100 (CI omitted)				
							Sputnik + Ad26.COV2.S	100 (CI omitted)				
							BBIBP-CorV (3 doses)	Documented infection		60.6 (53.4-66.7)		
							BBIBP-CorV + BNT162b2			88.0 (87.2-88.7)		
							BBIBP-CorV + mRNA-1273			91.0 (88.2-93.1)		
							BBIBP-CorV + Ad26.COV2.S			78.1 (74.7-81)		
							BBIBP-CorV (3 doses)	Hospitalization		77.5 (58.2-87.9)		
							BBIBP-CorV + BNT162b2			94.6 (93.3-95.6)		
							BBIBP-CorV + mRNA-1273			94.8 (87.6-97.9)		
							BBIBP-CorV + Ad26.COV2.S			95.3 (88.7-98)		
							BBIBP-CorV (3 doses)	Death		91.1 (36.4-98.7)		
							BBIBP-CorV + BNT162b2			95.9 (93.4-97.5)		
							BBIBP-CorV + Ad26.COV2.S			95.8 (70-99.4)		
							BBIBP-CorV + mRNA-1273			100 (CI omitted)		
							Ad26.COV2.S (2 doses)	Documented infection		78.1 (74.7-81)		



#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							Ad26.COV2.S	Symptomatic infection		16.2 (-4.7-33.0)	70-139	
							CoronaVac	Hospitalization		92.3(64.7-98.3)	14-69	
								Symptomatic infection		62.9 (61.2-64.5)	14-69	
								Hospitalization		41.1 (39.1-43.1)	70+	
										81.0 (64.0-90.0)	14-69	
										84.5 (74-90.8)	70+	
68	<a href="#">Cohen et al (April 13, 2022)</a>	Israel	Retrospective cohort	29,612 HCWs	Omicron^	Excluded	BNT162b2 (4 doses)	Documented infection	Complete vaccination with <u>three</u> doses of <u>BNT162b2</u> at <u>least 4 months prior</u>	44(37-50)	7+	~4 weeks
67	<a href="#">Institute of public health (April 12, 2022)</a>	Chile	Test-negative case control	2,181 cases and 979 controls	Gamma and Delta^	Included	BNT162b2 Sinovac	Hospitalization	Unvaccinated	88.3(79.5-93.3) 67.2(59.1-73.7)	14+	~24 weeks
66	<a href="#">Plumb et al (April 12, 2022)</a>	USA	Test-negative case control	11,283 hospitalized adults	Omicron ^ Delta ^	Included	BNT162b2 or mRNA-1273	Hospitalization	Unvaccinated	67.6 (61.4-72.8) 57.8 (32.1-73.8)	14+	~25 weeks
65	<a href="#">Kim et al (April 10, 2022)</a>	USA	Test-negative case control	2,208 cases and 1639 controls	Omicron specifically^ Delta specifically^	Included	BNT162b2 or mRNA-1273	Symptomatic infection	Complete vaccination with two doses at least 150 days prior	62 (48-72) 96 (93-98)	7+	~33 weeks
64	<a href="#">Buchan et al (April 7, 2022)</a>	Canada	Test-negative case control	29,855 individuals, 12-17 years	Omicron specifically^	Included	BNT162b2	Symptomatic infection	Unvaccinated	56 (34-70) 62 (49-72)	0-6 7+	~3 weeks
63	<a href="#">Kwon et al (April 6, 2022)</a>	USA	Test-negative case control	440 solid organ transplant recipients; 1684 patients with other immunocompromising conditions; 8301 immunocompetent individuals	Alpha and Delta^	Included	BNT162b2 or mRNA-1273	Hospitalization in solid organ transplant recipient (SOTR) Hospitalization in immunocompromised adults Hospitalization in immunocompetent adults Supplemental oxygen/oxygen support in SOTR Supplemental oxygen/oxygen	Unvaccinated	77 (48-90) 92 (85-95) 96 (94-98) 84 (57-94) 93 (85-97)	7+	~16 weeks



#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
								support in immunocompromised				
								Supplemental oxygen/oxygen support in immunocompetent		97 (94-98)		
62	<a href="#">Yoon et al (April 6, 2022)</a>	USA	Prospective cohort	3241 HCWs	Omicron specifically^	Excluded	BNT162b2 or mRNA-1273	Documented infection	Unvaccinated	60 (42-72)	7+	~21 weeks
									Complete vaccination with two doses	60 (40-73)		
					Delta specifically^				Unvaccinated	91 (84-95)		
									Complete vaccination with two doses	86 (69-94)		
61	<a href="#">Ranzani et al (April 1, 2022)</a>	Brazil	Test-negative case control	1,339,986 matched pairs of adults	Omicron^	Included	CoronaVac	Symptomatic disease	Complete vaccination with two doses of CoronaVac at least 6 months prior	4 (0.2-7.6)	8-59	~6 weeks
								Hospitalization or death		-14.2 (-16.7 to -11.6)	90+	~24 weeks
							CoronaVac primary + BNT162b2 booster	Symptomatic disease		42 (19.1-58.5)	8-59	~6 weeks
								Hospitalization or death		14.8 (5.4-23.2)	90+	~24 weeks
										53.5 (52.9-54.2)	8-59	~6 weeks
										24.6 (23.7-25.4)	90+	~24 weeks
										72.2 (69.9-74.4)	8-59	~6 weeks
										66.9 (64.7-69)	90+	~24 weeks
							CoronaVac	Symptomatic disease	Unvaccinated	15 (12-18)	8-59	~6 weeks
								Hospitalization or death		0.4 (-2.2-2.9)	60+	~24 weeks
										71.3 (60.3-79.2)	8-59	~6 weeks
										65.4 (61.5-68.8)	60+	~24 weeks
							CoronaVac primary + BNT162b2 booster	Symptomatic disease		56.8 (56.3-57.4)	8-59	~6 weeks
								Hospitalization or death		34.9 (34.3-35.6)	60+	~24 weeks
										85.5 (83.8-87)	8-59	~6 weeks
										86.1 (85-87.1)	60+	~24 weeks
					Delta^		CoronaVac	Symptomatic disease		59.8 (53.3-65.3)	8-59	~6 weeks
								Hospitalization or death		45.5 (18.1-63.7)	60+	~24 weeks
										80.3 (73.7-85.2)	8-59	~6 weeks
										65.8 (29.7-83.4)	60+	~24 weeks
							CoronaVac primary + BNT162b2 booster	Symptomatic disease		86.6 (85.9-87.3)	8-59	~6 weeks
								Hospitalization or death		84.3 (80.9-87.2)	60+	~24 weeks
										91.7 (90.4-92.9)	8-59	~6 weeks
										88.4 (80.7-93)	60+	~24 weeks

