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
273	Magro et al (June 22, 2022)	USA	Matched case control	4,238 skilled nursing facility healthcare personnel aged 18-54 in California	Non-VOC, Alpha††	Included	BNT162b2 or mRNA-1273	Documented infection	71.7 (55.9-81.8)	14+	~10 weeks
						Excluded			72.7 (54.3-83.7)		
272	Adams et al (June 14,2022)	USA	Prospective test-negative case control	4,299 hospitalised patients	**Omicron specifically^**	Included	BNT162b2	Hospitalization	46 (30-58)	14+	~64 weeks
							mRNA-1273		47 (30-60)		
							BNT162b2 or mRNA-1273		40 (-668-95)		
							Ad26.COV2.S		41 (9-62)		
271	Gray et al * (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	**Omicron^**	Excluded	BNT162b2	Hospitalization	88 (62-96)	14-27	~30 weeks
									67 (63-71)	148-207	
								ICU admission	69 (56-79)	14-27	
									71 (65-76)	148-207	
270	Al Kaabi et al* (June 9, 2022)	UAE	Retrospective cohort	1,153,515 vaccinated individuals matched with 1,153,515 unvaccinated individuals (18+ years)	Non-VOC^	Excluded	BBIBP-CorV	Hospitalization	97.3 (95.7-98.3)	14+	~39 weeks
								Critical care admission	98.8 (95.3-99.7)		
								Death	100 (100-100)		
					Alpha^			Hospitalization	73.3 (70.6-75.7)		
								Critical care admission	79.1 (73.1-83.7)		
								Death	81.9 (66.9-90.1)		
					Delta^			Hospitalization	34.6 (14.2-50.2)		
								Critical care admission	49.6 (0-76.4)		
								Death	62.5 (31.4-79.5)		
269	European Centre for Disease Prevention and Control (March 14, 2021)	11 EU countries	Test-negative case control	4,828 hospitalized adults aged 30+	Non-VOC, Alpha†† (pre-Delta^)	Included	BNT162b2	Hospitalization	94 (88-97)	14+	~45 weeks
					Delta^		BNT162b2		82 (76-87)		
							AZD1222		79 (69-86)		
268	European Centre for Disease Prevention and Control	10 EU countries	Test-negative case control	1456 hospitalized adults aged 65+	Non-VOC, Alpha†† (pre-Delta^)	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
	(October 8, 2021)										
267	Lewis et al* (June 8, 2022)	USA	Test-negative case control	6208 adults (18+ years) hospitalized in 21 facilities across the US	Alpha, Delta^	Included	Ad26.COV2.S	Hospitalization: All	70 (63-75)	14+	~39.5 weeks
									73 (60-82)	14-90	
									70 (54-81)	>180	
								Hospitalization: Immunocompromised	55 (31-72)	14+	
					Alpha^			Hospitalization: All	68 (43-83)		
					Delta^				72 (64-78)		
266	Lin et al* (June 8, 2022)	USA	RCT crossover	14,164 placebo and 14,287 vaccinated participants 18+ years	Original & Alpha††	Excluded	mRNA-1273	Symptomatic disease	92.6 (80.5-97.2)	12 days	~0 weeks
									89.6 (41.7-98.2)	172 days	~22.5 weeks
265	Richterman et al* (June 6, 2022)	USA	Test-negative case control	14,520 tests among healthcare workers	**Omicron^**	Excluded	BNT162b2	Symptomatic disease	41 (-17-87)	14+	~63 weeks
							mRNA-1273		5 (-69-47)		
					Delta^		BNT162b2		75 (52-87)		
							mRNA-1273		73 (56-84)		
264	Spicer et al* (May 26, 2022)	USA	Test-negative case control	89,736 adolescents (ged 12-17 y) in Kentucky	Delta^	Excluded	BNT162b2 or mRNA-1273	Documented infection	81 (79.7-82.3)	14+	~36.5 weeks
						Previously infected only			78.3 (66.7-86.5)		
263	Grewal et al (June 1, 2022) *[Update to April 18,2022 preprint]*	Canada	Test-negative case control	13,654 cases and 205,862 controls amongst LTCF residents aged 60+ in Ontario	**Omicron specifically^**	Included	BNT162b2 or mRNA-1273	Documented infection	6 (-5-15)	0+	~66 weeks
								Symptomatic disease	23 (1-40)		
								Hospitalization or death	52 (33-65)		
262	Carlsen et al* (June 1, 2022)	Norway	Retrospective cohort study	21, 643 newborns	**Omicron^**	Excluded	BNT162b2 or mRNA-1273 *(~4% of mothers received*	Documented infection during an infant's first 4 months of life (born to unvaccinated mothers and mothers vaccinated in 2nd or 3rd trimester)	30 (17-41)	14+	~45 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^		*AZD1222 as first dose)*	Documented infection during an infant's first 4 months of life (born to unvaccinated mothers and mothers vaccinated in 2nd or 3rd trimester)	71 (56-81)		
261	Chin et al (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^	Excluded	BNT612b2 or mRNA-1273	Documented infection	14.9 (12.3-19.7)	14+	~ 65 weeks
						Included before July 01/2021			47.8 (46.6-52.8)		
						Included since July 01/2021			73.1 (69.8-80.1)		
260	Amir et al (May 25, 2022)	Israel	Retrospective cohort	691,921 children 5-10 years	Omicron^	Excluded	BNT162b2	Documented infection	58.3 (54.6-61.5)	14-35	~2 weeks
259	Tsundue et al* (May 24, 2022)	India	Prospective cohort	1114 residents of congregate living facilities in Dharamshala (all ages)	Delta^	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	Paranthaman et al* (May 20, 2022)	UK	Retrospective cohort	197,885 LTCF residents aged 65+ in England	Alpha, Delta^	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	Fano et al* (May 18,2022)	Italy	Retrospective cohort	946,156 individuals aged 12+	Alpha, Delta^	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	

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
									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	Tenforde et al* (May 17, 2022)	USA	Case-control	10,078 adults (aged 18+) hospitalized at 21 hospitals across 18 states	Alpha, Delta††	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
							BNT612b2 or mRNA-1273	Hospitalization: Immunocompetent persons	90 (88-91)	14-179	~23.5 weeks
									82 (79-85)	180+	~47 weeks
								Hospitalization: Immunocompromised persons	63 (55-69)	14+	~47 weeks
									65 (57-72)	14-179	~23.5 weeks
									53 (38-65)	180+	~47 weeks
					Delta^			Hospitalization (Overall)	90 (88-91)	14-179	~23.5 weeks
									83 (80-86)	180+	~47 weeks
255	Lan et al* (May 12, 2022)	USA	Retrospective cohort	4615 HCW in Massachusetts	Non-VOC, Alpha, Delta††	Excluded	BNT162b2 or mRNA-1273 *Note: A small proportion (~2.5%) received Ad26.COV2.S*	Documented infection	82.3 (75.1-87.4)	14+	~36 weeks
					Delta^				76.5 (40.9-90.6)		
254	Braeye et al* (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)	7-57	~28.5 weeks
							mRNA-1273		82 (79-84)	14-64	
							Ad26.COV2.S		38 (34-44)	21-71	
							AZD1222		56 (51-59)	14-64	
					Delta^		BNT162b2		64 (63-66)	7-57	
									44 (43-44)	157-207	
							mRNA-1273		75 (71-77)	14-64	
									56 (55-58)	164-214	
							Ad26.COV2.S		33 (28-38)	21-71	
									22 (19-25)	171-221	
							AZD1222		49 (45-52)	14-64	
									35 (33-37)	164-214	
						Previously infected	BNT162b2	Documented infection	87 (84-88)	7-57	
									82 (81-83)	157-207	
							mRNA-1273		87 (83-92)	14-64	

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
						persons only			85 (80-89)	164-214	
							Ad26.COV2.S		88 (85-91)	21-71	
									87 (84-89)	171-221	
							AZD1222		88 (84-94)	14-64	
									83 (81-85)	164-214	
253	Martellucci et al* (April 22, 2022)	Italy	Retrospective cohort	1,279,694 residents of the Abruzzo region (all ages)	Alpha, Delta, Omicron††	Excluded	BNT162b2	Documented infection	24 (23-25)	14+	~53 weeks
								Hospitalization	86 (84-88)		
								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.COV2.S	Documented infection	12 (7-17)		
								Hospitalization	87 (73-94)		
252	Zahradka et al* (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	Simwanza et al (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.COV2.S	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	Rennert et al (May 7, 2022)	USA	Propensity matched case control	1,944 students aged 18-64	Omicron^	Included	BNT162b2	Documented infection	2.1 (-21.2-21)	14+	~23 weeks
							mRNA-1273		17.3 (-10.8-38.3)		
				658 employees aged 18-65			BNT162b2		30.1 (-24.5-60.8)		
							mRNA-1273		14.4 (-64.2-55.4)		
249	Ma et al* (May 3, 2022)	China	Retrospective cohort/Outbreak investigation	1058 close contacts 18+ years	Delta^	Included	BBIBP-CorV	Symptomatic disease	75.5 (63-93.6)	14+	~8 weeks
								Pneumonia	56.5 (-95.9-90.4)		
							CoronaVac	Symptomatic disease	73 (22.3-96)		
								Pneumonia	84.6 (18.8-97.1)		
							Ad5-nCoV	Symptomatic disease	61.5 (9.5-83.6)		
								Pneumonia	67.9 (1.7-89.9)		
								Severe disease	100 (CI omitted)		
248	Carazo et al	Canada			Omicron^	Excluded		Documented infection	42 (41-44)	7+	~51 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 3, 2022)		Test-negative case control	224,007 cases and 472,432 controls among individuals (12+ y) in Quebec			BNT162b2 or mRNA-1273	Hospitalization	76 (74-78)		
						Previously infected only		Documented infection	23.2 (21.2-27.4)		
								Hospitalization	68.4 (63.6-73.5)		
247	Kirsebom et al (May 1, 2022)	UK	Test-negative case control	759,450 adults aged 40-64 y	**Omicron specifically^**	Included	AZD1222	Symptomatic disease	8.0 (6.0-9.9)	175+	~44.5 weeks
				166,720 adults aged 65+ y				Symptomatic disease	19.5 (11.7-26.6		
								Hospitalization	61 (49.8-69.7)		
					Delta specifically^			Hospitalization	73.4 (70.4-76.2)		
246	Florentino et al (April 29, 2022)	Brazil	Test-negative case control	88,073 cases and 106,185 controls aged 6-11 years	**Omicron^**	Included	CoronaVac	Symptomatic disease	41.5 (34.4-47.7)	14+	~12 weeks
								Hospitalization or death	63.5 (5.8-90)		
245	Zhang et al (April 27,2022)	Morocco	Case control	348,190 individuals 18+ years	Alpha††	Unknown	BBIBP-CorV	Critical hospitalization	88.5 (85.8-90.7)	14+	~21 weeks
244	Sharma et al* (April 27,2022)	USA	Matched case control	221,267 veterans	**Omicron^**	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	Castillo et al* (April 21, 2022)	France	Test-negative case control	761,744 cases 18+ years	**Omicron specifically^**	Included	BNT162b2 or mRNA-1273 *Note: A small proportion (~3%) received two doses of AZD1222*	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^			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		USA	Case control			Excluded	BNT162b2	Documented infection	87.6 (86.2-88.9)	14+	~19 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
	Eick-Cost et al* (April 20, 2022)			441,379 US military personnel	Pre-Delta^ (Non-VOC, Alpha††)			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)		
								Asymptomatic infection	81.4 (62.6-90.8)		
								Symptomatic infection	82.4 (73.9-88.2)		
					Delta^		BNT162b2	Documented infection	69.3 (68.2-70.3)	14+	~35 weeks
								Asymptomatic infection	66.0 (64.0-67.8)		
								Symptomatic infection	71.0 (69.7-72.1)		
								Hospitalization	88.4 (82.1-92.5)		
							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	Gonzales et al (April 19, 2022)	Argentina	Retrospective cohort	1,536,435 children aged 3-17 years in Buenos Aires Province	Delta, Omicron^	Included	BNT162b2 or mRNA-1273 (ages 12-17)	Hospitalization	81 (59.9-90.1)	14+	~17 weeks
							BBIBP-CorV (ages 3-11)		83.4 (70.9-90.2)		~9 weeks
					Omicron^		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	Cerqueira-Silva et al (April 14, 2022)	Brazil	Test-negative case control	4,219,703 adults (aged 18+)	Omicron^	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

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
								Severe disease	74.5 (71.4-77.2)	2-9 weeks	7 weeks
									71.5 (68.5-74.2)	20+ weeks	~26 weeks
							AZD1222	Sympomatic 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
									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	Widdifield et al* (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)		

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
				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	Sanchez Ruiz et al* (April 2022)	France	Retrospective cohort	72 LTCF residents in southern France	Delta specifically^	Excluded	BNT162b2	Documented infection	11.2 (0-61.1)	14+	
								Symptomatic disease	88.4 (59.9-96.7)		
								Severe disease	93.5 (67.2-98.7)		
237	Lind et al (April 25,2022) *[Update to April 20, 2022 preprint]*	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	
						Included			36.1 (7.1-56.1)	14-140	
									34 (18.5-46.5)	≥150	
			1:1 Matched case control			Excluded			30.7 (20.6-39.6)	14-140	
									20 (14-25.6)	≥150	
						Included			14.3 (-43.1-48.7)	14-140	
									18.8 (-9- 39.5)	≥150	
236	Gram et al (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	
					Delta^			Documented infection	82.2 (75.3-87.1)	14-30	
									49.8 (46.5-52.8)	>120	
								Hospitalization	97.7 (95.2-98.9)	31-60	
									86.2 (84.2-87.9)	>120	
					Alpha^			Documented infection	91 (88.5-92.9)	14-30	
									71.5 (54.7-82.1)	>120	
								Hospitalization	96.4 (92.6-98.3	14-30	
									90.5 (67-97.2)	>120	
235	Vokó et al (April 18,2022	Hungary	Retrospective cohort	*6,193,552 individuals aged 18-64 years*	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	

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
				Note: VE for persons aged 65-100 years are also aavailable from publication; estimates are relatively similar across age groups.					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	
							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	Richardson et al* (June 19, 2022) *[Update to April 17, 2022 preprint]*	Mexico	Prospective cohort	43,925 childcare workers	Non-VOC, Alpha, Gamma and Delta††	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††			Documented infection	53 (23-71)	14+	
					Delta^			Documented infection	18 (8-28)		

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	74 (38-89)		
								Death	94 (67-99)		
233	Nasreen et al (April 13, 2022)	Canada	Test-negative case control	31,776 hospitalizations and 5,842 deaths 18+ years	Non-VOC, Alpha, Beta, Gamma, Delta^	Excluded	BNT162b2 or mRNA-1273	Hospitalization or death	98 (95-99)	7-55	~32 weeks
									98 (95-99)	≥112	
							AZD1222		96 (88-96)	7-55	~7 weeks
									97 (91-99)	≥56	
							AZD1222+any mRNA		99 (98-100)	14+	
232	Cerqueira-Silva (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	Dale et al* (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)		

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
230	Plumb et al (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	Institute of pubic health (April 12,2022)	Chile	Test-negative case control	2,181 cases and 979 controls	Lambda, Gamma and Delta^	Included	BNT162b2	Hospitalization with SARI	85.3 (73.5-91.8)	14+	~53 weeks
							Sinovac		59.5 (49-67.9)		
228	Kildegaard et al* (April 11, 2022)	Denmark	Retrospective cohort	404,975 adolescents aged 12-17 years	Delta^	Excluded	BNT162b2	Documented infection	93 (93-94)	0-59	~13 weeks
227	Kim et al (April 10, 2022)	USA	Test-negative case control	2,208 cases and 1639 controls 18+ years	Omicron specifically^	Included	BNT162b2 or mRNA-1273	Symptomatic disease	45 (14-66)	14-149	~58 weeks
									11 (-21-35)	150+	
					Delta specifically^				89 (78-94)	14-149	~48 weeks
									58 (44-68)	150+	
226#	Buchan et al (April 7,2022)	Canada	Test-negative case control	9,202 cases and 19,953 controls 12-17 years old	Omicron specifically^	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^			Symptomatic disease	97 (94-99)	7-59	
									90 (79-95)	180+	
225	Paraguay Ministry of Health and Social Welfare (March 22, 2022)	Paraguay	Test-negative case-control	2953 patients ≥ 16 years with severe acute respiratory infection	Gamma and Delta^	Excluded	BBV152	Hospitalization with SARI	27.7 (-10.2-52.6)	14+	~38 weeks
							AZD1222		85.8 (70.6-93.1)		
							Hayat vax		56.4 (15.5-77.6)		
							Sputnik v		77.0 (30.8-92.3)		
							BNT162b2		95.4 (65.7-99.4)		
224	Kwon et al* (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^	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)		