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
60	<a href="#">Glatman-Freedman et al*</a> (March 31, 2022)	Israel	Retrospective cohort	1,561,812 booster recipients aged 16+, and unvaccinated controls	Delta, <b>Omicron</b> <sup>^</sup>	Excluded	BNT162b2	Documented infection: 16-59 y	Unvaccinated	96.8 (96-97.5)	15-21	14 weeks
										77.6 (68.4-84.2)	106-112	
								Documented infection: 60+ y		93.1 (91.8-94.2)	15-21	18 weeks
										61.3 (52.5-68.4)	134-140	
59	<a href="#">Starrfelt et al</a> (March 30, 2022)	Norway	Retrospective cohort	4,301,995 adults (18+ y)	Delta <sup>^</sup>	Excluded	BNT162b2	Documented infection	Unvaccinated	75.3 (72.5-77.8)	7+	~6.5 weeks
								Hospitalization		95.6 (93.1-97.2)		
							BNT162b2 primary + mRNA-1273 booster	Documented infection		68.2 (57.6-76.1)		
								Hospitalization		73.5 (45.7-87.1)		
							mRNA-1273	Documented infection		84.9 (71.8-91.9)		
							mRNA-1273 primary + BNT162b2 booster	Documented infection		87.1 (80.1-91.6)		
58	<a href="#">Hansen et al</a> (March 30, 2022)	Denmark	Retrospective cohort	3,090,833 participants aged 12+	<b>Omicron</b> <sup>^</sup>	Excluded	BNT162b2	Documented infection	Unvaccinated	47.9 (47.4-48.2)	14-30	~2 weeks
										40.5 (38.9-42.2)	121+	~20 weeks
								Hospitalization		88.8 (87.3-90.1)	14-30	~2 weeks
										66.2 (61.1-70.7)	121+	~20 weeks
							mRNA-1273	Documented infection		47.7 (47-48.3)	14-30	~2 weeks
										37.9 (33.4-42)	121+	~18 weeks
								Hospitalization		90.2 (87.3-92.5)	14-30	~2 weeks
										77.3 (63.1-86.1)	121+	~18 weeks
57	<a href="#">Natarajan et al</a> (March 29, 2022)	USA	Test-negative case control	80,287 ED/UC encounters and 25,244 hospitalizations among adults with COVID-19 like illness	<b>Omicron</b> <sup>^</sup>	Included	Ad26.COVS.2	Emergency Dept/ Urgent Care visit	Unvaccinated	54 (43-63)	7+	~15 weeks
								Hospitalization		67 (52-77)		
							Ad26.COVS.2 primary + any mRNA booster	Emergency Dept/ Urgent Care visit		79 (74-82)		
								Hospitalization		78 (70-84)		
								Emergency Dept/ Urgent Care visit		83 (82-84)		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated	
							Any mRNA primary + any mRNA booster	Hospitalization		90 (88-91)			
56	<a href="#">Wang et al</a> (March 25, 2022)	USA	Test-negative case control	249,070 patients	Omicron^	Included	Any mRNA primary + any mRNA booster	Documented infection	Unvaccinated	65 (63-66)	14-179	~23.5 weeks	
					Delta^					50 (45-55)	180+	unknown	
										91 (90-92)	14-179	~23.5 weeks	
										71 (67-74)	180+	xx	
55	<a href="#">Arbel et al*</a> (April 25, 2022)  <i>[update to Mar 24, 2022 preprint]</i>	Israel	Retrospective cohort	563,465 older adults (aged 60+)	Omicron^	Excluded	BNT162b2 (4 doses)	Death	Complete vaccination with <a href="#">three doses of BNT162b2</a> at least 4 months prior	78 (72-83)	7+	~5 weeks	
54	<a href="#">Gazit et al*</a> (May 24, 2022)  <i>[Update to March 24 preprint]</i>	Israel	Matched test-negative case control	97,499 adults aged ≥60 years	Omicron^	Excluded	BNT162b2(4 doses)	Documented infection	Complete vaccination with <a href="#">three doses of BNT162b2</a> at least 4 months prior	57.7 (55.6-59.7)	7-13	~10 weeks	
			Unmatched multiple test analysis					Severe COVID-19		22 (4.9-36.1)	63-69		
								Documented infection		77.5 (69.7-83.2)	7-27		
										Severe COVID-19	86.5 (63.4-95)		49-69
											46 (43.7-48.3)		7-13
								29.5 (18.1-39.2)		63-69			
								73.3 (66.3-78.9)		7-27			
								86.1 (73.4-92.8)		49-69			
53	<a href="#">Stowe et al</a> (April 1, 2022)	UK	Test-negative case control	Overall: 115,720 cases and 294,265 controls  18-64 years	Omicron^	Included	AZD1222 primary + BNT162b2 booster	Hospitalization with ARI	Unvaccinated	90.2 (78.1-95.6)	7-13	~22 weeks	
							AZD1222 primary + mRNA-1273 booster	Hospitalization with ARI		69.0 (50.3-80.7)	105+		
							BNT162b2 primary + BNT162b2 booster	Hospitalization with ARI		97.2 (86.1-99.4)	7-13		
							BNT162b2 primary + mRNA-1273 booster	Hospitalization with ARI		89.2 (82.5-93.3)	36-69		
										85.2 (47.1-95.8)	7-13		
										66.0 (44.5-79.2)	105+		
							Adults aged 65+	BNT162b2 primary + mRNA-1273 booster		Hospitalization with ARI	94.3 (85-97.8)		14-34
				AZD1222 primary + BNT162b2 booster				Hospitalization with ARI		89.8 (77.9-95.3)	70+		
										85.4 (73.4-92)	7-13		
										86.1 (82.5-88.9)	105+		
				AZD1222 primary + mRNA-1273 booster				Hospitalization with ARI		92.9 (87.7-95.9)	14-34		
										91.8 (85.9-95.3)	70+		
							86.4 (69.1-94)			7-13			

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							BNT162b2 primary + BNT162b2 booster	Hospitalization with ARI		85.2 (82.1-87.7)	105+	
							BNT162b2 primary + mRNA-1273 booster	Hospitalization with ARI		92.9 (50.2-99)	7-13	
										97.3 (90.8-99.2)	70+	
52	<a href="#">Tenforde et al (March 25,2022)</a>	USA	Case-control	7,544 hospitalised patients	Omicron^ Delta^ Alpha^	Included	BNT162b2 or mRNA-1273 primary series + BNT162b2 or mRNA-1273 booster	Invasive mechanical ventilation or in-hospital death	Unvaccinated	94 (88-97) 95 (91-97) 94 (91-96)	7+	~20 weeks
51	<a href="#">Altarawneh et al* (June 15, 2022)</a>  <i>[Update to March 31, 2022 study]</i>	Qatar	Test-negative case control	158,484 individuals	Omicron BA.1 specifically^	Previously infected only	BNT162b2	Symptomatic infection Hospitalization and death	Unvaccinated	74.4 (63.4-82.2) 100 (30.6-100)	7+	~19 weeks
mRNA-1273	Symptomatic infection Hospitalization and death	77.2 (38.5-91.5) 100 (CI omitted)										
	Excluded	BNT162b2	Symptomatic infection Hospitalization and death	59.6 (52.9-65.3) 97.5 (71.7-99.8)								
		mRNA-1273	Symptomatic infection Hospitalization and death	56.5 (38.1-69.4) 100 (-432.5-100)								
	Omicron BA.2 specifically^	Previously infected only	BNT162b2	Symptomatic infection Hospitalization and death	77.3 (72.4-81.4) 100 (82.6-100)							
mRNA-1273				Symptomatic infection Hospitalization and death	69.8 (50.1-81.7) 100 (CI omitted)							
Excluded			BNT162b2	Symptomatic infection Hospitalization and death	52.2 (48.1-55.9) 98.2 (91.9-99.6)							
				mRNA-1273	Symptomatic infection	52.9 (43-61.2)						

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
					Omicron specifically	Previously infected only	BNT162b2	Hospitalization and death		100 (-3800-100)		
								Symptomatic infection		76.3 (71.7-80.1)		
								Hospitalization and death		100 (91.8-100)		
							mRNA-1273	Symptomatic infection		79.4 (66.1-87.5)		
								Hospitalization and death		100 (-51.5-100)		
						Excluded	BNT162b2	Symptomatic infection		54 (50.4-57.3)		
								Hospitalization and death		92.5 (84.4-96.3)		
							mRNA-1273	Symptomatic infection		61.3 (53.3-67.9)		
								Hospitalization and death		82.7 (-80.2-98.3)		
50	<a href="#">Montez-Rath et al (March 18, 2022)</a>	USA	Prospective cohort	3,576 patients receiving dialysis	Omicron specifically^	Included	BNT162b2 or mRNA-1273 primary series + BNT162b2 or mRNA-1273 booster	Documented infection	Unvaccinated	53 (38-65)	21+	~14 weeks
49	<a href="#">Baum et al (July 6, 2022)</a>  [Update to March 13, 2022 preprint]	Finland	Retrospective cohort	896,220 older adults (aged 70+)	Non-VOC, Alpha, Delta, Omicron^ Delta^	Excluded	BNT162b2 (3 doses)	Hospitalization	Unvaccinated	95 (94-96)	14-60	~20.5 weeks
								ICU admission		89 (87-91)	61+	
							BNT162b2 primary + mRNA-1273 booster	Hospitalization		98 (95-99)	14-60	
								ICU admission		95 (92-97)	61+	
										91 (87-94)	14-60	
										85 (78-89)	61+	
							mRNA-1273 primary series + BNT162b2 booster	Hospitalization		92 (79-97)	14-60	
										96 (84-99)	61+	
							mRNA-1273 (3 doses)	Hospitalization		91 (81-96)	14-60	
										90 (80-94)	61+	
							AZD1222 primary series + BNT162b2 booster	Hospitalization		97 (93-98)	14-60	
								ICU admission		87 (82-91)	61+	
										98 (91-99)	14-60	
										88 (78-93)	61+	
										96 (71-99)	61+	