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
								Supplemental oxygen/ oxygen support in immunocompetent	90 (89-92)		
223	Yoon et al* (April 6,2022)	USA	Prospective cohort	3241 HCWs	Omicron specifically^	Excluded	BNT162b2 or mRNA-1273	Documented infection	46 (25-61)	14+	~21 weeks
					Delta specifically^				65 (49-76)		
222	Florentino et al (April 5, 2022)	Brazil	Test-negative case control	447,882 tests among adolescents aged 12-17	Omicron^	Included	BNT162b2	Symptomatic disease	62.8 (60.9-64.7)	14-27	2 weeks
									13.9 (10.9-16.9)	98+	~21 weeks
								Severe disease	75.4 (57.3-85.9)	14-27	2 weeks
									84.9 (75.2-90.8)	98+	~21 weeks
					Delta^			Symptomatic disease	85.8 (83.9-87.5)	14-27	2 weeks
									40.3 (31.9-47.7)	56-69	~8 weeks
		Scotland		375,385 tests among adolescents aged 12-17	Omicron^			Symptomatic disease	78.3 (75.3-80.9)	14-27	2 weeks
									31.3 (4.8-50.5)	98+	~15.5 weeks
					Delta^			Symptomatic disease	89.3 (78-94.8)	14-27	2 weeks
									78.4 (53.8-89.9)	56-69	~8 weeks
221	Ranzani et al (April 1, 2022)	Brazil	Test-negative case control	1,339,986 matched pairs of adults	Omicron^	Included	CoronaVac	Symptomatic disease	26.9 (25.1-28.6)	14-59	~6 weeks
									8.1 (7-9.1)	180+	~55 weeks
								Hospitalization or death	49.9 (30.7-63.7)	14-59	~6 weeks
									57 (53.5-60.2)	180+	~55 weeks
					Delta^			Symptomatic disease	51 (49.6-52.4)	14-59	~6 weeks
									33.5 (31.7-35.3)	180+	~55 weeks
								Hospitalization or death	86.7 (83.8-89.2)	14-59	~6 weeks
									57.3 (53.4-60.9)	180+	~55 weeks
220	Nordstrom et al* (March 31, 2022)	Sweden	Retrospective cohort	6,530,128 individuals	Non-VOC, Alpha, Delta^	Previously infected only	BNT162b2 or mRNA-1273	Documented infection	68 (63-72)	14+	~38 weeks
							AZD1222		25 (-37-59)		
219	Pardo-Seco et al* (March 29, 2022)	Spain	Test-negative case control	2,280,288 adults (18+ y) in Galicia	Non-VOC, Alpha††	Excluded	BNT162b2	Documented infection	90.8 (88.6-92.7)	14+	~7.5 weeks
218	Starrfelt et al (March 30, 2022)	Norway	Retrospective cohort	4,301,995 adults (18+ y)	Delta^	Excluded	BNT162b2	Documented infection	77.7 (76.8-78.5)	2-9 weeks	~7 weeks
									8.2 (3.4-12.8)	>33 weeks	~43 weeks
								Hospitalization	97.5 (95.6-98.6)	2-9 weeks	~7 weeks
									63.9 (54.3-71.5)	>33 weeks	~43 weeks
							mRNA-1273	Documented infection	86.6 (85.6-87.6)	2-9 weeks	~7 weeks
									28.6 (9.6-43.6)	>33 weeks	~43 weeks
								Hospitalization	95.3 (91.5-97.4)	18-25 weeks	~23 weeks
									91.1 (84.9-94.8)	26-33 weeks	~31 weeks
								Documented infection	84.1 (83.2-85)	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
							Heterologous mRNA		40.7 (23.9-53.8)	18-25 weeks	~23 weeks
217	Marra et al* (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	Price et al* (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
								Hospitalization (5-11 years)	68 (42-82)	14+	~11 weeks
					Delta^			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	Hansen et al (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	Natarajan et al (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	Wang et al (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

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
212	Veneti et al (March 25,2022)	Norway	Retrospective cohort	117,681 children aged 16-17 years	Omicron^	Excluded	BNT162b2	Documented infections	53.1 (42·6-61.7)	7-34	~12 weeks
									23.3 (2·7–39.5)	≥63	
					Delta^				89.9 (82.8-94.1)	7-34	
									80.3 (60.0-90.3)	≥63	
211	Tenforde et al (March 25,2022)	USA	Case-control	7,544 hospitalised patients	Omicron^	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	Stowe et al (April 1, 2022)	UK	Test-negative case control	115,720 cases and 294,265 controls	Omicron^	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	Horne et al (March 23, 2022)	UK	Retrospective cohort	2,030,997 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	
									80 (68-88)	133-154	
				2,150,257 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	
				1,336,156 aged 16-64 years and clinically vulnerable			BNT162b2	Documented infection	34 (30-39)	21-42	
									4 (-1-8)	161-182	
								Hospitalization	96 (94-97)	49-70	
									87 (85-90)	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	
							BNT162b2	Documented infection	81 (74-86)	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
				1,648,968 aged 65+ years					15 (8-22)	161-182	
								Hospitalization	91 (86-95)	21-42	
									80 (76-82)	161-182	
								Death	95 (87-98)	21-42	
									88 (84-91)	161-182	
							AZD1222	Documented infection	53 (41-62)	21-42	
									-21 (-30- -13)	161-182	
								Hospitalization	87 (80-92)	21-42	
									74 (70-77)	161-182	
								Death	90 (84-94)	21-42	
									83 (77-88)	161-182	
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	Symptomatic infection	51.7 (43.5-58.7)	14+	44 weeks
								Hospitalization and death	96.2 (37.7-99.8)		
							mRNA-1273	Symptomatic infection	44.3 (30.4-55.4)		
								Hospitalization and death	100 (-51.5-100)		
						Excluded	BNT162b2	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)		
					Omicron BA.2 specifically^	Previously infected only	BNT162b2	Symptomatic infection	55.1 (50.9-58.9)		
								Hospitalization and death	97.8 (82.6-99.7)		
							mRNA-1273	Symptomatic infection	47.9 (40.8-54.1)		
								Hospitalization and death	100 (55.4-100)		
						Excluded	BNT162b2	Symptomatic infection	-1.1 (-7.1-4.6)		
								Hospitalization and death	76.8 (58-87.1)		
							mRNA-1273	Symptomatic infection	-7.3 (-15.6-0.3)		
								Hospitalization and death	84.8 (47.9-95.6)		
					Omicron specifically	Previously infected only	BNT162b2	Symptomatic infection	55.5 (51.8-59)		
								Hospitalization and death	94.3 (81.3-98.3)		
							mRNA-1273	Symptomatic infection	52 (45.8-57.4)		
								Hospitalization and death	100 (CI omiited)		

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
						Excluded	BNT162b2	Symptomatic infection	-0.2 (-5.5-4.9)		
								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	Can et al *(March 19, 2022)	Turkey	Retrospective cohort	4067 HCWs	Alpha^	Excluded	CoronaVac	Documented infection	39 (20-64)	14+	13 weeks
205	Rearte et al* (March 15, 2022)	Argentina	Test-negative case control	95,519 cases and 141,811 controls	Alpha, Gamma and Delta††	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	Jara et al* (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	Baum et al (March 13, 2022)	Finland	Retrospecitve cohort	897,932 older adults (aged 70+)	Non-VOC, Alpha, Delta, Omicron^	Excluded	BNT162b2	Hospitalization	93 (90-95)	14-90	~56 weeks
									72 (66-77)	181+	
								ICU admission	97 (91-99)	14-90	
									84 (70-91)	181+	
							mRNA-1273	Hospitalization	97 (88-99)	14-90	
									81 (67-89)	181+	
								ICU admission	100 (CI omitted)	14-90	
									98 (83-100)	181+	
							AZD1222	Hospitalization	83 (53-94)	14-90	
									39 (-1-63)	181+	
								ICU admission	77 (1-95)	14-90	
									50 (-64-85)	181+	
					Delta^		BNT162b2	Hospitalization	90 (78-96)	14-90	~48.5 weeks
									78 (71-84)	181+	
							mRNA-1273		92 (42-99)	14-90	
									87 (70-94)	181+	
							AZD1222		20 (-84-65)	181+	
					Omicron^		BNT162b2	Hospitalization	91 (79-96)	14-90	~56 weeks
									61 (48-71)	181+	
							mRNA-1273		92 (43-99)	14-90	
									72 (43-86)	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		43 (-10-70)	181+	
202	Shrotri et al (March 12, 2022)	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)	14-83	45 weeks
									26.3 (-21.7-55.4)	84+	
								Hospitalization	88.8 (16.8-98.5)	14-83	
									65.1 (33.6-81.6)	84+	
								Deaths	100	14-83	
									66.1 (26-84.4)	84+	
							AZD1222	Documented infection	62.1 (12.1-83.6)	14-83	
									13.6 (-33.2-43.9)	84+	
								Hospitalization	82.7 (46.4-94.4)	14-83	
									48.7 (12.5-70)	84+	
								Deaths	91.7 (65.1-98)	14-83	
									61.1 (26.2-79.5)	84+	
				19,515 staff			BNT162b2 & mRNA-1273	Documented infection	60.7 (44.2-72.4)	14-83	
									45.1 (31.3-56.2)	84+	
								Hospitalization	100	14-83	
									92.1 (69.3-97.9)	84+	
							AZD1222	Documented infection	29 (-10.3-54.3)	14-83	
									36.9 (20.6-49.9)	84+	
								Hospitalization	100 (CIs omitted)	14-83	
									89.6 (64.4-96.9)	84+	
201#	Fowlkes et al (March 11,2022)	USA	Prospective cohort	1052 children aged 5-11 years, 312 children aged 12-15 years	**Omicron specifically ^**	Excluded	BNT162b2	Documented infection 5-11 years	31 (9-48)	14-82	~29 weeks
								Documented infection, 12-15 years	59 (24-78)	14+	
									59(22-79)	14-149	
									62 (-28-89)	≥150	
					Delta specifically ^			Documented infection, 12-15 years	81 (51-93)	14+	
									87(49-97)	14-149	
									60 (-35-88)	≥150	
200	Ashmawy et al (March 11,2022)	Egypt	Ambispective cohort	1,228 HCWs	Delta^	Included	BBIBP-CorV	Symptomatic infection	67 (43-80)	14+	~29 weeks
								Infection	46 (24-62)		
								Hospitalization	65 (-8-88)		
199	Oliveira et al* (March 3,2022)	USA	Matched-case control	186 case participants and 356 matched control	Delta^	Excluded	BNT162b2	Documented infection	91 (33-99)	1-4 wk	~11 weeks
									83 (34-95)	13-17 wk	
								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	Oliver et al* (March 9,2022)	Canada	Retrospective cohort	13,579 individuals in hemodialysis	Alpha^	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	Perry et al* (March 3, 2022)	UK	Retrospective cohort	1,262,689 adults aged 50 or older in Wales	Alpha, Delta^	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	Wright et al* (February 25, 2022)	USA	Case control	9667 cases and 38,668 controls (18 years or older)	Alpha,†† Delta^	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	Klein et al (March 1,2022)	USA	Test-negative case control	39,217 ED and UC encounters and 1,699 hospitalizations a mong persons aged 5–17 years	**Omicron^**	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	
									-2 (-25-17)	150+	
								ED or UC encounters in 16-17 years	34 (8-53)	14-149	
									-3 (-30-18)	150+	
					Delta^	Unknown	BNT162b2	ED or UC encounters in 12-15 years	92 (89-94)	14-149	~33 weeks
									79 (68-86)	150+	
								ED or UC encounters in 16-17 years	85 (81-89)	14-149	
									77 (67-84)	150+	
					Omicron or Delta^			Hospitalizations in 5-11 years	74 (-35-95)	14-67	
								Hospitalizations 12-15 years	92 (79-97)	14-149	
									73 (43-88)	150+	
								Hospitalizations 16-17 years	94 (87-97)	14-149	
									88 (72-95)	150+	
194	Šmíd et al (Febraury 25, 2022)	Czech Republic	Retrospective cohort	8,173,828 individuals, all ages	**Omicron^**	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	Cura-Bilbao et al* (February 2,2022)	Spain	Prospective cohort	925,915 residents of Aragon, Spain	Non-VOC, Alpha††	Excluded	BNT162b2	Documented infection	70 (65.3-74.1)	7+	~16 weeks
							mRNA-1273		70.3 (52.2-81.5)	14+	
192	Shen et al* (February 23,2022)	USA	Retrospective cohort	5,536 immuno-suppressed individuals	Non-VOC, Alpha,†† Delta^	Excluded	BNT162b2	Documented infection	41 (9-62)	14+	~36 weeks
							mRNA-1273		48 (18-67)		
							Ad26.COV2.S		66 (-30-91)		
191	Mallow et al* (February 9, 2022)	USA	Test-negative case control	13,203 emergency department patients (aged 18+)	Non-VOC, Alpha,†† Delta^	Unknown	BNT162b2	Emergency department visit	73.9 (66.3-79.8)	14+	~31 weeks
							mRNA-1273		78 (68.1-84.9)		
190	Wu et al (January 10,2022)	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	Filon et al* (February 15, 2022)	Italy	Retrospective cohort	4251 HCWs	Non-VOC and Alpha††	Excluded	BNT162b2	Documented infection (March)	95 (92-98)	7+	~16 weeks
								Documented infection (April)	95 (92-98)		
								Documented infection (May)	80 (70-84)		
187	Halasa et al* (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, **Omicron^**	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
								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)		
					Omicron^			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^			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	Jara et al (February 15, 2022)	Chile	Prospective cohort	1,976,344 children aged 6-16 years	Delta^	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	Ferdinands et al (February 11, 2022)	USA	Test-negative case control	241,204 ED/UC encounters and 93,408 hospitalizations	**Omicron^**	Included	BNT162b2 & mRNA-1273	ED or UC encounters	69 (62–75)	< 2 mos	~25 weeks
									37 (34–40)	≥5 mos	
								Hospitalization	71 (51–83)	< 2 mos	
									54 (48–59)	≥5 mos	
					Delta^			ED or UC encounters	92 (91–94)	< 2 mos	
									77 (76–78)	≥5 mos	
								Hospitalization	94 (92–96)	< 2 mos	
									82 (82–83)	≥5 mos	
184	Goldin et al* (February 8, 2022)	Israel	Retrospective cohort	43,596 residents of long-term care facilities (65+ years)	Non-VOC, Alpha††	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	Hayek et al* (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	ECDC (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	Butt et al* (February 9, 2022)	USA	Test-negative case control	4,229 cases and controls on haemodialysis	Delta^	Excluded	BNT162b2	Documented infection	68.9 (61.9-74.7)	14+	~31 weeks
							mRNA-1273		66.7 (58.9-73.0)		
180	Cerqueira-Silva et al* (February 9,2022)	Brazil	Test-negative case control	7,747,121 individuals	Gamma and Delta^	Excluded	CoronaVac	Documented infection	55 (54.3-55.7)	14-30	~30 weeks
									34.7 (33.1-36.3)	>180	
								Severe disease	82.1 (81.4-82.8)	14-30	
									72.6 (71.0-74.2)	>180	
								Hospitalization	82.1 (81.4-82.8)	14-30	
									72.4 (70.7-73.9)	>180	
								Death	82.7 (81.7-83.6)	14-30	
									74.8 (72.2-77.2)	>180	
179#	Chemaitelly et al* (June 2, 2022) *[Published version of March 13,2022 preprint]*	Qatar	Test-negative case control	2,706,008 individuals	**Omicron BA.1 specifically^**	Included	BNT162b2	Symptomatic disease	46.6(33.4-57.2)	1-3 mo	~58 weeks
									-17.8(-28.2- -8.2)	7+ mo.	
							mRNA-1273		71.0 (24.0- 89.0)	1-3 mo	
									-10.2 (-23.1-1.3)	7+ mo.	
					Omicron BA.2 specifically^		BNT162b2		51.7 (43.2-58.9)	1-3 mo	
									-12.1 (-19.1-5.5)	7+ mo.	
							mRNA-1273		35.9 (-5.9-61.2)	1-3 mo	
									-20.4 (-30.2-1.2)	7+ mo.	
					Omicron specifically^		BNT162b2	Symptomatic disease	51.7(43.2-58.9)	1-3 mo	
									-9.0 (-14.5- -3.7)	7+ mo.	
							mRNA-1273		43.2(15-62.1)	1-3 mo	
									-13.7(-21.3- -6.6)	7+ mo.	
							BNT162b2	Severe, critical or fatal	70.4 (45.0-84.0))	1-6 mo	
									77.5 (67.8-84.3)	7+ mo.	
							mRNA-1273		87.1 (40.2-97.2)	1-6 mo	
									68.4 (46.1-81.5)	7+ mo.	
178	Lauring et al* (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)	14+	~3 weeks
									85 (83-87)	≤150	~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
	[February 7,2022]			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	Suryatma et al (March 11,2022) *[Update to February 3 preprint]*	Indonesia	Test-negative case control	14,168 adults aged ≥18	Non-VOC, Alpha††	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	Sritipsukho et al* (February 3,2022)	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	Roberts et al (January 31,2022)	USA	Test-negative case control	74,060 adults	Non-VOC, Alpha, Delta††	Included	BNT162b2	Documented infection (Overall)	83 (81-84)	<3 mos.	~48 weeks
									60 (58-62)	≥3 mos.	
								Documented infection (Jan-March)	80 (74-85)	<3 mos.	
									80.5 (74-86)	≥3 mos.	
								Documented infection (Oct-Dec)	75 (64-81)	<3 mos.	
									60 (55-62)	≥3 mos.	
								Severe disease (Overall)	88 (80-91)	<3 mos.	
									75 (70-80)	≥3 mos.	
								Severe disease (Jan-March)	90 (49-99)	<3 mos.	
									90 (50-99)	≥3 mos.	
								Severe disease (Oct-Dec)	69 (22-88)	<3 mos.	
									78 (70-82)	≥3 mos.	
							mRNA-1273	Documented infection (Overall)	88 (85-90)	<3 mos.	
									65 (62-68)	≥3 mos.	
								Documented infection (Jan-March)	89 (73-95)	<3 mos.	
									89 (74-93)	≥3 mos.	
								Documented infection (Oct-Dec)	82 (69-91)	<3 mos.	
									68 (64-69)	≥3 mos.	
								Severe disease (Overall)	85 (75-90)	<3 mos.	
									72 (65-78)	≥3 mos.	
								Severe disease (Jan-March)	70 (0-95)	<3 mos.	
									70 (0-93)	≥3 mos.	
								Severe disease (Oct-Dec)	91 (5-99)	<3 mos.	
									80 (72-88)	≥3 mos.	
174	Lytras et al* (June 14, 2022)	Greece	Retrospective cohort	9100 COVID-19 intubations and	Delta^	Included	BNT162b2	Intubation (age 15-59)	98.1 (97.5-98.6)	14+	~ 48 weeks
									95.5 (94.3–96.5)	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
	[Published version of January 29,2022 preprint]			14755 COVID-19 deaths in Greece aged ≥15 years				Intubation (age 60-79)	96.7 (95.9–97.4)	14+	
									92 (91.0–92.9)	6 mos	
								Intubation (age 80+)	94.2 (92.0–95.7)	14+	
									85.9 (83.5–88.0)	6 mos	
								Death (age 15-59)	96.5 (94.8–97.6)	14+	
									93.8 (91.0–95.7)	6 mos	
								Death (age 60-79)	94.1 (92.7–95.2)	14+	
									89.4 (87.9–90.8)	6 mos	
								Death (age 80+)	91 (88.4–93.0)	14+	
									84 (82.2–85.6)	6 mos	
							mRNA-1273	Intubation (age 15-59)	99.4 (98.2-99.8)	14+	
									97.3 (93.1-98.9)	6 mos	
								Intubation (age 60-79)	98.9 (97.3–99.5)	14+	
									98.4 (95.5–99.5)	6 mos	
								Intubation (age 80+)	97.9 (90.2–99.5)	14+	
									90.6 (67-97.3)	6 mos	
								Death (age 15-59)	99.3 (94.7-99.9)	14+	
									98.3 (88.3-99.8)	6 mos	
								Death (age 60-79)	98.4 (95.5–99.5)	6 mos	
									96.2 (93.6–97.7)	14+	
								Death (age 80+)	96.7 (87.9–99.1)	6 mos	
									92 (80–96.8)	14+	
							AZD1222	Intubation (age 15-59)	97.8 (95.3-99)	14+	
									92.4 (84-96.4)	6 mos	
								Intubation (age 60-79)	97.2 (95.3–98.3)	6 mos	
									95.4 (91.2–97.6)	14+	
								Intubation (age 80+)	97.8 (91.7–99.4)	6 mos	
									92.4 (72.7–97.9)	14+	
								Death (age 15-59)	97.5 (89.7-99.4)	14+	
									94.5 (77.2-98.7)	6 mos	
								Death (age 60-79)	95.4 (91.2–97.6)	6 mos	
									89.8 (85.2–93.0)	14+	
								Death (age 80+)	92.6 (84.2–96.5)	6 mos	
									83.4 (69.6–90.9)	14+	
							Ad26.COV2.S	Intubation (age 15-59)	85.0 (73.9–91.4)	14+	
								Intubation (age 60-79)	79.6 (65.2–88.0)	14+	
								Intubation (age 80+)	85.0 (62.3–94.0)	14+	
								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)			
								Death (age 60-79)	69.1 (43.2–83.2)	14+	
								Death (age 80+)	61.9 (43.2–74.4)	14+	
									80.6 (59.7–90.7)	6 months	
173	Tenforde et al* (January 28, 2022)	USA	Test-negative case control	2952 hospitalized adults (18+ y)	Delta^	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	Belayachi et al (January 27, 2021)	Morocco	Test-negative case control	25,768 Moroccan patients	Non-VOC, Alpha, Delta††	Included	BBIBP-CorV	Severe hospitalisation	73 (71-76)	1-273	~39 weeks
									88 (84-91)	1-30	
									64 (59-69)	150+	
171#	Willet et al (January 26,2021)	Scotland	Test-negative case control	6166 Omicron cases and 4911 Delta cases	**Omicron specifically^**	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^		BNT162b2		83.5 (78.6-87.3)		
							mRNA-1273		87.8 (79.8-92.7)		
							AZD1222		78.9 (66.6-86.7)		
170	Spensley et al* (January 26, 2022)	UK	Prospective cohort	1121 end stage kidney disease patients receiving in-center haemodialysis	**Omicron specifically^**	Included	BNT162b2	Documented infection	17 (-62-57)	14+	~52.5 weeks
							AZD1222		-4 (-97-43)		
169	Botton et al* (January 24, 2022)	France	Retrospective cohort	4,053,569 elderly adults (aged 75+)	Non-VOC, Alpha††	Unknown	BNT162b2 & mRNA-1273	Hospitalization	86 (83-89)	7+	~7 weeks
168	Bedston et al* (January 21, 2022)	UK	Prospective cohort	93,292 HCWs	Alpha^	Excluded	BNT162b2	Documented infection	86 (74-91)	2-5 weeks	~37 weeks
									45 (39-51)	26+ weeks	
167	Thompson et al (January 21,2022)	USA	Test-negative case control	222,772 ED encounters and 87,904 hospitalization	**Omicron^**	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^			ED or UC encounters	86 (85-87)	14-179	
									76 (75-77)	≥180	
								Hospitalisation	90 (89-90)	14-179	
									81(80-82)	≥180	
166		Italy				Excluded		Documented infection	81.3 (80.3-82.3)	2 months	~37 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
	Amodio et al*(March 11,2022) [Published version od January 13,2022 preprint]		Retrospective cohort	3,966,976 adults aged≥ 18 years	Alpha, Delta††		BNT162b2 & mRNA-1273		57.8 (55.4-60.2)	8 months	
								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#	Tartof et al* (April 22, 2022) *[Update to January 18, 2022 preprint]*	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	Young-Xu et al (March 13, 2022) *[Update to January 18 preprint]*	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	Suah et al* (March 21, 2022) *[Update to (January 16,2022 preprint]*	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	Gazit et al* (November 24, 2021)	Israel	Retrospective cohort	4024 adult household members of	Alpha^	Excluded	BNT162b2	Documented infection	80.3 (73.5-85.4)	7+	~7.5 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
				SARS-CoV-2 index cases							
161	Olson et al* (January 12,2022)	USA	Case control	445 case patients and 777 control patients aged 12-18 years	Delta^	Unknown	BNT162b2	Hospitalization	94 (90-96)	14+	~18 weeks
								ICU admission	98 (93-99)		
			Test-negative case control					Hospitalization	95 (91-97)		
								ICU admission	98 (94-100)		
160	Chiew et al (January 8, 2022)	Singapore	Retrospective cohort	307,587 adolescents aged 12-18	Delta^	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#	Tseng et al* (February 21, 2022) *[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^**	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^			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	Zambrano et al (January 7,2022)	USA	Test-negative case control	102 MIS-C case-patients and 181 hospitalized controls aged 12-18 years	Delta^	Included	BNT162b2	MIS-C	86 (70-93)	14+	~23 weeks
									91 (78-97)	28+	
						Excluded			90 (75-96)		
157	Prunas et al (January 5,2022)	Israel	Matched Case-control	11,822 cases and 226,201 controls aged 12-16 years	Delta^	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		Czech Republic	Retrospective cohort		Alpha, Delta††	Excluded	BNT162b2	Documented infection: Overall	88.3 (83.2-91.8)	>14	~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
	Petráš et al* (December 22, 2021)			11,016 staff of three hospitals in Prague				Symptomatic disease: Overall	91.7 (85.7-95.2)		
					Alpha††			Documented infection: February 2021	96.2 (91.6-98.7)		4 weeks
					Delta††			Documented infection: June-Aug 2021	65 (<0-96.6)		~30 weeks
155	Cerqueira-Silva et al* (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^	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.COV2.S	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