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated						
					Delta^		AZD1222 primary series + mRNA-1273 booster	Hospitalization		94 (82-98)	14-60	~13 weeks						
							ICU admission	87 (70-95)		61+								
								BNT162b2 (3 doses)		Hospitalization	89 (22-99)							
							BNT162b2 primary series + mRNA-1273 booster			96 (93-97)	14-60							
							mRNA-1273 primary series + BNT162b2 booster			94 (75-99)	61+							
							mRNA-1273 (3 doses)			75 (-3-94)	14-60							
							AZD1222 primary series + BNT162b2 booster			82 (28-96)	14-60							
										100 (CI omitted)	61+							
								100 (CI omitted)		14-60								
								100 (CI omitted)		61+								
								84 (-16-98)		14-60								
					Omicron^		BNT162b2 (3 doses)	Hospitalization		94 (92-95)	14-60	~20.5 weeks						
							BNT162b2 primary series + mRNA-1273 booster			87 (85-89)	61+							
							mRNA-1273 primary series + BNT162b2 booster			91 (87-94)	14-60							
							mRNA-1273 (3 doses)			83 (76-88)	61+							
							AZD1222 primary series + BNT162b2 booster			92 (80-97)	14-60							
							AZD1222 primary series + mRNA-1273 booster			88 (77-94)	61+							
										96 (91-98)	14-60							
									85 (78-89)	61+								
								99 (91-100)	14-60									
								86 (75-92)	61+									
								94 (81-98)	14-60									
								87 (68-95)	61+									
					48		<a href="#">Shrotri et al (March 12, 2022)</a>	UK	Prospective cohort	15,518 long-term care facility residents	Alpha and Delta^	Excluded	BNT162b2 or mRNA-1273	Documented infection	Unvaccinated	71.4 (49.7-83.8)	0+	11 weeks
														Hospitalization		83.6 (63.4-92.7)		
Death	98.7 (90-99.8)																	
AZD1222	Documented infection	71.4 (49-84)																
	Hospitalization	93.3 (82.8-97.4)																
	Death	95.3 (79.4-98.9)																
BNT162b2 or mRNA-1273	Documented infection	79.3 (70-85.7)																

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated	
				19,515 long-term care facility staff			AZD1222	Hospitalization		100 (no CIs)			
								Documented infection		75.9 (61.5-84.8)			
								Hospitalization		93.4 (25.2-99.4)			
47	<a href="#">Butt et al*</a> (March 4, 2022)	USA	Retrospective cohort	395,686 matched pairs of veterans	Delta^	Excluded	BNT162b2	Symptomatic disease	Complete vaccination with two doses of BNT162b2 at least 4.5 months prior	84 (78-88)	14+	7 weeks	
								Hospitalization		77 (65-85)			
							mRNA-1273	Symptomatic disease	Complete vaccination with two doses of mRNA-1273 at least 4.5 months prior	87 (83-90)			
								Hospitalization		94 (93-95)			
46	<a href="#">Norddahl et al</a> (March 1, 2022)	Iceland	Retrospective cohort	227,461 adults (18-80 years)	Omicron specifically^	Excluded	BNT162b2 + BNT162b2	Documented infection	Complete vaccination with two doses of BNT162b2 at least 6 months prior	47 (36-56)	0+	~5.5 weeks	
							BNT162b2 + mRNA-1273			50 (34-62)			
					Delta specifically^		BNT162b2 + BNT162b2			52 (28-69)			
							BNT162b2 + mRNA-1273			73 (29-90)			
45	<a href="#">Klein et al</a> (March 1, 2022)	USA	Test-negative case control	39,217 ED and UC encounters and 1,699 hospitalizations among persons aged 5–17 years	Omicron^	Included	BNT162b2 primary + BNT162b2 booster	ED or UC encounters in children aged 16-17 years	Unvaccinated	81 (59-91)	7+	~4 weeks	
					Omicron or Delta^			ED or UC encounters in children aged 16-17 years		86 (73-93)			
44	<a href="#">Šmíd et al</a> (February 25, 2022)	Czech Republic	Retrospective cohort	8,173,828 individuals	Omicron^	Included	BNT162b2	Documented infection	Unvaccinated	58 (58-59)	14-74	~24 weeks	
											24 (22-26)		75+
										Hospitalization	86 (84-89)		14-74
											79 (74-82)		75+
							mRNA-1273	Documented infection		61 (60-62)	14-74		
											33 (29-38)		75+
										Hospitalization	89 (84-93)		14-74
											84 (72-91)		75+
					Delta^		BNT162b2			90 (90-91)	14-74		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
								Documented infection		80 (78-83)	75+	
								Hospitalization		98 (97-98)	14-74	
							mRNA-1273	Documented infection		96 (94-97)	75+	
								Hospitalization		93 (92-94)	14-74	
										91 (83-96)	75+	
										98 (97-99)	14-74	
43	<a href="#">Patalon et al *</a> (June 9, 2022)  [Published version of February 26, 2022 preprint]	Israel	Test-negative case control	351,120 individuals	Omicron <sup>^</sup>	Excluded	BNT162b2 primary + BNT162b2 booster	Documented infection	Complete vaccination with two doses of BNT162b2 at least 5 months prior	53.4 (47.7-58.6)	1-51	~21 weeks
										3.6 (0.6-6.5)	93-142	
42	<a href="#">Monge et al*</a> (June 2, 2022)  [Published version of February 14, 2022 preprint]	Spain	Retrospective cohort	2,083,857 matched pairs among adults aged 40+	Omicron <sup>^</sup>	Excluded	BNT162b2 primary + BNT162b2 or mRNA-1273 booster	Documented infection	Complete vaccination with two doses (or one dose for Ad26.COV2.S) ≥3 months prior	49.7 (48.3-51.1)	7-34	~3 weeks
							mRNA-1273 primary + BNT162b2 or mRNA-1273 booster			55.3 (52.3-58.2)		
							AZD1222 primary + BNT162b2 or mRNA-1273 booster			58.6 (55.5-61.6)		
							Ad26.COV2.S primary + BNT162b2 or mRNA-1273 booster			48 (42.5-53.7)		
41	<a href="#">Regev-Yochay</a> (February 15, 2022)	Israel	Open-label, non-randomized clinical trial	1,050 HCWs	Omicron <sup>^</sup>	Excluded	BNT162b2 (4 doses)	Infection	Complete vaccination with <a href="#">three doses of BNT162b2</a> at least 4 months prior	30 (-9 to 55)	8-29	~2 weeks
								Symptomatic disease		43 (7 to 65)	8-29	
							BNT162b2 (3 doses) + mRNA-1273 (4 <sup>th</sup> dose)	Infection		11 (-43 to 43)	8-23	~1 week
								Symptomatic disease		31 (-18 to 60)	8-23	
40	<a href="#">Ferdinands et al</a> (February 11, 2022)	USA	Test-negative case control	241,204 ED/UC encounters	Omicron <sup>^</sup>	Included	BNT162b2, mRNA-1273 primary	ED/UC encounter	Unvaccinated	87 (85–88)	<2 mos	~25 weeks
										31 (-50–68)	≥5 mos.	