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
									41 (-240.9-89.9)	>90	~37 weeks
154#	Buchan et al (January 28,2022) *[Updated version of previous January 1st preprint]*	Canada	Test negative case control	16,087 Omicron-positive cases, 4261 Delta-positive cases, and 114,087 test-negative controls aged ≥18 years	**Omicron specifically^**	Excluded	Any mRNA vaccine	Symptomatic disease	36 (24–45)	7-59	~34 weeks
									2 (-17-17)	240+	
								Severe outcomes	55 (-106-90)	7-59	
									86(-12-98)	240+	
					Delta^		Any mRNA vaccine	Symptomatic disease	89 (86-92)	7-59	
									80 (74-84)	240+	
								Severe outcomes	94(84-98)	7-59	
									95(85-99)	240+	
153	Chung et al *(January 1,2022)	USA	Test negative case control	3,384 individuals aged ≥12 years	Non-VOC, Alpha, Delta^	Included	BNT162b2	Symptomatic disease	66(56-73)	14+	~34 weeks
							mRNA-1273		81(73-86)		
152	Lutrick et al (December 31,2021)	USA	Prospective cohort	243 individuals aged 12-17 years	Delta^	Excluded	BNT162b2	Documented infection	92(79-97)	14+	~17 weeks
151#	Collie et al* (December 29, 2021)	South Africa	Test negative case control	211,610 PCR tests of individuals In Gauteng Province	**Omicron specifically^**	Included	BNT162b2	Hospitalization	69 (48-81)	14+	~24 weeks
					Delta^				93 (90-94)		~19 weeks
150	Mendola et al* (23 December, 2021)	Italy	Retrospective cohort	2,478 HCWs 18+ years at a public hospital	Alpha††	Excluded	BNT162b2	Documented infection	89 (78-95)	8-98	~12 weeks
149	Alali et al* (December 7, 2021)	Kuwait	Retrospective cohort	3,246 HCWs 20+ years at a secondary hospital	Alpha††	Excluded	AZD1222	Symptomatic disease	94.5 (89.4 – 97.2)	14+	~20 weeks
148	Ostropolets et al (December 25, 2021)	USA	Retrospective cohort	179,666 patients of Columbia University Medical Center	Non-VOC, Alpha, Delta††	Excluded	BNT162b2	Documented infection	94 (91-95)	14+	52 weeks
								Hospitalization	95 (92-97)		
							mRNA-1273	Documented infection	97 (94-98)		
								Hospitalization	96 (92-99)		
							Ad26.COV2.S	Documented infection	81 (50-94)		
								Hospitalization	92 (58-100)		
147	Amir et al (December 21, 2021)	Israel	Quasi-experimental	348,468 individuals aged 16-18 and 361,050 individuals aged 12-14	Delta^	Excluded	BNT162b2	Documented infection: 12-14 years	92 (91.1-92.8)	14-60	~6.5 weeks
								Documented infection: 16-18 years	89.8 (80-93.8)		
146		Scotland			Delta^	Excluded	AZD1222		83.7 (79.7-87.0)	14-27	~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
	Katikireddi et al* (December 20, 2021)		Retrospective cohort	2,534,527 adults (aged 18+)				Hospitalization or death	53.6 (48.4-58.3)	140-153	
145	Kissling et al* (May 26,2022) *[Published version of December 23,2021 preprint]*	Croatia, France, Ireland, Netherlands, Portugal, Romania, Spain, and the UK	Test negative case control	2,725 cases and 11,557 controls aged 30+	Delta^	Included	BNT162b2	Symptomatic disease (30-59 years)	87 (83–89)	14-29	~30 weeks
									65 (56–71)	90+	
								Symptomatic disease (60+ years)	65 (37-80)	30-59	
									64 (44-77)	90+	
							mRNA-1273	Symptomatic disease (30-59 years)	98 (93–100)	14-29	
									90 (76–96)	60-89	
							AZD1222		72 (52–83)	14-29	
									65 (48–76)	60-89	
							Ad26.COV2.S		50 (36–62)	30–59	
									52 (33–66)	60-89	
144#	Hansen et al (December 23,2021)	Denmark	Retrospective cohort	41,684 Danish residents aged ≥12 years	**Omicron specifically^**	Excluded	BNT162b2	Documented infection	55.2 (23.5-73.7)	15-44	21 weeks
									-76.5 (-95.3, -59.5)	105-164	
							mRNA-1273		36.7 (-69.9-76.4)	15-44	
									-39.3 (-61.6, -20)	105-164	
					Delta specifically^		BNT162b2		86.7 (84.6-88.6)	15-44	
									53.8 (52.9-54.6)	105-164	
							mRNA-1273		88.2 (83.1–91.8)	15-44	
									65.0 (63.6- 66.3)	105-164	
143	Ioannou et al (December 21,2021)	USA	Target trial emulation study	4,199,742 individuals	Non-VOC and Alpha ††	Excluded	BNT162b2 & mRNA-1273	Documented infection (March 31st 2021)	65 (63–68)	7+	~28 weeks
								Documented infection (June 30th† 2021)	69 (67–70)		
								Death (March 31st 2021)	89 (84–92)		
								Death (June 30th† 2021)	86 (82–89)		
142	Lewis et al (December 21,2021)	USA	Test negative case control	3,619 adults	Alpha and Delta††	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		USA	Retrospective matched cohort	3,133,075 adults ≥ 18 years	Non-VOC, Alpha and Delta††	Included	BNT162b2	Documented infection	85 (83-86)	7-36	~48 weeks
									49 (46-51)	217+	
								Hospitalization	90 (86-92)	7-36	

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
	Tartof et al* (February 14, 2021) *[Updated version of previous December 21st preprint]*								88 (85-90)	217+	
140#	Bekker et al*(March 19,2022) *[Published version of December 20,2021]*	South Africa	Retrospective matched cohort	477,234 HCWs	Beta, Delta, Kappa^	Included	Ad26.COV2.S	Hospitalization	67 (62-71)	28+	16 weeks
								ICU/CCU admission	75 (69-82)		
								Death	83 (75-89)		
					Beta^			Hospitalization	62 (42-76)		
								ICU/CCU admission	49 (8-77)		
								Death	86 (57-100)		
					Delta^			Hospitalization	67 (62-71)		
								ICU/CCU admission	78 (71-88)		
								Death	82 (74-89)		
139	Abu-Raddad et al* (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^	Excluded	mRNA-1273	Documented infection	85.3 (83.5-86.9)	30+	~35 weeks
									-29.5 (-84-8.8)	240+	
								Symptomatic disease	94.4 (92.8-95.6)	30+	
									20 (-29-59.3)	240+	
								Asymptomatic disease	79.9 (75.5-83.4)	30+	
									-28.4 (-129.3-28.1)	240+	
								Hospitalization and death	97.2 (92.4-99)	30+	
									61 (-225.5-95.3)	180+	
138	McLean et al* (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††	Included	BNT162b2	Symptomatic and asymptomatic infections	50 (21-69)	14+	~52 weeks
							mRNA-1273		65 (37-81)		
							BNT162b2	Symptomatic infections	54 (26-71)		
							mRNA-1273		65 (38-81)		
						Excluded	BNT162b2	Symptomatic and asymptomatic infections	51 (22-70)		
							mRNA-1273		66 (38-82)		
					Delta specifically^	Excluded	BNT162b2	Symptomatic and asymptomatic infections	52 (20-71)		
							mRNA-1273		59 (24-78)		
137	Castillo-Arregoces et al (December 16,2021)	Colombia	Retrospective matched cohort	2,828,294 individuals aged 60+	Mu^	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)		

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	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)		
							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	Young-Xu et al* (December 15, 2021) *Updated analysis of reference #45*	USA	Test negative case control	71,190 male veterans aged 65+ in the Veterans Health Administration	Non-VOC and Alpha †† (pre-Delta)^	Excluded	BNT162b2 & mRNA-1273	Documented infection	94.5 (90.7-96.7)	14-43	4 weeks
									87.9 (85.9-89.5)	74-103	12 weeks
					Alpha, Delta†† (rising Delta)^				92.1 (87.2-95.1)	14-43	4 weeks
									67.3 (63.2-70.9)	134-163	20 weeks
					Delta^				62.0 (45.6-73.5)	14-43	4 weeks
									24.8 (18.8-30.4)	224-253	32 weeks
135	Florea et al* (April 28, 2022) *Updated interim analysis of reference #86*	USA	Prospective cohort	927,004 matched pairs of adult (18+) Kaiser Permanente members in Southern California	Non-VOC, Alpha, Delta††	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
								Death in hospital	97.2 (94.8-98.4)	14+	
					Delta^			Documented infection	86.5 (84.8-88.0)	14+	~15 weeks
134	Machado et al (December 14,2021)	Portugal	Retrospective cohort	1,884,932 adults aged 65+	Alpha and Delta^	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+	

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 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+	
								Death in 65-79 years old	95 (90-97)		
133	Berec et al (December 12,2021)	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	Powell et al* (March 21, 2022)	UK	Test-negative case control	617,259 eligible tests for 12-15-year-olds and	**Omicron specifically^**	Excluded	BNT162b2	Symptomatic disease(12-15 years)	73(66.4-78.3)	14+	~33 weeks
									71.3(69.3-73.1)	14-34	

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
	[Update to February 18, 2022 preprint]			225,670 for 16-17-year-olds				Symptomatic disease(16-17 years)	22.6(14.5-29.9)	70+	
					Delta specifically^			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	Bajema et al* (December 10,2021) *Updated analysis of reference #94*	USA	Test-negative case control	755 cases and 1,141 controls	Non-VOC, Alpha, Delta††	Excluded	BNT162b2	Hospitalization	86 (77.6-91.3)	14-119	~36 weeks
									75.1 (64.6-82.4)	120+	
							mRNA-1273		89.6 (80.1-94.5)	14-119	
									86.1 (77.7-91.3)	120+	
130#	UKHSA (January 27 2022) *[Update to Jan 14, 2022 briefing]* *[March 2, 2022 publication by Andrews et al with VE estimated till January 12, 2022 can be accessed here]*	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
									9.4 (7.8-11.1)	25+ weeks	
							AZD1222		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	
					Delta specifically^		BNT162b2		90.9 (89.6-92)	2-4 weeks	
									62.7 (61.6-63.7)	25+ weeks	
							AZD1222		82.8 (74.5-88.4)	2-4 weeks	
									43.5 (42.4-44.5)	25+ weeks	
							mRNA-1273		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	
									34.9 (17.7-48.4)	25+ weeks	
							AZD1222		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	Yassi et al (December 6, 2021)	Canada	Retrospective cohort	21,242 HCWs in Vancouver, BC	Non-VOC, Alpha, Delta††	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)		

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
128	Muhsen et al* (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	Wu et al* (December 2, 2021)	USA	Retrospective cohort	29,152 matched pairs of cancer patients in the Veterans Affairs health system	Non-VOC, Alpha††	Excluded	BNT162b2 & mRNA-1273	Documented infection	58 (39-73)	14+	15 weeks
126	Vokó et al* (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)		
							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	Hall et al* (February 16, 2022) *[Update to December 1, 2021 preprint]*	United Kingdom	Prospective cohort	35,768 HCWs (18+ years) undergoing routine asymptomatic testing	Non-VOC, Alpha, Delta^	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	Thiruvengadam et al (November 25,2021)	India	Test-negative case control	2766 cases and 2377 controls	Delta^	Excluded	AZD1222	Documented infection	63.1 (51.5-72.1)	14+	~10 weeks
123	Desai et al (November 23,2021)*	India	Test-negative case control	1068 matched case-control HCW pairs	Delta^	Included	BBV152	Symptomatic disease	50 (33-62)	14+	~4 weeks
									46 (22-62)	28+	
									57 (21-76)	42+	
						Excluded			47 (29-61)	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
122	Paixao et al* (April 5, 2022) *[Update to November 12 preprint]*	Brazil	Test-negative case control	Pregnant women aged 18-49	Gamma and Delta††	Included	CoronaVac	Symptomatic disease	41.0 (27.0-52.2)	14+	~25 weeks
								Severe disease	85.4 (59.4-94.8)		
121	Ng et al* (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	Al Hosani et al*(March 18,2022) *[Published version of October 27,2021 preprint]*	United Arab Emirates	Retrospective cohort	176,640 individuals aged 15+	Non-VOC and Alpha^	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)		
119	Poukka et al* (January 31, 2022) *[Published version of November 8, 2021]*	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	Documented infection	77 (71-82)	14-90	~11 weeks
									55 (34-69)	91-180	~24 weeks
								Hospitalization	95 (64-99)	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
							or heterologous)		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
							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
					Delta^		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
							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
									100 (CI omitted))	181+	~25 weeks
							Heterologous AZD1222 + mRNA	Documented infection	80 (72-86)	14-90	~11 weeks
									63 (33-80)	91-180	~24 weeks
								Hospitalization	100 (CI omitted)	14-90	~11 weeks
									100 (CI omitted)	181+	~25 weeks
118	Embi et al* (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, †† Alpha, †† Delta^	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††		BNT162b2 & mRNA-1273	Hospitalization: immunocompromised	76 (69-81)		
								Hospitalization: immunocompetent	91 (90-93)		
					Delta^			Hospitalization: immunocompromised	79 (74-83)		
								Hospitalization: immunocompetent	90 (89-91)		
117	Sheikh et al* (October 20,2021)	Scotland	Retrospective cohort	1,563,818 adults	Alpha and Delta^	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)		

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 ≥ 60 years	90 (84-94)		
					Delta specifically^		BNT162b2	Death	90 (83-94)		
							AZD1222		91 (86-94)		
116	Reis et al* (October 20,2021)	Israel	Retrospective cohort	94,354 vaccinated adolescents aged 12-18 matched with 94,354 controls	Delta^	Excluded	BNT162b2	Documented infection	90 (88-92)	7-21	~12 weeks
								Symptomatic disease	93 (88-97)		
115	Nordström et al* (October 18, 2021)	Sweden	Retrospective cohort	541,071 vaccinated individuals and 180,716 unvaccinated matched individuals	Delta^	Excluded	BNT162b2	Symptomatic disease	78 (78-79)	14+	~11 weeks
							mRNA-1273		87 (84-88)		
							AZD1222		50 (41-58)		
							AZD1222/ BNT162b2		67 (59-73)		
							AZD1222/ mRNA-1273		79 (62-88)		
114#	Skowronski et al* (April 19, 2022) *[Update to Oct 26,2021 preprint]*	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+	

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
									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	
							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)		

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	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	Lin et al* (March 10, 2022) *[Update to October 26,2021 preprint]*	USA	Retrospective cohort	10,600,823 cases registered in North Carolina	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	
								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	~32 weeks
							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	~22 weeks
							Ad26.COV2.S	Symptomatic disease	71.4 (68.3-74.2)	2 mo	
									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	Nordstrom et al* (February 4,2022) *[Published version of October 25 preprint]*	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+	
									89 (79-94)	15-30	

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 and any mRNA vaccine		66 (41-80)	120+	
111	Ranzani et al* (February 9, 2022) *[Update to (October 20,2021 preprint]*	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	Chin et al*(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)		
						Previously infected only		Documented infection	80.5 (52.8-92.0)		
						Excluded		Documented infection	49.5 (31.5-62.7)		
109	Irizarry et al(November 17, 2021) *[Updated version of Robles-Fontan et al (October 20,2021)]*	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		87 (85-89)	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
								Documented infection[xx]	57(53-60)	144+	
								Hospitalisation	92(85-95)	14+	
									80(73-85)	144+	
								Death	97(86-100)	14+	
									86(75-92)	144+	
							mRNA-1273	Documented infection[xx]	90(88-91)	14+	~18 weeks
									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[xx]	62(54-68)	14+	~22 weeks
									36(30-42)	144+	
								Hospitalisation	81(60-91)	14+	
									67(53-76)	144+	
								Death	78(16-94)	14+	
									72(49-85)	144+	
							BNT162b2	Documented infection[xx]	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	Olson et al* (October 19, 2021)	USA	Test-negative case control	179 case patients and 285 controls aged 12-18 years	Delta^	Unknown	BNT162b2	Hospitalization (12-15y)	91 (74-97)	14+	~12 weeks
								Hospitalization (16-18y)	94 (78-99)		
107	Arregoces et al (October 19, 2021)	Colombia	Matched-pair cohort study	3,346,826 adults aged 60+ in Colombia	Mu^	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

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 without prior hospitalization	75(0.0-93.8)		
106	Ranzani et al (October 18, 2021)	Brazil	Test-negative case control	11,817 adults In Mato-Grosso do Sul	Gamma^	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	Liu et al* (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^	Excluded	BNT162b2 & mRNA-1273	Overall: Documented infection	59 (52-65)	14+	~35 weeks
								Immunocompromised: Documented infection	57 (45-66)		
104	Bruxvoort et al*(December 15,2021) *[Update to October 1, 2021 preprint]*	USA	Test-negative case control	8,153 cases and matched controls among Kaiser Permanente patients (aged 18+) in Southern California	Delta specifically^	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
									80.0 (70.2-86.6)	151-180	~23.5 weeks
								Hospitalization	97.5 (92.7-99.2)	14+	~25 weeks
					Non-Delta specifically^			Documented infection	98.6 (97.3-99.3)	14-60	~6.5 weeks
									88.7 (73.2-95.2)	121-150	~19.5 weeks
					Alpha specifically^			Documented infection	98.4 (96.9-99.1)	14+	~25 weeks
					Gamma specifically^			Documented infection	95.5 (90.9-97.8)	14+	
103	Martinez-Baz et al (September 30,2021)	Spain	Prospective cohort	30,240 close contacts of 12,263 index cases	Non-VOC, Alpha and Delta^	Excluded	BNT162b2	Documented infection	69 (66-72)	14+	~31 weeks
									70 (67-73)	<90	~11 weeks
									63 (58-68)	≥ 90	~18 weeks
								Symptomatic disease	72 (69-75)	14+	~31 weeks
								Hospitalization	93 (88-96)		
							mRNA-1273	Documented infection	82 (78-86)	14+	~28 weeks
									67 (50-78)	≥ 90	~15 weeks
								Symptomatic disease	85 (80-89)	14+	~28 weeks
								Hospitalization	98 (82-100)		
							AZD1222	Documented infection	54 (48-60)	14+	~16 weeks
									54 (47-60)	<90	~11 weeks
								Symptomatic disease	56 (48-63)	14+	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
								Hospitalization	95 (79-99)		
							Ad26.COV2.S	Documented infection	50 (42-57)	14+	~23 weeks
									52 (44-59)	<90	~11 weeks
									28 (-8–53)	≥ 90	~10 weeks
								Symptomatic disease	54 (45-62)	14+	~23 weeks
								Hospitalization	74 (43-88)		
							1 dose of AZD1222+ 1 dose of BNT162b2	Documented infection	86 (70-93)	14+	~21 weeks
									85 (69-93)	<90	~11 weeks
								Symptomatic disease	91 (71-97)	14+	~21 weeks
								Hospitalization	95 (79-99)		
					Alpha^ specifically		BNT162b2	Documented infection	71 (61-78)	14+	~31 weeks
							mRNA-1273		86 (56-95)		~28 weeks
							AZD1222		38 (-42–73)		16 weeks
							Ad26.COV2.S		77 (27-93)		~23 weeks
					Delta^ specifically		BNT162b2	Documented infection	67 (59-74)	14+	~31 weeks
							mRNA-1273		77 (64-85)		~28 weeks
							AZD1222		55 (39-67)		16 weeks
							Ad26.COV2.S		42 (18-59)		~23 weeks
							1 dose of AZD1222+ 1 dose of BNT162b2		86 (45-97)		~21 weeks
102#	Eyre et al* (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	Glatman-Freedman et al (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	Meyer et al (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	Pilishvili et al* (September 22,2021)	USA	Test-negative case control	1482 HCPs as cases and 3449 HCPs as control	Alpha††	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+	

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		96.3 (91.3-98.4)		
97	Self et al* (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††	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	Glatman-Freedman et al* (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#	Andrews et al* (January 12,2022) *[Update to September 14, 2021 preprint]*	England	Test-negative case control	1,706,743 symptomatic cases and 3,763,690 test-negative control patients among adults (16+)	Alpha specifically^	Excluded	BNT162b2	Symptomatic disease	94.9 (93.6-95.9)	14-63	~33.5 weeks
									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
					Delta specifically^		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

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
									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
94	Bajema et al (September 10,2021)	USA	Test-negative case control	388 case-patients and 787 controls from 5 Veterans Affair Medicals Centers	Alpha, Delta, Non-VOC††	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+	~28.5 weeks
							mRNA-1273	Hospitalization	91.6 (83.5-95.7)		~26.5 weeks
					Alpha^		BNT162b2 & mRNA-1273	February-June: Hospitalization	84.1 (74.1-90.2)		~23 weeks
					Delta^			July-August: Hospitalization	89.3 (80.1-94.3)		~28.5 weeks
93	Polinski et al* (March 17,2022) *[Published version of previous September 10,2021 preprint]*	USA	Retrospective Cohort	2,076,065 individuals ≥18 years	Alpha††	Excluded	Ad26.COV2.S	Documented infection	76(75-77)	14+	~14 weeks
								Hospitalization	81(78-82)		
								Immunocompromised: Documented infection	64 (59-68)		
								Immunocompromised: Hospitalization	67 (57-74)		
					Delta^			June-August: Documented infection	74(71-77)		
								June-August: Hospitalization	81(75-86)		
92	Grannis et al (September 10,2021)	USA	Test-negative	32,867 events from 187 hospitals and 221 emergency	Delta^	Included	BNT162b2	Hospitalization	80 (73-85)	14+	4 weeks
								Emergency/Urgent care visit	77 (74–80)		
							mRNA-1273	Hospitalization	95 (92-97)		

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
				departments/urgent care visits				Emergency/Urgent care visit	92 (89-93)		
							Ad26.COV2.S	Hospitalization	60 (31-77)		
								Emergency/Urgent care visit	65 (56-72)		
91	Dagan et al* (September 7,2021)	Israel	Prospective Cohort	10,861 vaccinated pregnant females matched with 10,861 controls	Alpha^	Excluded	BNT162b2 & mRNA-1273	Documented infection	96 (89-100)	7-56	~11 weeks
								Symptomatic infection	97 (91-100)		
								Hospitalization	89 (43-100)		
90	Thompson et al* (September 8, 2021)	USA	Test-negative case control	58,904 adults aged 50+ with Covid-like illness who were hospitalized or visited emergency/ urgent care facilities	Non-VOC, Alpha^††	Excluded	BNT162b2	Hospitalization	87 (85-90)	14+	~22 weeks
								Emergency department or urgent care visit	89 (85-91)		
							mRNA-1273	Hospitalization	91 (89-93)		20 weeks
								Emergency department or urgent care visit	92 (89-94)		
							Ad26.COV2.S	Hospitalization	68 (50-79)		14 weeks
								Emergency department or urgent care visit	73 (59-82)		
							BNT162b2 & mRNA-1273	Hospitalization, patients with ≥ 1 chronic respiratory condition	90 (88-92)	14+	~22 weeks
								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	Iliaki et al* (October 18, 2021) *[Update to September 6 preprint]*	USA	Retrospective Cohort	4,317 HCWs	Alpha††	Excluded	BNT162b2 & mRNA-1273	Documented infection	95.2(80.0-98.8)	14+	~10 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
88	Tande et al* (September 6,2021)	USA – Mayo Clinic, Minnesota	Retrospective Cohort	Asymptomatic screening of 46,008 patients: pre-surgical, pre-op PCR tests	Non-VOC^††	Included	BNT162b2 & mRNA-1273	Asymptomatic infection (January-March)	91 (72-98)	14+	~10 weeks
					Alpha^††			Asymptomatic infection (April-May)	71 (53-83)		~19 weeks
					Delta^††			Asymptomatic infection (June-August)	63 (44-76)		~32 weeks
87	Barlow et al (September 3,2021)	USA	Test-negative case control	500 matched pairs aged 15 years and above	Delta^	Excluded	BNT162b2 and mRNA-1273	Documented infection	74(65-82)	14+	~4 weeks
							Ad26.COV2.S		51(-2 – 76)		
86	Bruxvoort et al* (November 24, 2021) *[Update to September 2,2021 Preprint]*	USA	Matched prospective cohort	352,878 vaccinated 352,878 unvaccinated individuals	Delta and Alpha^	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)		
								Hospitalization	95.8 (92.5-97.6)		
								Death	97.9 (84.5-99.7)		
85	Giansante et al* (September 2, 2021)	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
								Symptomatic infection	87.1 (69.3-94.6)		
				Only 7190 HCWs				Documented infection	84.4 (69.7-92.0)		
								Symptomatic infection	86.5 (62.9-95.1)		
84	Katz et al* (December 10,2021) *[Published version of September 2 pre-print]*	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	Nunes et al* (September 23, 2021)	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#	Chemaitelly et al*	Qatar				Included	BNT162b2	Documented infection	73.2 (71.3-75.0)	28-63	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
	(October 6, 2021) *[Update to Aug 27 preprint]* *Note: See Duration of Protection Table for further context*		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)				22.3 (-1.7-40.7)	175+	~32 weeks
								Symptomatic infection	72.5 (69.6-75.1)	28-63	7 weeks
									27.8 (-1.4-48.7)	175+	~32 weeks
								Asymptomatic infection	66.9 (61.9-71.3)	28-63	7 weeks
									-33.3 (-181.8-36.9)	175+	~32 weeks
								Severe, critical, or fatal disease	96.8 (93.9-98.3)	28-63	7 weeks
									55.6 (-44.3-86.3)	175+	~32 weeks
					Alpha specifically^		BNT162b2	Documented infection	88.6 (79.2-93.7)	28-63	7 weeks
									80.0 (-71.2-97.7)	147+	~32 weeks
					Beta specifically^		BNT162b2	Documented infection	63.9 (52.6-72.5)	28-63	7 weeks
									40.0 (-151.1-85.7)	147+	~32 weeks
					Delta specifically^		BNT162b2	Documented infection	73.3 (63.6-80.4)	28-63	7 weeks
									17.9 (-12.9-40.3)	147+	~32 weeks
81	Goldberg et al (October 27, 2021) *[Update to Aug 25 preprint]* *Note: See Duration of Protection Table for further context*	Israel	Retrospective cohort	9,395,923 adults (16+) in Israel	Delta^	Excluded	BNT162b2	Documented infection, 16-39 y fully vaccinated May 2021 (~2 mos prior)	80 (75-84)	55-98	13 weeks
								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

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
								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#	Tartof et al* (October 16, 2021) *[Update to Aug 23 preprint]*	USA	Retrospective cohort	3,436,957 members (12+) of Kaiser Permanente Southern California healthcare system	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
									88 (82-92)	157+	~29 weeks
					Delta specifically^			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
					Non-Delta variants specifically^			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	Prasad et al (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	Pouwels et al* (October 14, 2021) *[Update to Aug 18 preprint]*	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^		BNT162b2	Documented infection	80 (77-83)		
								Ct<30	84 (82-86)		