#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated	
				and 93,408 hospitalizations			series + BNT162b2 and mRNA-1273 booster	Hospitalization		91 (88–93)	<2 mos.		
					Delta^			ED/UC encounter		78 (67–85)	≥4 mos		
								Hospitalization		97 (96-97)	<2 mos.		
										89 (64-97)	≥4 mos		
										96 (95-97)	<2 mos.		
										76 (14-93)	≥4 mos		
49	<a href="#">Hayek et al*</a> (January 27, 2022)	Israel	Retrospective cohort	76,621 households with 181,307 children	Delta^	Excluded	BNT162b2	Documented infection	Complete vaccination with two doses of primary mRNA series at least 5 months prior	86.3 (83.4-88.6)	7+	~11 weeks	
38	<a href="#">Cerqueira-Silva et al</a> (February 9, 2022)	Brazil	Test-negative case control	7,747,121 individuals	Gamma and Delta^	Excluded	CoronaVac primary dose + BNT162b2 booster	Documented infection	Unvaccinated	80.2 (77-82.9)	7-13	~5 weeks	
								Severe disease		82.6 (76.9-86.9)	>30		
										Hospitalisation	91 (88.5-93.5)		7-13
											96.8 (94.1-98.3)		>30
										Death	91.2 (88.3-93.4)		7-13
								96.7 (93.9-98.2)			>30		
					Delta^			Documented infection	Complete vaccination with CoronaVac 2 <sup>nd</sup> dose >180 days	92.2 (87.4-95.2)	7-13		
										97.1 (90.5-99.1)	>30		
								Death or hospitalizations		76.1 (73.7- 78.4)	7-13		
										84.5 (81.0- 87.4)	>30		
37	<a href="#">Chemaitelly et al</a> (March 13, 2022)  <i>[Update to February 8 preprint]</i>	Qatar	Test-negative case control	138,182 individuals	Omicron BA.1 specifically^	Included	BNT162b2	Symptomatic infections	Unvaccinated	59.9 (51.2-67)	<1 mo.	~19 weeks	
							mRNA-1273			40.5 (30.8-48.8)	≥1 mo.		
										BNT162b2	51.5 (32.3- 65.2)		<1 mo.
											45.3 (17.8 -63.5)		≥1 mo.
					Omicron BA.2 specifically^		mRNA-1273			43.7 (36.5- 50.0)	<1 mo.		
										40.2 (34.2- 45.7)	≥1 mo.		
										39.4 (24.8- 51.2)	<1 mo.		
							41.9 (23.4 -56.0)			≥1 mo.			
					Omicron specifically^		BNT162b2			49.5(44.3-54.1)	<1 mo.		
							mRNA-1273			39.4(34.4-44.0)	≥1 mo.		
										43.6(33.2-52.4)	<1 mo.		
							BNT162b2			47.5(34.1-58.1)	≥1 mo.		
										90.9 (78.6- 96.1)	1-6 weeks		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							mRNA-1273			90.1 (80.6-95.0)	≥7 weeks	
										81.8 (-49.5-97.8)	1-6 weeks	
										100.0 (Omitted)	≥7 weeks	
36	<a href="#">Lauring et al*</a> (March 9, 2022)  [February 7,2022]	USA	Test-negative case control	5582 COVID-19 cases and 5962 test negative and syndrome negative controls	<b>Omicron specifically^</b>  Delta specifically^	Excluded	BNT162b2, mRNA-1273 primary series + BNT162b2 and mRNA-1273 booster	Hospitalization(overall)  Hospitalization (overall)  Hospitalization (immune-compromised)	Unvaccinated	86 (77-91)  94 (92-95)  87 (78-92)	7+   	~3 weeks  ~25 weeks
35	<a href="#">Sritipsukho et al</a> (February 3,2022)	Thailand	Test-negative case control	1,118 cases and 2,235 controls	Delta^	Excluded	CoronaVac primary dose + AZD1222 booster  CoronaVac primary dose + BNT162b2 booster	Documented infection	Unvaccinated	86 (74-93)  98 (87-100)	7+  	~6 weeks  ~8 weeks
34	<a href="#">Bar-On et al</a> (April 5, 2022)  [Update to February 1, 2022 preprint]	Israel	Retrospective cohort	1,252,331 persons aged over 60 years	<b>Omicron^</b>	Excluded	BNT162b2 (four doses)	Documented infections  Severe illness	<b>Complete vaccination with three doses at least 4 months prior</b>	33.3 (33.3-37.5)  9.2 (0-16.7)  58.3 (50.0-65.5)  76.7 (61.5-85.9)	8-14  50-56  8-14  36-42	2 weeks
33	<a href="#">Roberts et al</a> (January 31,2022)	USA	Test-negative case control	74,060 adults	Non-VOC, Alpha, Delta <sup>††</sup>	Included	BNT162b2, mRNA-1273 primary series + BNT162b2 and mRNA-1273 booster	Documented infection  Severe	Complete vaccination with two doses of primary mRNA series at least 6 months prior	87.3(85-89.2)  94(89.5-96.6)	14+  	~20 weeks
32	<a href="#">Lytras et al*</a> (June 14, 2022)  [Published version of January 29,2022 preprint]	Greece	Retrospective cohort	9100 COVID-19 intubations and 14755 COVID-19 deaths in Greece	Non-VOC, Alpha, Delta^	Included	BNT162b2	Intubation (15-79y)  Intubation (80+ y)  Death (15-79y)  Death (80+y)	Unvaccinated	98.2 (97.2-98.9)  97.5 (95.5-98.6)  98.3 (96.8-99.1)  98.4 (97.4-99.0)	14+    	~12 weeks

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
31	<a href="#">Willett et al</a> (Janaury 26,2022)	Scotland	Test-negative case control	6166 Omicron cases and 4911 Delta cases	Omicron specifically^	Included	BNT162b2	Documented infection	Unvaccinated	43.2 (38.1-47.8)	14+	~11 weeks
					mRNA-1273		46.3 (41.3-51.0)					
					BNT162b2		85.9 (84.2-87.4)					
					mRNA-1273		86.5 (84.8-88.0)					
30	<a href="#">McConeghy et al</a> (January 28,2022)	USA	Nested trial	200 Nursing homes	Delta <sup>††</sup>	Excluded	BNT162b2, mRNA-1273 primary series + BNT162b2 and mRNA-1273 booster	Documented infection	Complete vaccination with two doses of primary mRNA series at least 6 months prior	50.4 (29.4-64.7)	≤42	~12 weeks
				127 VA Community living centers				Hospitalization		47.7 (-377.7-88.9)		
								Death		97.2 (88.1-100)		
								Combined death or hospitalization		82 (55.5-94)		
								Documented infection		58.2 (32.3-77.8)		
								Hospitalization		36.6 (-35.4-77.3)		
								Combined death or hospitalization		45.8 (-15.5-79.1)		
								29		<a href="#">Tenforde et al*</a> (January 28, 2022)		
Hospitalization: non-immunocompromised	97 (95-99)	~10 weeks										
28	<a href="#">Spensley et al</a> (January 26, 2022)	UK	Prospective cohort	1121 end stage kidney disease patients receiving in-center haemo-dialysis patients	Omicron specifically^	Included	BNT162b2 primary + BNT162b2 booster	Documented infection	Unvaccinated	66 (36-81)	14+	~15 weeks
				AZD1222 + BNT162b2 booster			47 (2-70)					
27	<a href="#">Abu-Raddad et al*</a> (May 12, 2022)  [Update to Jan 24, 2022 preprint]	Qatar	Matched retrospective cohort	2,239,193 individuals in Qatar	Omicron specifically^	Excluded	BNT162b2	Symptomatic infection	Complete vaccination at least 6-8 months prior	49.4 (47.1-51.6)	>7	~10 weeks
								Hospitalization or death		49.9 (47.6-52.2)	>14	
								Symptomatic infection	Complete vaccination ≤8 months prior	38 (28.8-46)	>7	
									Complete vaccination >8 months prior	50.5 (48.2-52.8)	>7	
							mRNA-1273	Symptomatic infection	Complete vaccination at least 6-8 months prior	47.3 (40.7-53.3)	>7	
										52 (45.1-57.9)	>14	