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 - August)		AZD1222	Documented infection	67 (62-71)		
								Ct<30	70 (65-73)		
77	Tenforde et al* (November 4, 2021) [*Update to Aug 18 MMWR*)	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
							BNT162b2 or mRNA-1273	Hospitalization, Immunocompetent	90 (87-91)	14+	~30 weeks
								Hospitalization, Immunocompromised	51 (31-65)		
					Alpha specifically^		BNT162b2 or mRNA-1273	Hospitalization, all	90 (84-94)		
					Delta specifically^			Hospitalization, all	86 (79-90)		
76	Chin et al* (January 27, 2022) *[Published version of August 18, 2021 preprint]*	USA	Retrospective cohort	60,707 incarcerated people in California prisons	Non-VOC^	Excluded	BNT162b2 or mRNA-1273	Documented infection, all	97 (88-99)	14+	~5 weeks
								Documented infection, cohort at moderate/high risk for severe COVID-19	92 (74-98)		
							mRNA-1273	Documented infection, all	96 (67-99)		
75	Nanduri et al (August 18,2021)	USA	Retrospective cohort	10,428,783 residents of skilled nursing facilities	Non-VOC and Alpha†† (Pre-Delta circulation) ^	Unknown	BNT162b2	Documented infection	74.2 (69–78.7)	14+	~16 weeks
							mRNA-1273		74.7(66.2-81.1)		
					Alpha†† (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^		BNT162b2	Documented infection	52.4 (48–56.4)		~28 weeks
							mRNA-1273		50.6 (45–55.7)		
74#	Tang et al*	Qatar	Test-negative case control	Cases with confirmed Delta	Delta specifically^	Included	BNT162b2	Documented infection	50.6 (45.4-55.3)	14+	~25 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
	(November 2, 2021) *[Update to Aug 11 preprint]*			(~2800 per analysis) or Beta infection and matched controls (~11,200) among residents of Qatar of all ages			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^		BNT162b2	Documented infection	74.3 (70.3-77.7)		
							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	Chemaitelly et al (August 9, 2021)	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	Puranik et al (August 9, 2021)	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	de Gier et al* (August 5, 2021)	Netherlands	Retrospective cohort	184,672 household and other close	Alpha^	Unknown	AZD1222	Documented infection among household contacts (adj. for	87 (77-93)	7+	~15 weeks
							BNT162b2		65 (60-70)		

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
				contacts (aged 18+) of 113,582 index cases (aged 18+)			mRNA-1273	vaccination status of index case)	91 (79-97)		
							Ad26.COV2.S		12 (-71-54)	14+	
70	Lefèvre et al (July 31,2021)	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	Alali et al (July 29,2021)	Kuwait	Retrospective cohort	3,246 HCWs	Alpha^	Excluded	BNT162b2	Documented infection	94.5 (89.4-97.2)	7+	~18 weeks
68	Gram et al* (December 17, 2021) *[Published version of July 28 pre-print]*	Denmark	Retrospective cohort	5,542,079 adults	Alpha^	Excluded	Heterologous: AZD1222 (1st dose) BNT162b2 or mRNA-1273(2nd dose)	Documented infection	88 (83-92)	14+	~20 weeks
67	Amirthalingam et al (December 10,2021) *[Published version of July 28 pre-print]*	UK	Test-negative case control	750 participants aged 50-89 years	Alpha^	Excluded	BNT162b2	Documented infection, 80 y+	77 (56-88)	14+, dose interval 19-29 days	~16 weeks
									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	

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
								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	Kissling et al (July 22,2021)	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#	Carazo et al* (August 30, 2021) *[Update to July 22 preprint]*	Canada	Test-negative case control	5316 cases and 53,160 test negative controls among HCWs	Non-VOC and Alpha^	Excluded	BNT162b2	Documented infection	85.5 (80.4-89.3)	7+	~20 weeks
								Symptomatic COVID-19	92.2 (87.8-95.1)		
							mRNA-1273	Documented infection	84.1 (34.9-96.1)	7+	
					Alpha specifically^	Excluded	BNT162b2 and mRNA-1273	Documented infection	92.6 (87.1-95.8)	7+	
					Non-VOC specifically^	Excluded	BNT162b2 and mRNA-1273	Documented infection	86.5 (56.8-95.8)		
64	Hitchings et al (October 28, 2021) *[Update to July 22 preprint]*	Brazil	Test-negative case control	30,680 matched pairs of adults aged 60+ in Sao Paolo, Brazil	Gamma^	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	Kim et al* (September 8, 2021) [*Update to July 22 preprint]*	USA	Test-negative case control	812 US adults aged 16+ with COVID-19-like illness	Non-VOC and Alpha††	Unknown	BNT162b2 and mRNA-1273	Symptomatic COVID-19	91 (83-95)	14+	~18.5 weeks
62#	Lopez Bernal et al* (July 21, 2021)	UK	Test-negative case control	19,109 cases and 171,834 test	Alpha specifically^	Excluded	BNT162b2	Symptomatic COVID-19	93.7 (91.6–95.3)	14+	~17 weeks
							AZD1222	Symptomatic COVID-19	74.5 (68.4–79.4)		

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
				negative controls aged 16+	Delta specifically^		BNT162b2	Symptomatic COVID-19	88.0 (85.3–90.1)		
							AZD1222	Symptomatic COVID-19	67.0 (61.3–71.8)		
61	Butt et al* (July 20, 2021)	USA	Test-negative case control	54,360 propensity-matched pairs of veterans	Original and Alpha ††	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	Layan et al* (March 03, 2022) *[Published version of July 16,2021 preprint]*	Israel	Prospective cohort	215 index cases and 687 household contacts (HHCs) from 210 Israeli households	Original and Alpha¶	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	Balicer et al* (September 7,2021) *[Update to July 12 preprint]*	Israel	Prospective Cohort	21722 pregnant women	Original and Alpha^	Excluded	BNT162b2	Documented infection	96 (89-100)	7-56	~18 weeks
								Symptomatic COVID-19	97 (91-100)		
								Hospitalization	89 (43-100)		
58	Butt et al* (October 7, 2021) *[Update to June 22 preprint]*	Qatar	Retrospective cohort	814pregnant women	Alpha and Beta^	Excluded	BNT162b2	Documented infection	87.7 (43.5-97.3)	14+	~17 weeks
							mRNA-1273		100.0 (0-100.0)		
57	Prunas et al* (January 27, 2022) *[Update to July 16, 2021 preprint]*	Israel	Retrospective cohort	2,472,502 Israeli individuals from 1,327,647 households	Original and Alpha¶ (pre-Delta^)	Excluded	BNT162b2	Documented infection among household contacts	89.4 (88.7-90)	10-90	~11 weeks
									58.3 (45.8-67.9)	90+	~26.5 weeks
					Delta^				72 (65.9-77)	10-90	~11 weeks
									40.2 (37.6-42.6)	90+	~26.5 weeks
56	Whitaker et al* (January 2, 2022)	UK	Prospective cohort	5,591,142 patients reporting to 718 English general practices	Alpha^	Included	BNT162b2	Symptomatic COVID-19: Ages 16-64	48.6 (-61.5-83.7)	14-69	~8 weeks
								Symptomatic COVID-19: Ages 65+	84.7 (77.7-89.5)		

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
	[*Update to July 9,2021 preprint*]							Immunosuppressed	59.6 (-35.5-86.3)		
							AZD1222	Symptomatic COVID-19: Ages 16-64	67.9 (-1.1-89.8)		
								Symptomatic COVID-19: Ages 65+	81.7 (59.6-91.7)		
								Symptomatic COVID-19: Immunosuppressed	60.0 (-63.6-90.2)		
55	John et al (July 13,2021)	USA	Retrospective cohort	40,074 patients with cirrhosis within Veterans Health Administration, propensity matched	Original and Alpha ††	Excluded	BNT162b2 and mRNA-1273	Documented infection	78.6 (25.5-93.8)	7+	~10 weeks
								Hospitalization	100.0 (99-100)		
								COVID-19 related death	100.0 (99-100)		
54	Bertollini et al (July 13, 2021)	Qatar	Prospective cohort	10,092 matched pairs of Qatari adults arriving at an international airport.	Original, Alpha and Beta^	Included	BNT162b2 and mRNA-1273	Documented infection	78 (72-83)	14+	~4 weeks
52#	Chemaitelly et al* (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)		
								Asymptomatic infection	92.5 (84.8-96.9)		
			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)		

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
51#	Tenforde et al* (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	Jara et al (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#	Nasreen et al* (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
								Hospitalization or death	97 (88-99)		
							mRNA-1273	Symptomatic infection	98 (83-100)		~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)		
					Alpha specifically^		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)		
					Beta specifically^		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)		

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	Symptomatic infection	100 (no CI provided)		~3 weeks
					Gamma specifically^		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
								Hospitalization or death	90 (67-97)		
48	Baum et al* (November 18,2021) *[Update to June 28 preprint]*	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^	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	Saciuk et al* (December 30,2021) *[Update to June 27, 2021 preprint]*	Israel	Retrospective cohort	1.6 million members of Maccabi HealthCare HMO ≥16	Original and Alpha¶	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	Pawlowski et al.* (June 17, 2021) *[Update to Feb. 18, 2021 preprint]*	USA – Mayo Clinic	Retrospective Cohort	68,266 – propensity matched on, zip, #	Original & Alpha ¥	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	

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
				of PCRs, demographics			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	Young-Xu et al (October 6, 2021)* *[Update to Jul 14 preprint]*	USA	Test negative case control	77014 veterans aged 65+ within Veterans Health Administration	Original and Alpha ††	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#	Stowe et al (June 14, 2021)	UK	TND Case-control	Patients seeking emergency care services with subsequent hospitalization	Alpha specifically^	Included	BNT162b2	Hospitalization	95 (78-99)	14+	~20 weeks (but most much less)
							AZD1222		86 (53-96)		
					Delta specifically^		BNT162b2		96 (86-99)		
							AZD1222		92 (75-97)		
42#	Sheikh et al (June 14, 2021)	Scotland	TND	Scottish population	Alpha^	Unknown	BNT162b2	Documented infection	92 (90–93)	14+	~20 weeks (but most much less)
						Unknown	AZD1222	Documented infection	73 (66–78)	14+	
					Delta^	Unknown	BNT162b2	Documented infection	79 (75–82)	14+	
						Unknown	AZD1222	Documented infection	60 (53–66)	14+	
41	Flacco, Maria et al* (June 10, 2021)	Italy	Retrospective cohort	245,226 individuals	Original and Alpha††	Excluded	BNT162b2	Documented infection	98 (97-99)	14+	~14 weeks
								Hospitalization	99 (96-100)	14+	
								Death	98 (87-100)	14+	
39	Emborg et al. (June 2, 2021) *[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	original & Alpha¶¶	Excluded	BNT162b2	Documented infection	82 (79-84)	>7	10 weeks
								COVID-Hospitalization	93 (89-96)	>7	
								COVID-Mortality	94 (90-96)	>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
				workers (HCWs), and 231,858 individuals with comorbidities that predispose for severe COVID-19 disease (SCD)							
38	Thompson et al* *[updated on June 30,2021]*	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	Khan et al (May 31, 2021)	USA	Retrospective cohort	14,697 IBD patients in VA hospitals	Unknown	Included	BNT162b2 & mRNA-1273	Documented infection	69 (44-83)	7+	
								Hospitalization/death	49 (-36-81)	7+	
35	Martinez-Bas et al* (May 27, 2021)	Spain	Prospective Cohort	20,961 close contacts of confirmed cases	Alpha	Excluded	BNT162b2	Documented infection	65 (56-73)	14+	12 weeks
								Symptomatic infection	82 (73-88)		
								Hospitalization	94 (60-99)		
34#	Chung et al* (Aug 20, 2021) *[Update to July 26 preprint]*	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+	
								Hospitalization and Death	94 (59-99)	0+	
					Beta or Gamma specifically^		BNT162b2 & mRNA-1273	Symptomatic infection	88 (61-96)	7+	
							BNT162b2 & mRNA-1273	Hospitalization and Death	100	0+	
33	PHE (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#	Ranzani et al.* (Aug 20, 2021)	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)		

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
	[update to Jul 21 preprint]										
								Death	61.2 (48.9-70.5)		
31	Ismail et al. (May 12, 2021)	UK	Screening method	13,907 ≥70	Alpha	Included	BNT162b2	Hospitalization in 80+	93 (89-95)	≥14	
30	Pilishvili et al.* (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	Lopez-Bernal et al.* (May 13, 2021) *[Update to Mar 1 preprint]*	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	Angel et al.* (May 6, 2021)	Israel	Retrospective cohort	6710 HCWs at a single tertiary care center in	Alpha¶	Excluded	BNT162b2	Symptomatic	97 (94-99)	>7 days	
								Asymptomatic	86 (69-97)		
27#	Abu-Raddad et al.* (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)		
					Beta specifically^			CC Beta documented infection	75 (71-79)		
								CC Beta severe/fatal infection	100 (74-100)		
			Retrospective cohort	Qatari adults	Alpha specifically^	Unknown	BNT162b2	Cohort documented infection Alpha	87 (82-91)		
					Beta specifically^			Cohort documented infection Beta	72 (66-77)		
26	Haas et al. * (May 5, 2021) *[Update to Mar 24 preprint]*	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)		

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
25	Corchado-Garcia et al.* (November 2, 2021) *[Update to April 30 preprint]*	USA	Retrospective cohort	97,787 adults in the Mayo Clinic Network	Alpha and Delta^	Excluded	Ad26.COV2.S	Documented infection	74.2 (64.9-81.6)	≥15	
24	Fabiani et al.* (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	Tenforde et al.* (Apr 28, 2021)	USA	Test-negative case-control	Hospitalized adults ≥65 years	Original and Alpha[¥]	Unknown	BNT162b2 & mRNA-1273	Hospitalization	94 (49-99)	≥14 days	
21	Goldberg et al.* (March 30, 2022) *[Update to Apr 24, 2021 preprint]*	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	Pritchard et al.* (Jun 9, 2021) *[Update to Apr 23 preprint]*	UK	Prospective cohort	373,402 individuals ≥16 years	Alpha & Original^	Excluded	BNT162b2	Documented infection	80 (74-85)	≥0 days	
								Symptomatic disease	95 (91-98)		
							AZD1222	Documented infection	79 (65-88)		
								Symptomatic disease	92 (78-97)		
18	Hall et al.* (Apr 23, 2021) *[Update to Feb 21 preprint]*	UK – SIREN study	Prospective Cohort (Person-time)	23,324 healthcare workers	Alpha^	Excluded	BNT162b2	Documented infection	86 (76-97)	≥7	
17	Mason et al.* (October 18, 2021) *[Update to Apr 22 preprint]*	UK - England	Case-control	170,226 80-83-year-olds	Alpha^	Excluded	BNT162b2	Documented infection	70 (55- 80)	35-41	
								Hospitalization	75 (52-87)	35-41	
								Emergency visit	79(60-90)		
16	Bjork et al.* (September 29, 2021) *[Update to Apr 21 preprint]*	Sweden	Retrospective cohort	805,741 Swedish adults aged 18-64 years	Original & Alpha^	Unknown	BNT162b2	Documented infection	86 (72-94)	≥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
14	Andrejko et al.* (Jul 20, 2021) *[update to May 25 preprint]*	USA	Test-negative case control	1023 California adults ≥18 years	B.1.427/ B.1.429 & Alpha^	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	Regev-Yochay et al.* (July 7,2021) [*Update to April 9 preprint]*	Israel	Prospective cohort	3578 HCWs in one Israeli health system	Alpha¶	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	
11	Thompson et al.* (Mar 29, 2021)	USA	Prospective cohort	3,950 healthcare workers in eight US sites	Original¥	Excluded	BNT162b2 & mRNA1273	Documented infection	90 (68-97)	≥14	
6	Tande et al.* (Mar 10, 2021)	USA – Mayo Clinic	Retrospective Cohort	Asymptomatic screening of 39,156 patients: pre-surgical, pre-op PCR tests	original¥	Included	BNT162b2 & mRNA-1273	Asymptomatic infection	80 (56-91)	>0	
							BNT162b2	Asymptomatic infection	80 (56-91)	>0	
5	Mousten-Helms et al. (Mar 9, 2021)	Denmark	Retrospective Cohort	Long term care facilities in Denmark - 39,040 residents, 331,039 staff	original & Alpha¶¶	Excluded	BNT162b2	LTCF Resident: Documented Infection	64 (14-84)	>7	
								LTCF Staff: Documented Infection	90 (82-95)	>7	
3	Dagan et al.* (Feb. 24, 2021)	Israel – Clalit Health System	Retrospective Cohort	596,618 – matched on demographics,	original & Alpha^	Excluded	BNT162b2	Documented infection	92 (88-95)	>7	
								Symptomatic infection	94 (87-98)	>7	
								Hospitalization	87 (55-100)	>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
				residence, clinical characteristics				Severe disease	92 (75-100)	>7	
2	Public Health England – Feb. (Feb. 22, 2021)	UK - England	Screening Method	43,294 cases, with England as source population	Alpha^	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
±Unless noted otherwise, days post 1st dose are prior to receiving dose 2.
‡Unclear if 1st dose VE estimates includes any individuals who received a second dose.
*Manuscripts with an asterisk (*) are peer-reviewed publications.
^Indicates predominant variant identified by study authors. If no ^ then variants identified through secondary source when possible. Please see additional footnotes.
¶The rise of SARS-CoV-2 variant Alpha in Israel intensifies the role of surveillance and vaccination in elderly | medRxiv
¥CDC Says More Virulent British Strain Of Coronavirus Now Dominant In U.S. : Coronavirus Updates : NPR
£Coronavirus (COVID-19) Infection Survey, UK - Office for National Statistics
¶¶Denmark logs more contagious COVID variant in 45% of positive tests | Reuters
¥¥COVID variant first detected in UK now dominant strain in Spain
££Reporte-circulacion-variantes-al-9.04.21-PUBLICADO-FINAL.pdf (minsal.cl)
††Based on https://outbreak.info/location-reports
ɣhttps://www.gov.uk/government/publications/covid-19-variants-genomically-confirmed-case-numbers/variants-distribution-of-cases-data
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.
XXVE 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.
5. Shah ASV, Gribben C, Bishop J, et al. Effect of vaccination on transmission of COVID-19: an observational study in healthcare workers and their households. *medRxiv*. Published online 2021:2021.03.11.21253275. doi: 10.1101/2021.03.11.21253275
6. Jameson AP, Sebastian T, Jacques LR. Coronavirus disease 2019 (COVID-19) vaccination in healthcare workers: An early real-world experience. *Infect Control Hosp Epidemiol*.:1-2. doi:10.1017/ice.2021.171
7. Vahidy FS, Pischel L, Tano ME, et al. Real World Effectiveness of COVID-19 mRNA Vaccines against Hospitalizations and Deaths in the United States. *medRxiv*. Published online 2021:2021.04.21.21255873 doi: 10.1101/2021.04.21.21255873
8. Swift MD, Breeher LE, Tande AJ, et al. Effectiveness of Messenger RNA Coronavirus Disease 2019 (COVID-19) Vaccines Against Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection in a Cohort of Healthcare Personnel. *Clin Inf Dis.* Published online Apr 26, 2021:2021;ciab361. doi: 10.1093/cid/ciab361
9. Zaqout A, Daghfal J, Alaqad I, et al. The initial impact of a national BNT162b2 mRNA COVID-19 vaccine rollout. *medRxiv*. Published online 2021:2021.04.26.21256087 doi: 10.1101/2021.04.26.21256087
10. Cavanaugh AM, Fortier S, Lewis P, et al. COVID-19 Outbreak Associated with a SARS-CoV-2 R.1 Lineage Variant in a Skilled Nursing Facility After Vaccination Program – Kentucky, March 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70:639-643. doi: 10.15585/mmwr.mm7017e2