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
									Complete vaccination ≤8 months prior	41.5 (32.3-49.5)	>7	
									Complete vaccination >8 months prior	56.8 (47-64.8)	>7	
					Delta specifically^		BNT162b2	Symptomatic infection	Complete vaccination with BNT162b2 at least 6-8 months prior	86.1(67.3-94.1)	>7	
26	<a href="#">Thompson et al</a> (January 21,2022)	USA	Test-negative case control	222,772 ED encounters and 87,904 hospitalization	<b>Omicron specifically^</b>	Excluded	BNT162b2 or mRNA-1273	ED or UC encounters	Unvaccinated	94 (93-95)	14+	~18 weeks
					Delta specifically^			Hospitalisation		90 (80-94)		
								ED or UC encounters		94 (93-94)		
								Hospitalisation		94 (93-95)		
25	<a href="#">Tartof et al*</a> (April 22, 2022) <i>[Update to January 18, 2022 preprint]</i>	USA	Test-negative case control	11,123 patients with ED or hospital encounter in Southern California	<b>Omicron specifically^</b>	Included	BNT162b2	ED admission	Unvaccinated	75 (70-79)	14+	~23 weeks
					Delta specifically^					77 (72-81)	14 to <3 mos	
										53 (36-66)	≥ 3 mos	
								Hospitalization		82 (77-87)	14+	
										85 (80-89)	14 to <3 mos	
										55 (28-71)	≥ 3 mos	
								ED admission		83 (79-86)	14+	
										84 (80-87)	14 to <3 mos	
										72 (58-82)	≥ 3 mos	
								Hospitalization		87 (81-92)	14+	
										89 (83-93)	14 to <3 mos	
										71 (40-86)	≥ 3 mos	
24	<a href="#">Young-Xu et al</a> (March 13,2022) <i>[Update to January 18 preprint]</i>	USA	Matched test-negative case control	24,581 veterans 18 or older as cases and 372,636 veterans as controls	<b>Omicron specifically^</b>	Excluded	Any mRNA vaccine	Documented infection	Unvaccinated	59(57-61)	14+	~20 weeks
					Delta specifically^			Hospitalization		87(80-91)		
								Death		94(85-98)		
								Documented infection		90(88-92)		
								Hospitalization		95(91-97)		
								Death		96(88-99)		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
23	<a href="#">Jara et al*</a> (April 23, 2022)  <i>[Update to January 13, 2022 preprint]</i>	Chile	Prospective cohort	11,174,257 Chilean residents aged ≥ 16 years	Delta and Gamma^	Excluded	CoronaVac primary series + CoronaVac booster	Documented infection	Unvaccinated	78.8 (76.8–80.6)	14+	~11 weeks
								Hospitalization		86.3 (83.7-88.5)		
								ICU admission		92.2 (88.7-94.6)		
								Death		86.7 (80.5-91.0)		
							CoronaVac primary series + BNT162b2 booster	Documented infection		96.3 (96.1–96.5)		
								Hospitalization		96.1 (95.3-96.9)		
								ICU admission		96.2 (94.6-97.3)		
								Death		96.8 (93.9-98.3)		
							CoronaVac primary series + AZD1222 booster	Documented infection		93.2 (92.9-93.6)		
								Hospitalization		97.7 (97.3-98)		
								ICU admission		98.9 (98.5-99.2)		
								Death		98.1 (97.3-98.6)		
22	<a href="#">Waxman et al*</a> (April 22, 2022)  <i>[update of Jan 11, 2022 preprint]</i>	Israel	Retrospective cohort	2,412,755 members of Clalit Health Services aged 16+	Delta^	Excluded	BNT162b2	Hospitalization	Complete vaccination with two doses of BNT162b2 at least 5 months prior	89 (87-91)	7+	~15.5 weeks
21	<a href="#">Spitzer et al*</a> (January 10, 2022)	Israel	Prospective cohort	1928 healthcare workers at a tertiary medical center in Tel Aviv	Delta^	Excluded	BNT162b2	Documented infection	Complete vaccination with two doses of BNT162b2 at least 1 month prior	93 (80-98)	7+	~4 weeks
								Symptomatic infection		93 (75-98)		
								Asymptomatic infection		92 (52-99)		
20	<a href="#">Tseng et al*</a> (February 21, 2022)  <i>[update from January 21 preprint]</i>	USA	Test-negative case control	26,683 cases and 109,662 controls among Kaiser Permanente Southern California members aged 18+	Omicron specifically^	Included	mRNA-1273	Documented infection: All	Unvaccinated	70 (68-71.9)	14+	8 weeks
										71.6 (69.7-73.4)	14-60	~6.5 weeks
										47.4 (40.5-53.5)	>60	8 weeks
								Hospitalization: All		99.2 (76.3-100)	14+	
					Delta specifically^			Documented infection: Immuno-compromised		29.4 (0.3-50)	14+	
								Documented infection: All		94.5 (92.9-95.7)	14+	8 weeks
										93.7 (92.2-94.9)	14-60	~6.5 weeks
										86 (78.1-91.1)	>60	8 weeks
								Documented infection: Immuno-compromised		70.6 (31-87.5)		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
								Hospitalization: All		99.7 (96.5-100)		
19	<a href="#">Tan et al*</a> (February 11,2022)  [Published version of January 5,2022 preprint]	Singapore	Retrospective cohort	703,209 individuals aged 60 years and above	Delta <sup>††</sup>	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection Symptomatic disease Severe disease	Complete vaccination with two doses of BNT162b2 primary series at least 5 months prior	73 (72-75) 72 (71-74) 95 (92-97)	12+	~6 weeks
							BNT162b2 primary series + mRNA-1273 booster	Documented infection Symptomatic disease Severe disease		82 (77-86) 82 (76-87) 92 (44-99)		
							mRNA-1273 primary series + mRNA-1273 booster	Documented infection Symptomatic disease		86 (81-90) 85 (79-89)		
							mRNA-1273 primary series + BNT162b2 booster	Documented infection Symptomatic disease		90 (73-96) 90 (69-97)		
18	<a href="#">Buchan et al</a> (January 28,2022)  [Update to January 1 pre-print]	Canada	Test negative case control	16,087 Omicron-positive cases, 4,261 Delta-positive cases, and 114,087 test-negative controls	Omicron specifically <sup>^</sup>	Excluded	mRNA primary + BNT162b2 booster	Symptomatic disease	Unvaccinated	60 (55-65) 65 (55-72)	7+	~9 weeks
							mRNA primary + mRNA-1273 booster			95 (87-98)		
							mRNA primary + BNT162b2 booster	Severe disease		93 (74-98)		
							mRNA primary + mRNA-1273 booster					
					Delta specifically <sup>^</sup>		mRNA primary + BNT162b2 booster	Symptomatic disease	Unvaccinated	97 (96-98) 97 (95-98)		
							mRNA primary + mRNA-1273 booster			99 (98-99)		
							mRNA primary + BNT162b2 booster	Severe disease		100 (98-100)		
							mRNA primary + mRNA-1273 booster					
17	<a href="#">Gray et al *</a> (June 9,2022)  [Published version of December 29,2021 preprint]	South Africa	Test-negative case control	69,092 HCWs	Omicron <sup>^</sup>	Excluded	Ad26.COV.2	Hospitalization ICU admission	Unvaccinated	84 (67-92) 85 (54-95)	14-27 1-2 months	~13 weeks
										69 (26-87) 82 (57-93)	14-27 28-87	

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
16	<a href="#">Lustig et al*</a> (May 09, 2021)  [Published version of December 21, 2021 preprint]	Israel	Prospective cohort	12,413 HCW in a large tertiary care center	Delta^	Excluded	BNT162b2	Documented infection	Complete vaccination with two doses of primary series at least 5 months prior	85.6 (79.2-90.1)	10+	~7 weeks
15	<a href="#">Amir et al</a> (December 21, 2021)	Israel	Quasi-experimental	348,468 individuals aged 16-18 (booster group) and 361,050 individuals aged 12-14 recently fully vaccinated	Delta^	Excluded	BNT162b2	Documented infection	Individuals aged 12-14 recently vaccinated (<60 days) with 2 doses Unvaccinated individuals aged 16-18	73.4 (67.1-78.9) 96.2 (94.8-97.2)	14+	~4 weeks
14	<a href="#">Hansen et al</a> (December 23, 2021)	Denmark	Retrospective cohort	41,684 Danish residents aged ≥12 years (booster analysis among 60+ years only)	<b>Omicron specifically^</b> Delta specifically^	Excluded	BNT162b2 BNT162b2 mRNA-1273	Documented infection	Complete vaccination with two doses of primary series at least 140 days prior, for 60+ year olds	54.6 (30.4-70.4) 81.2 (79.2-82.9) 82.8 (58.8-92.9)	1-30	~4 weeks
13	<a href="#">Tartof et al*</a> (February 14, 2021)  [Updated from December 21 <sup>st</sup> preprint]	USA	Retrospective matched cohort	3,133,075 individuals ≥ 18 years	Delta specifically^	Included	BNT162b2	Documented infection Hospitalization Documented infection Hospitalization	Unvaccinated Complete vaccination with two doses of primary series at least 6 months prior	88 (86-89) 97 (95-98) 75 (71-78) 70 (48-83)	14+	~12 weeks
12	<a href="#">Berec et al</a> (December 12, 2021)	Czech Republic	Retrospective cohort	6,287,356 individuals	Delta^	Included	BNT162b2 primary series + BNT162b2 booster mRNA-1273 primary series+ BNT162b2 booster AZD1222 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses of primary series at least 6-8 months prior	92 (91-92) 94 (91-96) 82 (68-90)	7+	~8 weeks