11. Menni C, Klaser K, May A, et al. Vaccine side-effects and SARS-CoV-2 infection after vaccination in users of the COVID Symptom Study app in the UK: a prospective observational study. *Lancet Infect Dis.* 2021; 21; 939-49. Published online April 27, 2021. doi: 10.1016/S1473-3099(21)00224-3.
12. Tang L, Hijano DR, Gaur AH, et al. Asymptomatic and Symptomatic SARS-CoV-2 Infections After BNT162b2 Vaccination in a Routinely Screened Workforce. *JAMA.* Published online May 6, 2021:2021;325(24):2500-2502. doi: 10.1001/jama.2021.6564
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
15. Bianchi FB, Germinario CA, Migliore G, et al. BNT162b2 mRNA COVID-19 Vaccine Effectiveness in the Prevention of SARS-CoV-2 Infection: A Preliminary Report. *J Infect Dis.* Published online May 19, 2021:2021;jiab262. doi: 10.1093/infdis/jiab262
16. Walsh J, Skally M, Traynor L, et al. Impact of first dose of BNT162b2 vaccine on COVID-19 infection among healthcare workers in an Irish hospital. *Ir J Med Sci*. Published online May 2021:1-2. doi:10.1007/s11845-021-02658-4
17. Bailly B, Guilpain L, Bouiller K, et al. BNT162b2 mRNA vaccination did not prevent an outbreak of SARS COV-2 variant 501Y.V2 in an elderly nursing home but reduced transmission and disease severity [published online ahead of print, 2021 May 16]. *Clin Infect Dis*. 2021;ciab446. doi:10.1093/cid/ciab446
18. Monge S, Olmedo C, Alejos B, et al. Direct and indirect effectiveness of mRNA vaccination against SARS-CoV-2 infection in long-term care facilities in Spain. *Emerg Infect Dis*. 2021;27(10):2595-2603. doi: https://doi.org/10.3201/eid2710.211184
19. Yassi A, Grant JM, Lockhart K, et al. Infection control, occupational and public health measures including mRNA-based vaccination against SARS-CoV-2 infections to protect healthcare workers from variants of concern: a 14-month observational study using surveillance data. *PLoS ONE*. 2021;16(7):e0254920. doi:10.1371/journal.pone.0254920
20. Kumar S, Saxena S, Atri M, Chamola SK. Effectiveness of the Covid-19 vaccine in preventing infection in dental practitioners: results of a cross-sectional questionnaire-based survey. *medRxiv*. Published online 2021 June 3. https://doi.org/10.1101/2021.05.28.21257967
21. Shrestha NK, Nowacki AS, Burke PC, Terpeluk P, Gordon SM. Effectiveness of mRNA COVID-19 Vaccines among Employees in an American Healthcare System. *medRxiv*. Published online 2021:2021.06.02.21258231. doi:10.1101/2021.06.02.21258231
22. Riley S, Wang H, Eales O, et al. *REACT-1 Round 12 Report: Resurgence of SARS-CoV-2 Infections in England Associated with Increased Frequency of the Delta Variant*.; 2021. https://spiral.imperial.ac.uk/bitstream/10044/1/89629/2/react1_r12_preprint.pdf
23. Ben-Dov IZ, Oster Y, Tzukert K, et al. The 5-months impact of tozinameran (BNT162b2) mRNA vaccine on kidney transplant and chronic dialysis patients. *medRxiv*. Published online June 16, 2021:2021.06.12.21258813. doi:10.1101/2021.06.12.21258813
24. Victor PJ, Mathews KP, Paul H, Murugesan M, Mammen JJ. Protective Effect of COVID-19 Vaccine Among Health Care Workers During the Second Wave of the Pandemic in India. *Mayo Clin Proc*. Published online 2021.

25. Chodick G, Tene L, Patalon T, et al. Assessment of Effectiveness of 1 Dose of BNT162b2 Vaccine for SARS-CoV-2 Infection 13 to 24 Days After Immunization. *JAMA Netw Open.* Published online Jun 7, 2021:2021;4(6):e2115985. doi: 10.1001/jamanetworkopen.2021.15985
26. Bahl A, Johnson S, Maine G, et al. Vaccination reduces need for emergency care in breakthrough COVID-19 infections: A multicenter cohort study. *medRxiv*. Published online 2021:2021.06.09.21258617. doi:10.1101/2021.06.09.21258617
27. Zacay G, Shasha D, Bareket R, et al. BNT162b2 Vaccine Effectiveness in Preventing Asymptomatic Infection with SARS-CoV-2 Virus: A Nationwide Historical Cohort Study. *Open Forum Infect Dis*. Published online June 9, 2021:2021;8(6). doi: 10.1093/ofid/ofab262
28. Ross C, Spector O, Tsadok MA, Weiss Y, Barnea R. BNT162b2 mRNA vaccinations in Israel: understanding the impact and improving the vaccination policies by redefining the immunized population. *medRxiv*. Published online 2021:2021.06.08.21258471. doi:10.1101/2021.06.08.21258471
29. Malinis M, Cohen E, Azar MM. Effectiveness of SARS-CoV-2 vaccination in fully-vaccinated solid organ transplant recipients. *Am J Transplant*. Published online June 2021. doi:10.1111/ajt.16713
30. Ramakrishnan, M., & Subbarayan, P. Impact of vaccination in reducing Hospital expenses, Mortality and Average length of stay among COVID 19 patients. A retrospective cohort study from India. *medRxiv*, Published online 2021: 2021.06.18.21258798. doi:10.1101/2021.06.18.21258798
31. Sansone E, Sala E, Tiraboschi M, et al. Effectiveness of BNT162b2 vaccine against SARS-CoV-2 among healthcare workers. *Med Lav*. Published online 15 June 2021. doi: 10.23749/mdl.v112i3.11747.
32. Mazagatos C, Monge S, Olmedo C, et al. Effectiveness of mRNA COVID-19 vaccines in preventing SARS-CoV-2 infections and COVID-19 hospitalizations and deaths in elderly long-term care facility residents, Spain, weeks 53 2020 to 13 2021. *Euro Surveill.* 2021;26(24):pii=2100452. doi: 10.2807/1560-7917.ES.2021.26.24.2100452.
33. Tanislav C, Ansari TE, Meyer M, et al. Effect of SARS-CoV-2 vaccination among health care workers in a geriatric care unit after a B.1.1.7-variant outbreak [published online ahead of print, 2021 Jun 19]. *Public Health.* 2021. doi: 10.1016/j.puhe.2021.06.003
34. Jaiswal A, Subbaraj V, Wesley J, et al. COVID-19 vaccine effectiveness in preventing deaths among high-risk groups in Tamil Nadu, India. *Indian J Med Res*. Accessed online ahead of print 23 June 2021. doi: 10.4103/ijmr.ijmr_1671_21.
35. Harris RJ, Hall JA, Zaidi A, et al. Effect of Vaccination on Household Transmission of SARS-CoV-2 in England. *N Engl J Med.* Published online Jun 23, 2021. doi: 10.1056/NEJMc2107717
36. Hitchings MDT, Ranzani OT, Torres MSS et al. Effectiveness of CoronaVac among healthcare workers in the setting of high SARS-CoV-2 Gamma variant transmission in Manaus, Brazil: A test-negative case-control study. *medRxiv*, Published online 2021 June 24. doi: https://doi.org/10.1101/2021.04.07.21255081
37. Knobel P, Serra C, Grau S, et al. COVID-19 mRNA vaccine effectiveness in asymptomatic healthcare workers [published online ahead of print, 2021 Jun 24]. *Infect Control Hosp Epidemiol*. 2021;1-7. doi:10.1017/ice.2021.287

38. Kale P, Bihari C, Patel N, et al. Clinicogenomic analysis of breakthrough infections by SARS CoV2 variants after ChAdOx1 nCoV-19 vaccination in healthcare workers. *medRxiv*, Published online 2021:2021.06.28.21259546. doi: 10.1101/2021.06.28.21259546
39. Mateo-Urdiales A, Alegiani SS, Fabiani M, et al. Risk of SARS-CoV-2 infection and subsequent hospital admission and death at different time intervals since first dose of COVID-19 vaccine administration, Italy, 27 December 2020 to mid-April 2021. *Euro Surveill.* 2021;26(25):pii=2100507. doi: 10.2807/1560-7917.ES.2021.26.25.2100507
40. Paris C, Perrin S, Hamonic S, et al. Effectivness of mRNA-BNT162b2, mRNA-1273, and ChAdOx1 nCoV-19 vaccines against COVID-19 in health care workers: an observational study using surveillance data. *Clin Microbiol Infect*. Published online Jun 29, 2021. doi: 10.1016/j.cmi.2021.06.043
41. Kojima N, Roshani A, Brobeck M, Baca A, Klausner JD. Incidence of Severe Acute Respiratory Syndrome Coronavirus-2 infection among previously infected or vaccinated employees. *International Journal of Infectious Diseases*. 2022. doi:10.1016/j.ijid.2022.02.015.
42. Lumley SF, Rodger G, Constantinides B, et al. An observational cohort study on the incidence of SARS-CoV-2 infection and B.1.1.7 variant infection in healthcare workers by antibody and vaccination status. *Clin Inf Dis.* Published online Jul 12, 2021:2021;ciab608. doi: 10.1093/cid/ciab608
43. Rovida F, Cassaniti I, Paolucci S, et al. SARS-CoV-2 vaccine breakthrough infections are asymptomatic or mildly symptomatic and are infrequently transmitted. *medRxiv*, Published online 2021.06.29.21259500. doi:10.1101/2021.06.29.21259500
44. Williams C, Al-Bargash D, Macalintal C, et al. COVID-19 Outbreak Associated with a SARS-CoV-2 P.1 Lineage in a Long-Term Care Home after Implementation of a Vaccination Program – Ontario, April-May 2021. *Clin Inf Dis.* Published online Jul 8, 2021:2021;ciab617. doi: 10.1093/cid/ciab617
45. Charmet T, Schaeffer L, Grant R, et al. Impact of original, B.1.1.7, and B.1.351/P.1 SARS-CoV-2 lineages on vaccine effectiveness of two doses of COVID-19 mRNA vaccines: Results from a nationwide case-control study in France [published online ahead of print, 2021 Jul 13]. *Lancet Regional Health—Eur.* 2021;8:100171. doi: 10.1016/j.lanepe.2021.100171
46. Bermingham CR, Morgan J, Ayoubkhani D, et al. Estimating the effectiveness of the first dose of COVID-19 vaccine against mortality in England: a quasi-experimental study. *medRxiv*, Published online 2021.07.12.21260385. doi:10.1101/2021.07.12.21260385
47. Alencar CH, de Goes Cavalcanti LP, de Almeida MM, et al. High Effectiveness of SARS-CoV-2 Vaccines in Reducing COVID-19-Related Deaths in over 75-Year-Olds, Ceará State, Brazil. *Trop Med Infect Dis.* 2021;6(3):129. doi: 10.3390/tropicalmed6030129
48. Waldman SE, Adams JY, Albertson TE, et al. Real-world impact of vaccination on COVID-19 incidence in health care personnel at an academic medical center. *Infect Control Hosp Epidemiol*. Published online Jul 21, 2021:2021;1-21. doi: 10.1017/ice.2021.336
49. Vignier N, Bérot V, Bonnave N, et al. Breakthrough infections of SARS-CoV-2 gamma variant in fully vaccinated gold miners, French Guiana, 2021 [published online ahead of print, 2021 Jul 21]. *Emerg Infect Dis*. 2021;27(10). doi: 10.3201/eid2710.211427

50. Pramod S, Govindan D, Ramasubramani P, et al. Effectiveness of Covishield vaccine in preventing Covid-19 – A test-negative case-control study. *Vaccine.* Published online 2022 February 9. doi: https://doi.org/10.1016/j.vaccine.2022.02.014
51. Rubin D, Eisen M, Collins S, et al. SARS-CoV-2 Infection in Public School District Employees Following a District-Wide Vaccination Program – Philadelphia County, Pennsylvania, March 21-April 23, 2021. *MMWR Morb Mortal Wkly Rep.* Published online 2021 Jul 23. doi: 10.15585/mmwr.mm7030e1
52. Mor O, Zuckerman NS, Hazan I, et al. BNT162b2 Vaccination efficacy is marginally affected by the SARS-CoV-2 B.1.351 variant in fully vaccinated individuals. *medRxiv*, Published online 2021.07.20.21260833. doi:10.1101/2021.07.20.21260833
53. Thiruvengadam, R et al. Cellular Immune Responses are Preserved and May Contribute to Chadox1 ChAdOx1 nCoV-19 Vaccine Effectiveness Against Infection Due to SARS-CoV-2 B·1·617·2 Delta Variant Despite Reduced Virus Neutralisation. *SSRN*, Published online 2021 Jul 16. https://ssrn.com/abstract=3884946.
54. Murillo-Zamora E, Trujilo X, Huerta M, et al. Effectiveness of BNT162b2 COVID-19 vaccine in preventing severe symptomatic infection among healthcare workers. *Medicina.* 2021;57(8):746. doi: https://doi.org/10.3390/medicina57080746
55. Blanco, S et al. Evaluation of the Gam-COVID-Vac and Vaccine-Induced Neutralizing Response Against SARS-CoV-2 Lineage P.1 (Manaus) Variant in an Argentinean Cohort. *SSRN*, Published online 2021 Jul 27. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3893461.
56. Aslam, S, Adler, E, Mekeel, K, Little, SJ. Clinical effectiveness of COVID-19 vaccination in solid organ transplant recipients. *Transpl Infect Dis*. Published online 2021 Jul 29. doi: 10.1111/tid.13705.
57. Cserep G, Morrow D, Latchford K, Jesset R, Dosa A, Kirmizis D. The effect of a single dose of BNT162b2 vaccine on the incidence of severe COVID-19 infection in patients on chronic hemodialysis: a single-centre study [published online ahead of print, 2021 Jul 29]. *Clin Exp Nephrol*. 2021;1-5. doi:10.1007/s10157-021-02118-4
58. Hetemäki Iivo, et al. An outbreak caused by the SARS-CoV-2 Delta variant (B.1.617.2) in a secondary care hospital in Finland, May 2021. *Euro Surveill.* Published online 2021 Jul 28. doi: https://doi.org/10.2807/1560-7917.ES.2021.26.30.2100636
59. Ghosh S, Shankar S, Chatterjee K, et al. COVIDSHIELD (AZD1222) VaccINe effectiveness among healthcare and frontline Workers of Indian Armed Forces: Interim results of VIN-WIN cohort study. *Med J Armed Forces India.* 2021;77(2):S264-S270. doi: 10.1016/j.mjafi.2021.06.032
60. Muthukrishnan J, Vardhan V, Mangalesh S, et al. Vaccination status and COVID-19 related mortality: A hospital based cross sectional study. *Med J Armed Forces India.* 2021;77(2):S278-S282. doi: 10.1016/j.mjafi.2021.06.034
61. Sakre M, Agrawal S, Ravi R, et al. COVID 19 vaccination: Saviour or unfounded reliance? A cross sectional study among the air warriors. *Med J Armed Forces India.* 2021;77(2):S502-S504. doi: 10.1016/j.mjafi.2021.06.017
62. Bobdey S, Kaushik SK, Sahu R, et al. Effectiveness of ChAdOx1 nCOV-19 Vaccine: Experience of a tertiary care institute. *Med J Armed Forces India.* 2021;77(2):S271-S277. doi: 10.1016/j.mjafi.2021.06.006