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							BNT162b2 primary series+ mRNA-1273 booster			92 (88-95)		
							mRNA-1273 primary series + mRNA-1273 booster			94 (91-95)		
							AZD1222 primary series+ mRNA-1273 booster			91 (63-98)		
11	<a href="#">UKHSA/Andrews et al</a> (January 14, 2022)  [Update to Dec 31, 2021 briefing]	England	Test-negative case control	760,647 Omicron cases, 236,023 Delta cases, and test negative controls aged 18+	Omicron specifically^	Included	BNT162b2 primary series + BNT162b2 booster	Symptomatic disease	Unvaccinated	68.7 (67.9-69.5)	2-4 weeks	~14 weeks
										50.1 (49-51.2)	10+ weeks	
							BNT162b2 primary series + mRNA-1273 booster			74.7 (73.7-75.7)	2-4 weeks	
										65.3 (63.1-67.4)	5-9 weeks	
							AZD1222 primary series + BNT162b2 booster			62.7 (62-63.4)	2-4 weeks	
										44.1 (42.2-45.9)	10+ weeks	
							AZD1222 primary series + mRNA-1273 booster			70.3 (69.5-71)	2-4 weeks	
										61.6 (60-63.1)	5-9 weeks	
							mRNA-1273 primary series + BNT162b2 booster			67 (63-70)	2-4 weeks	
							mRNA-1273 primary series + mRNA-1273 booster			68 (64-72)	2-4 weeks	
					Delta specifically^		BNT162b2 primary series + BNT162b2 booster			95.2 (94.9-95.5)	2-4 weeks	
										90.2 (89.6-90.8)	10+ weeks	
							BNT162b2 primary series + mRNA-1273 booster			96.8 (96.2-97.3)	2-4 weeks	
										94.7 (92.7-96.2)	5-9 weeks	



#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							AZD1222 primary series + BNT162b2 booster			95.4 (95.2-95.7)	2-4 weeks	
										88.5 (87-89.7)	10+ weeks	
							AZD1222 primary series + mRNA-1273 booster			97.1 (96.8-97.4)	2-4 weeks	
							mRNA-1273 primary series + BNT162b2 booster			94.9 (93.6-95.9)	5-9 weeks	
							mRNA-1273 primary series + mRNA-1273 booster			97.3 (91.5-99.1)	2-4 weeks	
10	<a href="#">Arbel et al (December 8, 2021)*</a>	Israel	Prospective cohort	843,208 individuals	Delta <sup>^</sup>	Excluded	BNT162b2 primary series + BNT162b2 booster	Death	Receipt of 2 doses at least 5 months prior	90 (86-93)	7-54	~8 weeks
								Documented infection		83 (82-94)		
9	<a href="#">Goldberg et al (December 5, 2021)</a>	Israel	Retrospective cohort	5.7 million Israeli individuals	Delta <sup>^</sup>	Excluded	BNT162b2 primary series + BNT162b2 booster	16-39: Documented infection	Receipt of 2 doses at least 5 months prior	91 (90.1-91.3)	12+	~8 weeks
								40-59: Documented infection		89 (88.3-89.3)		
								60+: Documented infection		82.2 (81.5-82.8)		
8	<a href="#">Sharma et al (November 30, 2021)</a>	USA	Matched retrospective cohort	129,130 matched pairs of veterans who received a second dose at least 6 months prior	Delta <sup>††</sup>	Included	BNT162b2 primary series + BNT162b2 booster	Documented infection	Receipt of 2 doses at least 180 days prior	45.7 (37.9-52.5)	0+	~7 weeks
								Hospitalization		44.8 (26.6-58.4)		
							mRNA-1273 primary series + mRNA-1273 booster	Documented infection		46.6 (36.4-55.3)		
								Hospitalization		50.0 (26.2-66.1)		
7	<a href="#">Andrews et al (December 17, 2021)</a>  <i>[Update to November 15, 2021 Preprint]</i>	England	Test-negative case control	462,591 adults aged 50+ years in England	Delta <sup>††</sup>	Included (if >90 days prior)	BNT162b2 primary series + BNT162b2 booster	Symptomatic disease	Complete vaccination with two doses of primary series at least 140 days prior	84.5 (83.7-85.3)	14+	~7.5 weeks
							AZD1222 primary series + BNT162b2 booster			89.1 (88.3-89.9)		

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
							BNT162b2 primary series + BNT162b2 booster		Unvaccinated individuals	94.3 (93.9-94.6)		
							AZD1222 primary series + BNT162b2 booster			93.8 (93.3-94.3)		
6	<a href="#">Barda et al*</a> (October 29, 2021)	Israel	Retrospective cohort	1158269 Israeli individuals	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses at least 5 months ago	88 (87-90)	7+	~7 weeks
								Symptomatic disease		91 (89-92)		
								Hospitalization		93 (88-97)		
								Severe disease		92 (82-97)		
								Death		81 (59-97)		
5	<a href="#">Saciuk et al*</a> (November 2, 2021)	Israel	Retrospective cohort	947,131 persons fully vaccinated at least 6 months prior (Jan-Feb 2021) among active members of the Maccabi HMO	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses at least 5 months prior	89.1 (87.5-90.5)	7+	10 weeks
4	<a href="#">Hardt et al</a> (January 31, 2022)	North and South America, Africa, Asia and Europe	Randomized-placebo control trial	14,492 participants in the per-protocol analysis	Non-VOC, Alpha, Delta	Unknown	Ad26.COV2.S primary series + Ad26.COV2.S booster dose	Documented infection	Complete vaccination one dose	51.1 (29.5-66.5)	7+	~8 weeks
								Asymptomatic infection		34.2 (-6.4-59.8)		
								Moderate Symptomatic infection		70.7 (45.5-85.2)		
								Moderate and severe/critical infection		75.2 (54.6-87.3)		
					Alpha^			Documented infection		94.2 (62.9-99.9)		
					Mu^					63.1 (-27.9-91.6)		
3	<a href="#">Bar-On et al *</a> (December 8, 2021) [Published version of October 7 pre-print]	Israel	Retrospective cohort	4,629,865 Israeli residents (16+) who had been fully vaccinated at	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	16-29 y: Documented infection	Complete vaccination with two doses at least 5 months prior	94.2 (93.6-94.9)	12+	~3.5 weeks
								30-39 y: Documented infection		88.6 (87.8-89.5)		~4.5 weeks
								40-49 y: Documented infection		89.7 (89.1-90.4)		5 weeks

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
				least 5 months prior				50-59 y: Documented infection		91.8 (91.2-92.4)		6 weeks
								60+ y: Documented infection		91.9 (91.6-92.2)		8 weeks
								40-59: Severe disease		95.4 (90.6-97.8)		6 weeks
								60+: Severe disease		94.5 (93.4-95.3)		8 weeks
								60+: Death		93.2 (89.4-95.7)		
2	<a href="#">Patalon et al*</a> (November 30, 2021) [Update to August 31 preprint]	Israel	Test-negative case control	306,710 Israeli adults ≥ 40 years with either 2 or 3 doses	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses at least 5 months prior	85 (83-86)	14-20	~7 weeks
			Matched case-control							86 (85-87)	28-65	
								Documented infection		87 (85-88)	14-20	
										83 (82-85)	28-65	
								Hospitalization		92 (87-95)	14-20	
										97 (95-98)	28-65	
1	<a href="#">Bar-On et al*</a> (October 7, 2021) [Update to August 31 Preprint]	Israel	Retrospective cohort	1,144,690	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses at least 5 months prior	92 (90- 93)	12+	~3 weeks
								Severe disease		94 (91-96)		

\*Bar-On et al presented adjusted risk difference instead of VE

## 2.1 Booster studies that do not meet criteria

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### 3. Summary of Study Results for Primary Series COVID-19 Vaccine Effectiveness Against Transmission§

#	Reference (date)	Country	Design	Population	Dominant Variants (Alpha=B.1.1.7 Beta=B.1351 Gamma=P.1 Delta=B.1617.2)	History of COVID	Vaccine Product	Outcome Measure	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
17	<a href="#">Braeye et al*</a> (May 11, 2022)	Belgium	Retrospective cohort	123,409 index cases and 139,140 contacts among women aged 45-64	Alpha^	Excluded	BNT162b2	Documented infection of high risk exposure contacts	71 (68-74)	7-57	~28.5 weeks
							mRNA-1273		76 (72-79)	14-64	
							Ad26.COV2.S		44 (41-48)	21-71	
							AZD1222		53 (49-57)	14-64	
							BNT162b2		46 (44-48)	7-57	
							mRNA-1273		34 (32-35)	157-207	
							Ad26.COV2.S		51 (48-54)	14-64	
							AZD1222		48 (47-50)	164-214	
					Delta^	Previously infected persons only	BNT162b2		25 (23-27)	21-71	
							mRNA-1273		25 (22-27)	171-221	
							Ad26.COV2.S		32 (29-35)	14-64	
							AZD1222		31 (29-33)	164-214	
							BNT162b2		74 (69-80)	7-57	
							mRNA-1273		62 (60-67)	157-207	
							Ad26.COV2.S		72 (60-83)	14-64	
							AZD1222		61 (49-68)	164-214	
							BNT162b2		71 (61-79)	21-71	
							mRNA-1273		63 (54-76)	171-221	
							Ad26.COV2.S		74 (66-81)	14-64	
							AZD1222		60 (55-68)	164-214	
16	<a href="#">Ng et al</a> (March 24, 2022)*	Singapore	Retrospective cohort	8,470 contacts linked to Delta variant index cases	Delta^	Unknown	BNT162b2	Documented infection of household contacts	44 (29-56)	14+	~26 weeks
							BNT162b2	Symptomatic disease of household contacts	39 (21-53)		
							mRNA-1273	Documented infection of household contacts	49 (4-73)		
							mRNA-1273	Symptomatic disease of household contacts	35 (-40-70)		

#	Reference (date)	Country	Design	Population	Dominant Variants (Alpha=B.1.1.7 Beta=B.1351 Gamma=P.1 Delta=B.1617.2)	History of COVID	Vaccine Product	Outcome Measure	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
15	<a href="#">Jalali et al (February 18, 2022)</a>	Norway	Retrospective cohort	1122 primary cases and 2169 household contacts (aged 16+)	Omicron specifically^ Delta specifically^	Excluded	BNT162b2, mRNA-1273, heterologous AZD1222 + BNT162b2/ mRNA-1273	Transmission to household contacts	-4 (-49-21) 37 (11-54)	7+	~51 weeks
14	<a href="#">Hayek et al*(January 27,2022)</a>	Israel	Retrospective cohort	231,926 households with 582,050 children	Alpha^	Excluded	BNT162b2	Transmission to unvaccinated child from one vaccinated parent Transmission to unvaccinated child from two vaccinated parents	26(14-36.2) 71.7(68.6-74.6)	7+	~36 weeks
13	<a href="#">Lyngse et al* (June 30, 2022)</a>  [Update to January 6, 2022 preprint]	Denmark	Retrospective cohort	24,693 primary cases and their 53,584 household members	Delta^	Excluded	BNT162b2, mRNA-1273, AZD1222, Ad26.COV2.S	Transmission to fully vaccinated household member Transmission to unvaccinated household member	28 (20-35) 36 (32-40)	7+ (BNT162b2), 14+ (mRNA-1273 or after 1 dose of Ad26.COV2.S), 15+ (AZD1222)	~40 weeks
12	<a href="#">Clifford et al (November 24,2021)</a>	UK	Prospective cohort	195 index cases and their 278 contacts	Alpha specifically ^ Delta specifically^	Unknown	BNT162b2 AZD1222 BNT162b2 AZD1222	Transmission to contacts	57 (5- 85) 35 (-26-74) 31 (-3- 61) 42 (14- 69)	7+	~31 weeks
11	<a href="#">Ng et al* (November 1, 2021)</a>	Singapore	Retrospective cohort	301 index cases and 1204 household contacts	Delta index cases, specifically	Unknown	BNT162b2 & mRNA-1273	Documented infection of household contacts	27 (-40-62)	15+	~16.5 weeks
10	<a href="#">Singanavagam et al*(October 28,2021)</a>	England	Prospective cohort	233 contacts (arising from 163 index notifications) and 19 index cases	Delta^	Included	BNT162b2 and AZD1222	Documented infection	34 (-15-60)	7+	~10.5 weeks

#	Reference (date)	Country	Design	Population	Dominant Variants (Alpha=B.1.1.7 Beta=B.1351 Gamma=P.1 Delta=B.1617.2)	History of COVID	Vaccine Product	Outcome Measure	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
9	<a href="#">de Gier et al*</a> (October 14, 2021)	Netherlands	Retrospective cohort	4921 index cases and 7771 household contacts (aged 12+)	Delta^	Unknown	BNT162b2, AZD1222, mRNA-1273, & Ad26.COV2.S	Transmission to unvaccinated household contacts  Transmission to fully vaccinated household contacts	63 (46-75)  40 (20-54)	14+ (or 28+ after a single dose of Ad26.COV2.S)	~32 weeks
8	<a href="#">Eyre et al*</a> (January 5, 2022)  [Update to Sept 29, 2021 preprint]	England	Retrospective cohort	108,498 index cases and 146,243 contacts of all ages	Alpha^ specifically  Delta^ specifically	Included	BNT162b2 AZD1222  BNT162b2 AZD1222	Transmission to contacts	68 (52-79) 52 (22-70) 50 (35-61) 24 (18-30)	14+	~20.5 weeks ~8 weeks ~29 weeks ~16 weeks
7	<a href="#">Meyer et al</a> (September 23,2021)	Germany	Retrospective cohort	Households of 14 SARS-CoV-2 positive nursing home staff (5 vaccinated, 9 unvaccinated)	Alpha^	Unknown	BNT162b2	Documented infection of household members	67.2 (no CI available)	7+	~11 weeks
6	<a href="#">Braeye et al*</a> (August 19,2021)	Belgium	Retrospective cohort	131,283 index cases and 301,741 high risk contacts	Alpha^	Included	BNT162b2 mRNA-1273	Transmission	62 (57-67) 52 (33-69)	14+	~20 weeks
5	<a href="#">de Gier et al*</a> (August 5, 2021)	Netherlands	Retrospective cohort	113,582 index cases (aged 18+) and 253,168 household and other close contacts (all ages)	Alpha^	Unknown	AZD1222 BNT162b2 mRNA-1273 Ad26.COV2.S	Transmission to any household contacts (adjusted for contact vaccination status)	58 (-12-84) 70 (61-77) 88 (50-97) —	7+	~15 weeks
4	<a href="#">Layan, Gilboa et al*</a> (March 03, 2022) [Published version of	Israel	Prospective cohort	215 index cases and 687 household contacts from 210 Israeli households	Original and Alpha <sup>†</sup>	Included	BNT162b2	Transmission to HHC by vaccinated vs. unvaccinated cases	75(23-94)	7+	~12 weeks