63. Vaishya R, Sibal A, Malani A, Prasad KH. SARS-CoV-2 infection after COVID-19 immunization in healthcare workers: A retrospective, pilot study. *Indian J Med Res.* Published online 2021 Aug 3. doi: 10.4103/ijmr.ijmr_1485_21
64. Bhattacharya A, Ranjan P, Ghosh T, et al. Evaluation of the dose-effect association between the number of doses and duration since the last dose of COVID-19 vaccine, and its efficacy in preventing the disease and reducing disease severity: A single centre, cross-sectional analytical study from India [published online ahead of print, 2021 Jul 30]. *Diabetes Metab Syndr.* 2021;15(5). doi: 10.1016/j.eimc.2021.06.021
65. Lakhia RT, Trivedi JR. The CT Scan Lung Severity Score and Vaccination Status in COVID-19 patients in India: Perspective of an Independent Radiology Practice. *medRxiv*, Published online 2021 Aug 3. doi:10.1101/2021.07.15.21260597
66. Elliott P, Haw D, Wang H, et al. Exponential growth, high prevalence of SARS-CoV-2 and vaccine effectiveness associated with Delta variant. *Science.*, Published online 2021 Nov 2. doi: 10.1126/science.abl9551
67. Mizrahi B, Lotan R, Kalkstein N, et al. Correlation of SARS-CoV-2 Breakthrough Infections to Time-from-vaccine; Preliminary Study. *Nature Communications*, Published online 2021 November 4. doi: https://doi.org/10.1038/s41467-021-26672-3
68. Riemersma K, Grogan E, Kita-Yarbro A, et al. Vaccinated and unvaccinated individuals have similar viral loads in communities with a high prevalence of the SARS-CoV-2 delta variant. *medRxiv*, Published online 2021 July 31. doi: 10.1101/2021.07.31.21261387.
69. Wickert D P, Almand E A, Baldovich K J, et al. Estimates of Single Dose and Full Dose BNT162b2 Vaccine Effectiveness among USAF Academy cadets, 1 Mar - 1 May 2021. *medRxiv*, Published online 2021 July 31. doi: 10.1101/2021.07.28.21261138.
70. Chia P Y, Ong S W X, Chiew C J, et al. Virological and serological kinetics of SARS-CoV-2 Delta variant vaccine-breakthrough infections: a multi-center cohort study. *Clin Microbiol Infect*. Published online 2021 November 22. doi: https://doi.org/10.1016/j.cmi.2021.11.010
71. Keegan L, Truelove SA, Lessler J, et al. Progress of the Delta variant and erosion of vaccine effectiveness, a warning from Utah. *medRxiv*, Published online 2021 August 09. doi: 10.1101/2021.08.09.21261554
72. Ye P, Fry L , Liu L,COVID outbreak after the 1st dose of COVID vaccine among the nursing home residents: What happened? *Geriatric Nursing.* Published online 2021 June 25. doi: 10.1016/j.gerinurse.2021.06.022
73. Tregoning, J.S., Flight, K.E., Higham, S.L. *et al.* Progress of the COVID-19 vaccine effort: viruses, vaccines and variants versus efficacy, effectiveness and escape. *Nat Rev Immunol*. Published online 2021 August 09. doi: 10.1038/s41577-021-00592-1.
74. Starrfelt J, Danielsen A.S, et al. High vaccine effectiveness against COVID-19 infection and severe disease among residents and staff of long-term care facilities in Norway, November – June 2021. *medRxiv.* Published online 2021 August 09. doi: doi.org/10.1101/2021.08.08.21261357
75. Herlihy R, Bamberg W, Burakoff A, et al. Rapid Increase in Circulation of the SARS-CoV-2 B.1.617.2 (Delta) Variant — Mesa County, Colorado, April–June 2021. MMWR Morb Mortal Wkly Rep. ePub: 6 August 2021. doi: 10.15585/mmwr.mm7032e2

76. Brown CM, Vostok J, Johnson H, et al. Outbreak of SARS-CoV-2 Infections, Including COVID-19 Vaccine Breakthrough Infections, Associated with Large Public Gatherings — Barnstable County, Massachusetts, July 2021. MMWR Morb Mortal Wkly Rep 2021;70:1059-1062. doi: 10.15585/mmwr.mm7031e2external icon
77. North C, Barczak A et al. Determining the Incidence of Asymptomatic SARS-CoV-2 among Early Recipients of COVID-19 Vaccines: A Prospective Cohort Study of Healthcare Workers before, during and after Vaccination [DISCOVER-COVID-19], *Clinical Infectious Diseases*, Published online 2021 August 07. doi: 10.1093/cid/ciab643
78. Israel A, Merzon E, Schaffer AA, et al. Elapsed time since BNT 162b2 vaccine and risk of SARS-CoV-2 infection in a large cohort. *medRxiv*, Published online 2021 August 05. doi: 10.1101/2021.08.03.21261496
79. Issac A, Kochuparambil JJ, Elizabeth L. SARS-CoV-2 Breakthrough Infections among the Healthcare Workers Post-Vaccination with ChAdOx1 nCoV-19 Vaccine in the South Indian State of Kerala. *medRxiv*, Published online 2021 August 08. doi: 10.1101/2021.08.07.21261587
80. Marco A, Teixido N, Guerrero RA, et al. Outbreak of SARS-CoV-2 in a prison: Low effectiveness of a single dose of the adenovirus vector ChAdOx1 vaccine in recently vaccinated inmates. *medRxiv*, Published online 2021 August 05. doi: 10.1101/2021.08.03.21258337
81. Bitan DT, Kridin K, Cohen AD, Weinstein O. COVID-19 hospitalization, mortality, vaccination, and postvaccination trends among people with schizophrenia in Israel: a longitudinal cohort study. *Lancet Psychiatry.* Published online 2021 Aug 5. doi: 10.1016/S2215-0366(21)00256-X
82. Public Health England. SARS-CoV-2 variants of concern and variants under investigation in England: Technical briefing 20. Published online 2021 Aug 6. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009243/Technical_Briefing_20.pdf
83. Pezzotti P, Fabiani M et al. Impact of vaccination on the risk of SARS-CoV-2 infection and hospitalization and death in Italy(27.12.2020-14.07.2021). *Ministere della Salute*. Published online 2021 July 27. Available from: https://www.epicentro.iss.it/vaccini/covid-19-report-valutazione-vaccinazione.
84. Moline HL, Whitaker M, Deng L, et al. Effectiveness of COVID-19 Vaccines in Preventing Hospitalization Among Adults Aged ≥65 Years — COVID-NET, 13 States, February–April 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70:1088-1093. doi: http://dx.doi.org/10.15585/mmwr.mm7032e3.
85. Kang M, Yi Y, Limei S, et al. Effectiveness of Inactivated COVID-19 Vaccines Against Illness Caused by the B.1.617.2 (Delta) Variant During an Outbreak in Guangdong, China. *Ann Intern Med*. Published online 2022 Feb 1. doi: 10.7326/M21-3509
86. Elavarasi A, Sagiraju HKR, Garg RK, et al. Clinical features, demography and predictors of outcomes of SARS-CoV-2 infection in a tertiary care hospital in India-A cohort study. *Lung India*, 2022;39(1):16-26. doi: 10.4103/lungindia.lungindia_493_21

87. Singer SR, Angulo FJ, Swerdlow DL et al. Effectiveness of BNT162b2 mRNA COVID-19 vaccine against SARS-CoV-2 variant Beta (B.1.351) among persons identified through contact tracing in Israel: A prospective cohort study. *EClinicalMedicine.* Published online 2021 Nov 28. doi: https://doi.org/10.1016/j.eclinm.2021.101190
88. Kang M, Xin H, Yuan J, et al. Transmission dynamics and epidemiological characteristics of Delta variant infections in China. *medRxiv*, Published online 2021 August 13. doi: 10.1101/2021.08.12.21261991.
89. Cavanaugh AM, Spicer KB, Thoroughman D, Glick C, Winter K. Reduced Risk of Reinfection with SARS-CoV-2 After COVID-19 Vaccination — Kentucky, May–June 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70:1081-1083. doi: http://dx.doi.org/10.15585/mmwr.mm7032e1
90. Li XN, Huang Y, Wang W, et al. Efficacy of inactivated SARS-CoV-2 vaccines against the Delta variant infection in Guangzhou: A test-negative case-control real-world study [published online ahead of print, 2021 Aug 14]. *Emerg Microbes Infect*. 2021;1-32. doi:10.1080/22221751.2021.1969291.
91. Cabezas C, Coma E, Mora-Fernandez N, et al. Associations of BNT162b2 vaccination with SARS-CoV-2 infection and hospital admission and death with covid-19 in nursing homes and healthcare workers in Catalonia: prospective cohort study. *BMJ.* 2021;374:n1868. doi: 10.1136/bmj.n1868
92. Rosenberg ES, Holtgrave DR, Dorabawila V, et al. New COVID-19 Cases and Hospitalizations Among Adults, by Vaccination Status – New York, May 3-July 25, 2021. *MMWR Morb Mortal Wkly Rep.* Published online 2021 Sep 17. doi: http://dx.doi.org/10.15585/mmwr.mm7037a7
93. Baltas I, Boshier FAT, Williams CA, et al. Post-vaccination COVID-19: A case-control study and genomic anlysis of 119 breakthrough infections in partially vaccinated individuals. *Clin Infect Dis*. Published online 2021 Aug 19;ciab714. doi: 10.1093/cid/ciab714
94. Braeye T, Cornelissen L, Catteau L, et al. Vaccine effectiveness against infection and onwards transmission of COVID-19: Analysis of Belgian contact tracing data, January-June 2021, Vaccine, 2021. Published online Aug 19, 2021. doi: https://doi.org/10.1016/j.vaccine.2021.08.060.
95. Theiler RN, Wick M, Mehta R, et al. Pregnancy and birth outcomes after SARS-CoV-2 vaccination in pregnancy. *Am J Obstet Gynecol.* Published online 2021 Aug 20. doi: 10.1016/j.ajogmf.2021.100467
96. Gomes D, Beyerlein A, Katz K, et al. Is the BioNTech-Pfizer COVID-19 vaccination effective in elderly populations? Results from population data from Bavaria, Germany. *PLOS One*. Published online 2021 November 5. doi: 10.1371/journal.pone.0259370
97. Kislaya I, Rodrigues EF, Borges V, et al. Delta variant and mRNA Covid-19 vaccines effectiveness: higher odds of vaccine infection breakthroughs. *medRxiv*. Published online 2021 August 22. doi: 10.1101/2021.08.14.21262020
98. Cerqueira-Silva T, Oliveira VA, Pescarini J, et al. Influence of age on the effectiveness and duration of protection in Vaxzevria and CoronaVac vaccines. *medRxiv*. Published online 2021 August 27. doi: 10.1101/2021.08.21.21261501

99. Servillita V, Morris MK, Sotomayor-Gonzalez A, et al. Predominance of antibody-resistant SARS-CoV-2 variants in vaccine breakthrough cases from the San Francisco Bay Area, California. *medRxiv*. Published online 2021 August 25. doi: 10.1101/2021.08.19.21262139
100. Barchuk A, Cherkashin M, Bulina A. Vaccine Effectiveness against Referral to hospital and Severe Lung Injury Associated with COVID-19: A Population-Based Case-Control Study in St. Petersburg, Russia. *medRxiv*. Published online 2021 August 26. doi: 10.1101/2021.08.18.21262065
101. Fowlkes, A., Gaglani, M., Groover, K., Thiese, M. S., Tyner, H., & Ellingson, K. (2021). Effectiveness of COVID-19 Vaccines in Preventing SARS-CoV-2 Infection Among Frontline Workers Before and During B.1.617.2 (Delta) Variant Predominance — Eight U.S. Locations, December 2020–August 2021. *MMWR. Morbidity and Mortality Weekly Report*, *70*(34). https://doi.org/10.15585/mmwr.mm7034e4
102. Ujjainiya R, Tyagi A, Sardana V, et al. High failure rate of ChAdOx1-nCoV19 immunization against asymptomatic infection in healthcare workers during a Delta variant surge: a case for continued use of masks post-vaccination. *medRxiv*. Published online 2021 August 28. doi: 10.1101/2021.02.28.21252621
103. Sagiraju HKR, Elavarasi A, Gupta N, et al. The effectiveness of SARS-CoV-2 vaccination in preventing severe illness and death – real-world data from a cohort of patients hospitalized with COVID-19. *medRxiv*. Published online 2021 August 29. doi: 10.1101/2021.08.26.21262705
104. Seppälä Elina, Veneti Lamprini, Starrfelt Jostein, Danielsen Anders Skyrud, Bragstad Karoline, Hungnes Olav, Taxt Arne Michael, Watle Sara Viksmoen, Meijerink Hinta. Vaccine effectiveness against infection with the Delta (B.1.617.2) variant, Norway, April to August 2021. *Euro Surveill.* Published 2021 September 2. doi: https://doi.org/10.2807/1560-7917.ES.2021.26.35.2100793
105. Keehner J, Binkin N, Laurent L. Resurgence of SARS-CoV-2 Infection in a Highly Vaccinated Health System Workforce. *N Engl J Med.* Published online Sep 1, 2021. doi: 10.1056/NEJMc2112981.
106. Tareq AM, Emran TB, Dhama K, et al. Impact of SARS-CoV-2 delta variant (B.1.617.2) in surging second wave of COVID-19 and efficacy of vaccines in tackling the ongoing pandemic. *Hum Vaccin Immunother.* Published online September 2, 2021. doi: 10.1080/21645515.2021.1963601
107. Veneti L, Salamanca BV, Seppala E, et al. No difference in risk of hospitalization between reported cases of the SARS-CoV-2 Delta variant and Alpha variant in Norway. *Int J Infect Dis*. Published online 2021 December 10. doi: 10.1016/j.ijid.2021.12.321
108. Kertes J, Gez SB, Saciuk Y, et al. Effectiveness of the mRNA BNT162b2 vaccine six months after vaccination: findings from a large Israeli HMO. *medRxiv*. Published online 2021 September 7. doi: 10.1101/2021.09.01.21262957
109. Puranik A, Lenehan PJ, O'Horo JC, et al. Durability analysis of the highly effective BNT162b2 vaccine against COVID-19. *medRxiv*. Published online 2021 September 7. doi: 10.1101/2021.09.04.21263115
110. Murugesan M, Mathews P, Paul H, et al. Protective Effect Conferred by Prior Infection and Vaccination on COVID-19 in a Healthcare Worker Cohort in South India. *SSRN*, Published online 2021 Aug 31. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3914633.

111. González S, Olszevicki S, Salazar M, et al. Effectiveness of the first component of Gam-COVID-Vac (Sputnik V) on reduction of SARS-CoV-2 confirmed infections, hospitalisations and mortality in patients aged 60-79: a retrospective cohort study in Argentina. *EClinicalMedicine*. 2021;40. doi:10.1016/j.eclinm.2021.101126
112. Villela DAM, de Noronha TG, Bastos LS, et al. Effectiveness of mass vaccination in Brazil against severe COVID-19 cases. *medRxiv*. Published online 2021 September 15. doi: 10.1101/2021.09.10.21263084
113. McKeigue PM, McAllister D, Hutchinson SJ, et al. Efficacy of vaccination against severe COVID-19 in relation to Delta variant and time since second dose: the REACT-SCOT case-control study. m*edRxiv*. Published online 2021 September 15. doi: 10.1101/2021.09.12.21263448
114. McKeigue PM, McAllister D, Robertson C, et al. Efficacy of two doses of COVID-19 vaccine against severe COVID-19 in those with risk conditions and residual risk to the clinically extremely vulnerable: the REACT-SCOT case-control study. *medRxiv.* Published online 2021 September 16. doi: 10.1101/2021.09.13.21262360
115. de Gier B, Kooijman M, Kemmeren J, et al. COVID-19 vaccine effectiveness against hospitalizations and ICU admissions in the Netherlands, April-August 2021. *medRxiv.* Published online 2021 September 17. doi: 10.1101/2021.09.15.21263613
116. Blaiszik, B., Graziani, C., Olds, J. L., & Foster, et al. The Delta Variant Had Negligible Impact on COVID-19 Vaccine Effectiveness in the USA. *medRxiv*. Published online 2021 September 22. doi: https://doi.org/10.1101/2021.09.18.21263783
117. Baden LR, Sahly HME, Essink B,et al. Covid-19 in the Phase 3 Trial of mRNA-1273 During the Delta-variant Surge. *medRxiv*. Published online 2021 September 22. doi: https://doi.org/10.1101/2021.09.17.21263624
118. Ruban, A. charle. pon, Mohamed, A., & Kalyanaraman, S. Effectiveness of vaccination in preventing severe SARS CoV-2 infection in South India-a hospital based cross sectional study. *medRxiv*. Published online September 23, 2021. doi: https://doi.org/10.1101/2021.09.17.21263670
119. McEvoy, Caitríona M. MB BCh, PhD1; Lee, Anna BHSc,2; Misra, Paraish S. MD2; Lebovic, Gerald PhD3; Wald, Ron MDCM, MPH2; Yuen, Darren A. MD, PhD1 Real-world Impact of 2-dose SARS-CoV-2 Vaccination in Kidney Transplant Recipients, Transplantation: February 25, 2022 doi: 10.1097/TP.0000000000004081
120. doi: 10.1097/TP.0000000000004081 Bleicher A, Kadour-Peero E, Sagi-Dain L, et al. Early exploration of COVID-19 vaccination safety and effectiveness during pregnancy: interim descriptive data from a prospective observational study. *Vaccine*. Published online September 25, 2021. doi: https://doi.org/10.1016/j.vaccine.2021.09.043
121. Manley HJ, Aweh GN, Hsu CM, et al. SARS-CoV-2 vaccine effectiveness and breakthrough infections in maintenance dialysis patients. *medRxiv*. Published online September 29, 2021. doi: https://doi.org/10.1101/2021.09.24.21264081
122. Chen X, Wang W, Chen X, et al. Prediction of long-term kinetics of vaccine-elicited neutralizing antibody and time-varying vaccine-specific efficacy against the SARS-CoV-2 Delta variant by clinical endpoint. *medRxiv*. Published online September 27, 2021. doi: https://doi.org/10.1101/2021.09.23.21263715