#	Reference (date)	Country	Design	Population	Dominant Variants (Alpha=B.1.1.7 Beta=B.1351 Gamma=P.1 Delta=B.1617.2)	History of COVID	Vaccine Product	Outcome Measure	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	<a href="#">July 16,2021 preprint]</a>										
3	<a href="#">Prunas et al* (January 27, 2022)</a>  <a href="#">[Update to July 16, 2021 preprint]</a>	Israel	Retrospective cohort	2,472,502 Israeli individuals from 1,327,647 households	Original and Alpha <sup>¶</sup> (pre-Delta <sup>^</sup> )	Excluded	BNT162b2	Infectiousness given Infection	23 (-11.3-46.7)	10-90	~11 weeks
									6.9 (-124.8-61.4)	90+	~26.5 weeks
								Transmission	91.8 (88.1-94.3)	10-90	~11 weeks
									61.1 (5.2-84.1)	90+	~26.5 weeks
					Infectiousness given Infection			-27.9 (-248.9-53.1)	10-90	~11 weeks	
								-27.9 (-53.7 to -6.5)	90+	~26.5 weeks	
					Transmission			65.6 (4.9-87.6)	10-90	~11 weeks	
								24.2 (9-36.9)	90+	~26.5 weeks	
2	<a href="#">Harris et al* (June 23, 2021)</a> <a href="#">[Update to Apr 28 preprint]</a>	UK	Retrospective cohort, case-control	970,128 household contacts of index case (unvaccinated, vaccinated with AZD1222 or BNT162b)	Alpha <sup>£</sup>	Unknown	AZD1222	Documented infection	—		
							BNT162b2				
1	<a href="#">Salo et al* (March 4, 2022)</a>  <a href="#">[Update to July 10, 2021 preprint]</a>	Finland	Retrospective cohort	265,326 HCW and their 298,100 unvaccinated spouses and children (3-18 years)	Alpha <sup>††</sup>	Excluded	BNT162b2 & mRNA-1273	Documented infection in HCW’s unvaccinated spouses	—	—	
								Documented infection in HCW’s unvaccinated spouses	—	—	
								Documented infection in	—	—	

#	Reference (date)	Country	Design	Population	Dominant Variants (Alpha=B.1.1.7 Beta=B.1351 Gamma=P.1 Delta=B.1617.2)	History of COVID	Vaccine Product	Outcome Measure	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								unvaccinated children of HCWs			
								Documented infection in unvaccinated children of HCWs	—	—	

<sup>§</sup>Study results captured during literature search of vaccine effectiveness studies. Note this is not an exhaustive list of transmission studies.

Purple text indicates new or updated study.

Product Manufacturers: BNT162b2 (Pfizer), mRNA-1273 (Moderna), AZD1222 (Astra-Zeneca), Ad26.COV2.S (Janssen), Coronavac

<sup>‡</sup>Unless noted otherwise, days post 1<sup>st</sup> dose are prior to receiving dose 2.

<sup>‡</sup>Unclear if 1<sup>st</sup> dose VE estimates includes any individuals who received a second dose.

\*Manuscripts with an asterisk (\*) are peer-reviewed publications.

<sup>^</sup>Indicates predominant variant identified by study authors. If no <sup>^</sup> then variants identified through secondary source when possible. Please see additional footnotes.

<sup>¶</sup>[The rise of SARS-CoV-2 variant Alpha in Israel intensifies the role of surveillance and vaccination in elderly | medRxiv](#)

<sup>£</sup>[Coronavirus \(COVID-19\) Infection Survey, UK - Office for National Statistics](#)

<sup>††</sup>Based on <https://outbreak.info/location-reports>

#### 4. Summary of Study Results for Booster Dose COVID-19 Vaccine Effectiveness Against Transmission

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
4	<a href="#">Jalali et al</a> (February 18, 2022)	Norway	Retrospective cohort	1122 primary cases and 2169 household contacts (aged 16+)	<b>Omicron specifically^</b> Delta specifically^	Excluded	BNT162b2, mRNA-1273, heterologous AZD1222 + BNT162b2/mRNA-1273 primary + BNT162b2 or mRNA-1273 booster	Transmission to household contacts	Unvaccinated primary cases	1 (-49-32) 82 (30-99)	7+	~13.5 weeks
3	<a href="#">Allen et al</a> (February 17, 2022)	UK	Retrospective cohort	23,667 cases and 40,123 contacts 59,031 cases and 111,469 contacts	<b>Omicron specifically^</b> Delta specifically^	Excluded	BNT162b2, mRNA-1273, AZD1222, Ad26.COV2.S primary + BNT162b2 or mRNA-1273 booster	Transmission in contacts in household setting Transmission in contacts in non-household setting Transmission in contacts in household setting Transmission in contacts in non-household setting	Complete vaccination with two doses of primary series	12(3-21) 24(6-39) 32(26-38) 49(34-61)	14+	~16 weeks
2	<a href="#">Hayek et al*</a> (January 27, 2022)	Israel	Retrospective cohort	231,926 households with 582,050 children	Delta^	Excluded	BNT162b2	Transmission to unvaccinated child from one boosted parent Transmission to unvaccinated child from two boosted parents	Fully vaccinated primary cases	20.8(11.4-29.1) 58.1(53.1-62.6)	7+	~9.5 weeks
1	<a href="#">Lyngse et al</a> (December 27, 2021)	Denmark	Retrospective cohort	11,937 primary cases and their household members	<b>Omicron and Delta^</b>	Included	BNT162b2, mRNA-1273, AZD1222, Ad26.COV2.S	Transmission to household members	Fully vaccinated primary cases	46 (29-60)	7+	~7 weeks

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## 5. Review Papers and Meta-analyses

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1. [Real-world effectiveness of BNT162b2 mRNA vaccine: a meta-analysis of large observational studies](#)
2. [Efficacy estimates for various COVID-19 vaccines: What we know from the literature and reports](#)
3. [Efficacy and effectiveness of COVID-19 vaccines against SARS-CoV-2 infection: interim results of a living systematic review, 1 January to 14 May 2021](#)
4. [Progress of the COVID-19 vaccine effort: viruses, vaccines and variants versus efficacy, effectiveness and escape](#)
5. [Accelerated COVID-19 vaccine development: milestones, lessons, and prospects](#)
6. [SARS-CoV-2 \(Covid-19\) vaccines structure, mechanisms and effectiveness: A review](#)
7. [A systematic review of Coronavirus Disease 2019 vaccine efficacy and effectiveness against Severe Acute Respiratory Syndrome Coronavirus 2 infection and disease](#)
8. [SARS-CoV-2 new variants: Characteristic features and impact on the efficacy of different vaccines](#)
9. [Effectiveness of COVID-19 vaccines against SARS-CoV-2 variants of concern: a systematic review and meta-analysis](#)
10. [Efficacy and effectiveness of SARS-CoV-2 vaccine: A systematic review and a meta-analysis](#)
11. [COVID-19 Living Evidence Synthesis #6: What is the efficacy and effectiveness of available COVID-19 vaccines for variants of concern?](#)
12. [Efficacy of COVID-19 vaccines in immunocompromised patients: A systematic review and meta-analysis](#)
13. [Comparative immunogenicity and effectiveness of mRNA-1273, BNT162b2 and AD26.COV2.S COVID-19 vaccines](#)
14. [Postvaccination SARS-CoV-2 infection among healthcare workers: A systematic review and meta-analysis](#)
15. [Effectiveness of COVID-19 vaccines against SARS-CoV-2 infection with the Delta \(B.1.617.2\) variant: second interim results of a living systematic review and meta-analysis, 1 January to 25 August 2021](#)
16. [Effectiveness of COVID-19 vaccines and their challenges \(Review\)](#)
17. [Effectiveness of COVID-19 vaccines and post-vaccination SARS-CoV-2 infection, hospitalization, and mortality: A systematic review and meta-analysis of observational studies](#)
18. [SARS-CoV-2 variants and effectiveness of vaccines: A review of current evidence](#)
19. [Effectiveness and safety of SARS-CoV-2 vaccine in real-world studies: a systematic review and meta-analysis](#)
20. [SARS-CoV-2 variants of concern](#)
21. [Duration of Effectiveness of Vaccines Against SARS-CoV-2 Infection and COVID-19 Disease: Results of a Systematic Review and Meta-Regression](#)
22. [Real-world effectiveness of COVID-19 vaccines: a literature review and meta-analysis](#)
23. [Vaccine versus Variants \(3Vs\): Are the COVID-19 vaccines effective against the variants? A systematic review](#)
24. [Effectiveness of COVID-19 vaccines against delta variant \(B.1.617.2\): A meta-analysis](#)
25. [Diverse vaccine platforms safeguarding against SARS-CoV-2 and its variants](#)

26. [Vaccines provide disproportional protection to the increased hospitalisation risk posed by the Delta variant of SARS-CoV2: a meta-analysis](#)
27. [COVID-19 phase 4 vaccine candidates, effectiveness on SARS-CoV-2 variants, neutralizing antibody, rare side effects, traditional and nano-based vaccine platforms: a review](#)
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