123. de Leo S. Effectiveness of the mRNA BNT162b2 vaccine against SARS-CoV-2 severe infections in the Israeli over 60 population: a temporal analysis done by using the national surveillance data. *medRxiv*. Published online September 28, 2021. doi: https://doi.org/10.1101/2021.09.27.21264130
124. Arifin WN, Musa KI, Hanis TM, et al. A brief analysis of the COVID-19 death data in Malaysia. *medRxiv*. Published online September 29, 2021. doi: https://doi.org/10.1101/2021.09.28.21264234
125. Young-Xu Y, Smith J, Korves C. SARS-Cov-2 Infection versus Vaccine-Induced Immunity among Veterans. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.09.27.21264194
126. Hollinghurst J, Hollinghurst R, North L, et al. COVID-19 risk factors amongst 14,876 care home residents: An observational longitudinal analysis including daily community positive test rates of COVID-19, hospital stays, and vaccination status in Wales (UK) between 1st September 2020 and 1st May 2021. *Age and Ageing*. 2022;51(5):afac084. doi: https://doi.org/10.1093/ageing/afac084
127. Wang L, Wang Q, Davis PB, et al. Increased risk for COVID-19 breakthrough infection in fully vaccinated patients with substance use disorders in the United States between December 2020 and August 2021. *World Psych*. Published online October 5, 2021. doi: 10.1002/wps.20921
128. Vaishya R, Sibal A, Malani A, et al. Symptomatic post-vaccination SARS-CoV-2 infections in healthcare workers – A multicenter cohort study. *Diabetes Metab Syndr.* 2021;15(6):102306. doi: https://doi.org/10.1016/j.dsx.2021.102306
129. Rosenberg ES, Dorabawila V, Easton D, et al. COVID-19 vaccine effectiveness in New York State. *NEJM.* Published online December 1, 2021. doi: 10.1056/NEJMoa2116063
130. Dolzhikova, I., Gushchin, V., et al(2021). One-shot immunization with Sputnik Light (the first component of Sputnik V vaccine) is effective against SARS-CoV-2 Delta variant: efficacy data on the use of the vaccine in civil circulation in Moscow. *MedRxiv*,.Published online October 14 2021. doi: https://doi.org/10.1101/2021.10.08.21264715
131. Uschner, D., Bott, M., Santacatterina, M et al. (2021). Breakthrough SARS-CoV-2 Infections after Vaccination in North Carolina. *MedRxiv*, Published online October 13, 2021. doi: https://doi.org/10.1101/2021.10.10.21264812
132. Singh C, Naik BN, Pandey S, et al. Effectiveness of COVID-19 vaccine in preventing infection and disease severity: A case control study from an Eastern State of India. *Epidemiol Infect*. Published online October 11, 2021. doi: https://doi.org/10.1017/S0950268821002247
133. de Gier B, S, Backer JA, et al. Vaccine effectiveness against SARS-CoV-2 transmission to household contacts during dominance of Delta variant (B.1.617.2), August-September 2021, the Netherlands. *medRxiv*. Published online October 14, 2021. doi: https://doi.org/10.1101/2021.10.14.21264959
134. Cohn BA, Cirillo PM, Murphy CC, et al. SARS-CoV-2 vaccine protection and deaths among US veterans during 2021. *Science*. Published online November 4, 2021. doi: https://doi.org/10.1101/2021.10.13.21264966

135. Pattni K, Hungerford D, Adams S, et al. Effectiveness of the BNT162b2 (Pfizer-BioNTech) and the ChAdOx1 nCoV-19 (Oxford-AstraZeneca) vaccines for reducing susceptibility to infection with the Delta variant (B.1.617.2) of SARS-CoV-2. *BMC Infectious diseases*. Published online October 14, 2021. doi: https://doi.org/10.1186/s12879-022-07239-z
136. Di Fusco M, Moran MM, Cane A, et al. Evaluation of COVID-19 vaccine breakthrough infections among immunocompromised patients fully vaccinated with BNT162b2. *medRxiv*, Published online October 16, 2021. doi: https://doi.org/10.1101/2021.10.12.21264707
137. Hulme WJ, Williamson EJ, Green ACA, et al. Comparative effectiveness of ChAdOx1 versus BNT162b2 COVID-19 vaccines in Health and Social Care workers in England: a cohort study using OpenSAFELY. *medRxiv*, Published online October 18, 2021. doi: https://doi.org/10.1101/2021.10.13.21264937
138. Laing ED, Weiss CD, Samuels EC, et al. Durability of antibody responses and frequency of clinical and subclinical SARS-CoV-2 infection six months after BNT162b2 COVID-19 vaccination in healthcare workers. *medRxiv*. Published online October 18, 2021. doi: https://doi.org/10.1101/2021.10.16.21265087
139. Moshe Mittelman, Ori Magen, Noam Barda, Noa Dagan, Howard S Oster, Avi Leader, Ran Balicer; Effectiveness of the BNT162b2mRNA Covid-19 Vaccine in Patients with Hematological Neoplasms. *Blood* 2021. Published online October 18, 2021. doi: https://doi.org/10.1182/blood.2021013768
140. Rosa-Diez, G., Papaginovic Leiva, M. M., Lombi, F.,et al. (2021). Safety and Effectiveness of COVID-19 SPUTNIK V Vaccine in Dialysis Patients. *MedRxiv*, 2021.Published online October 25, 2021. Doi: https://doi.org/10.1101/2021.10.21.21265349
141. Kurita, J., Sugawara, T., & Ohkusa, Y. (2021). Vaccine Effectiveness for the COVID-19 in Japan. *MedRxiv*, 2021.Published online 22 October 2021. Doi: https://doi.org/10.1101/2021.06.20.21259209
142. Brunelli S, Sibbel S, Karpinski S, et al. Comparative Effectiveness of mRNA-Based BNT162b2 Vaccine versus Adenovirus Vector-Based Ad26.COV2.S Vaccine for Prevention of COVID-19 among Dialysis Patients. *Journal of the American Society of Nephrology*. Published online 2022 February 8. doi:10.1681/asn.2021101395.
143. Chadeau-Hyam, M., Wang, H., Eales, O.,et al. (2021). REACT-1 study round 14: High and increasing prevalence of SARS-CoV-2 infection among school-aged children during September 2021 and vaccine effectiveness against infection in England. *MedRxiv*, 2021.Published online October 22,2021. https://doi.org/10.1101/2021.10.14.21264965
144. McKeigue, P. M., McAllister, D. A., Hutchinson, S. J., Robertson, C., Stockton, D., Colhoun, H. M., & Cell, for the P. H. S. C.-19 E. and R. (2021). Efficacy of vaccination against severe COVID-19 in relation to Delta variant and time since second dose: the REACT-SCOT case-control study. *MedRxiv*, 2021.Published online October 23, 2021. https://doi.org/10.1101/2021.09.12.21263448
145. Sajal De, Dibakar Sahu, Diksha Mahilang et al. Effectiveness of partial COVID-19 vaccination on the outcome of hospitalized COVID-19 patients during the second pandemic In India, 25 October 2021, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-964720/v1]

146. Taquet, M., Dercon, Q., & Harrison, P. J. (2021). Six-month sequelae of post-vaccination SARS-CoV-2 infection: a retrospective cohort study of 10,024 breakthrough infections. *MedRxiv*, 2021.Published online October 28, 2021. doi: https://doi.org/10.1101/2021.10.26.21265508
147. Bozio CH, Grannis SJ, Naleway AL, et al. Laboratory-confirmed COVID-19 among adults hospitalized with COVID-19-Like Illness with infection-induced or mRNA vaccine-induced SARS-CoV-2 immunity—Nine states, January-September 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70(44):1539-1544. doi: http://dx.doi.org/10.15585/mmwr.mm7044e1
148. Ben-Tov A, Banon T, Chodick G, et al. BNT162b2 messenger RNA COVID-19 vaccine effectiveness in patients with inflammatory bowel disease: Preliminary rea-world data during mass vaccination campaign. *Gastroenterology.* 2021;161(5):1715-1717. doi: https://doi.org/10.1053/j.gastro.2021.06.076
149. Abu-Raddad L, Chemaitelly H, Ayoub HH, et al. Association of prior SARS-CoV-2 infection with risk of breakthrough infection following mRNA vaccination in Qatar. *JAMA.* Published online November 1, 2021. doi:10.1001/jama.2021.19623
150. Mhawish H, Mady A, Alaklobi F, et al. Comparison of severity of immunized versus non-immunized COVID-19 patients admitted to ICU: A prospective observational study. *Ann Med Surg*. Published online October 15, 2021. doi: https://doi.org/10.1016/j.amsu.2021.102951
151. Macchia A, Ferrante D, Angeleri P, et al. Evaluation of a COVID-19 Vaccine Campaign and SARS-CoV-2 Infection and Mortality Among Adults Aged 60 Years and Older in a Middle-Income Country. *JAMA Netw Open*. 2021;4(10):e2130800. doi:10.1001/jamanetworkopen.2021.30800
152. Elliott P, Haw D, Wang H, et al. Exponential growth, high prevalence of SARS-CoV-2, and vaccine effectiveness associated with the Delta variant. *Science*. 2021 Nov 2;eabl9551. doi: 10.1126/science.abl9551.
153. Acharya S, Mahindra G, Nirala P, et al. Protection offered by COVID-19 vaccines in reducing SARS-CoV-2 infection frequency; severity and mortality, among Indian Healthcare Workers: Multi-center, pan-Fortis study. *Research Square.* Published online 2021 November 8. doi: 10.21203/rs.3.rs-1055978/v1
154. Gardner BJ & Kilpatrick AM. Third doses of COVID-19 vaccines reduce infection and transmission of SARS-CoV-2 and could prevent future surges in some populations: a modeling study. *medRxiv.* Published online 2021 November 4. doi: 10.1101/2021.10.25.21265500
155. Bergwerk M, Gonen T, Lustig Y, et al. Covid-19 breakthrough infections in vaccinated health care workers. *NEJM.* 2021;385:1474-1484. doi: 10.1056/NEJMoa2109072
156. Singanayagam A, Hakki S, Dunning J, et al. Community transmission and viral load kinetics of the SARS-CoV-2 delta (B.1.617.2) variant in vaccinated and unvaccinated individuals in the UK: a prospective, longitudinal, cohort study. *The Lancet Infectious Diseases*. Published online 2021 October 28. doi:10.1016/s1473-3099(21)00648-4

157. Rosero-Bixby L. Vaccine effectiveness of Pfizer-BioNTech and Oxford-AstraZeneca to prevent severe COVID-19 in Costa Rica: A nationwide, ecological study of hospitalisations prevalence. *JMIR Public Health Surveill*. Published online 2022 April 28. 26/04/2022:3504 (forthcoming/in press)
158. Niessen AF, Knol MJ, Hahne SJ, Bonten MJ, Bruijning-Verhagen PP. Vaccine effectiveness against COVID-19 related hospital admission in the Netherlands: a test-negative case-control study. *medRxiv* Published online 2021 November 10. doi:10.1101/2021.11.09.21266060.
159. Cohen K, Islam N, Jarvis MS, et al. Comparative Efficacy over time of the mRNA-1273 (Moderna) vaccine and the BNT162b2 (Pfizer-BioNTech) vaccine. *Research Square.* Published online 2021 November 12. doi: https://doi.org/10.21203/rs.3.rs-1071804/v1.
160. Robilotti EV, Whiting K, Lucca A, et al. Clinical and genomic characterization of SARS CoV-2 infections in mRNA vaccinated health care personnel in New York City. *Clin Infect Dis*. Published online 2021 October 13. doi: https://doi.org/10.1093/cid/ciab886
161. Maltezou HC, Panagopoulos P, Sourri F, et al. COVID-19 vaccination significantly reduces morbidity and absenteeism among healthcare personnel: A prospective multicenter study. *Vaccine.* Published online 2021 October 30. doi: https://doi.org/10.1016/j.vaccine.2021.10.054
162. Starrfelt J, Buanes EA, Juvet LK, et al. Age and product dependent vaccine effectiveness against SARS-CoV-2 infection and hospitalisation among adults in Norway: a national cohort study, January-September 2021. *medRxiv.* Published online 2021 November 12. doi: 10.1101/2021.11.12.21266222
163. National Centre for Immunisation Research and Surveillance (NCIRS). IN FOCUS Report: Vaccination among COVID-19 cases in the NSW Delta outbreak, Reporting period: 16 June to 7 October 2021. NSW Ministry of Health. Published online 2021 November. Available at: https://www.health.nsw.gov.au/Infectious/covid-19/Documents/in-focus/covid-19-vaccination-case-surveillance-051121.pdf
164. Texas Department of State Health Services. COVID-19 cases and deaths by vaccination status. Texas Health and Human Services. Published online 2021 November 8. Available at: https://www.dshs.texas.gov/immunize/covid19/data/Cases-and-Deaths-by-Vaccination-Status-11082021.pdf
165. Narayan P, Kumar S, Mohan M, et al. Uptake and impact of vaccination against COVID-19 among healthcare workers – evidence from a multicentre study. *Am J Infect Control.* Published online 2021 November 11. doi: https://doi.org/10.1016/j.ajic.2021.10.036
166. Bianchi FP, Tafuri S, Migliore G, et al. BNT162b2 mRNA COVID-19 vaccine effectiveness in the prevention of SARS-CoV-2 infection and symptomatic disease in five-month follow-up: A retrospective study. *Vaccines*. 2021 9(10):1143. doi: https://doi.org/10.3390/vaccines9101143
167. Bhatnagar T, Chaudhari S, Manickam P, et al. Effectiveness of BBV152/Covaxin and AZD1222/Covishield Vaccines Against Severe COVID-19 and B.1.617.2/Delta Variant in India, 2021: A Multi-Centric Hospital-Based Case-Control Study. *SSRN*, Published 2021 November 11. doi: http://dx.doi.org/10.2139/ssrn.3955739
168. Abu-Raddad LJ, Chemaitelly H, Ayoub HH, et al. Protection offered by mRNA-1273 versus BNT162b2 vaccines against SARS-CoV-2 infection and severe COVID-19 in Qatar. 2021. *medRxiv*. Published online 2021 November 13. doi:10.1101/2021.11.12.21266250.

169. Prieto-Alhambra D, Hermosilla E, Coma E, et al. Comparative effectiveness and safety of homologous two-dose ChAdOx1 versus heterologous vaccination with ChAdOx1 and BNT162b2: a cohort analysis. *Research Square.* Published online 2021 November 18. doi: 10.21203/rs.3.rs-1074858/v1
170. Pascucci D, Nurchis MC, Sapienza M, et al. Evaluation of the Effectiveness and Safety of the BNT162b2 COVID-19 Vaccine in the Vaccination Campaign among the Health Workers of Fondazione Policlinico Universitario Agostino Gemelli IRCCS. Policlinico Universitario Agostino Gemelli IRCCS. International Journal of Environmental Research and Public Health. 2021; 18(21):11098. https://doi.org/10.3390/ijerph182111098.
171. Naleway AL, Groom HC, Crawford PM, et al. Incidence of SARS-CoV-2 infection, emergency department visits, and hospitalizations because of COVID-19 among persons aged ≥12 years, by COVID-19 vaccination status – Oregon and Washington, July 4-September 25, 2021. *MMWR Morb Mortal Wkly.* 2021;70:1608-1612. http://dx.doi.org/10.15585/mmwr.mm7046a4.
172. Dashkevich AM, Vysotskaya VS, Hlinskaya IN, et al. COVID-19 in the Republic of Belarus: pandemic features and the interim safety and efficacy assessment of the Gam-COVID-Vac vaccine. *medRxiv*. Published online 2021 November 16. doi: 10.1101/2021.11.15.21265526.
173. Iskander J, Frost J, Russell S, et al. Effectiveness of vaccination against reported SARS-CoV-2 infection in United States Coast Guard personnel between May and August 2021: A time-series analysis. *medRxiv*. Published online 2021 November 21. doi: 10.1101/2021.11.19.21266537.
174. Clifford S, Waight P, Hackman J, et al. Effectiveness of BNT162b2 and ChAdOx1 against SARS-Cov-2 household transmission: a prospective cohort study in England. *medRxiv*. Published online 2021 November 24. doi: 10.1101/2021.11.24.21266401.
175. Lippi G & Mattiuzzi C. Primary COVID-19 vaccine cycle and booster doses efficacy: analysis of Italian nationwide vaccination campaign. *Research Square*. Published online November 30, 2021. doi: 10.21203/rs.3.rs-1116534/v1
176. Grant R, Charmet T, Schaeffer L, et al. Impact of SARS-CoV-2 Delta variant on incubation, transmission settings and vaccine effectiveness: Results from a nationwide case-control study in France. *The Lancet Regional Health - Europe.* 2021; 00; 100278. Published online November 25, 2021. doi: 10.1016/j.lanepe.2021.100278.
177. Kläser K, Molteni E, Graham M, et al. COVID-19 due to the B.1.617.2 (Delta) variant compared to B.1.1.7 (Alpha) variant of SARS-CoV-2: two prospective observational cohort studies. *medRxiv*. Published online 2021 November 26. doi: 10.1101/2021.11.24.21266748v1.
178. Dickerman BA, Gerlovin H, Madenci AL, et al. Comparative Effectiveness of BNT162b2 and mRNA-1273 Vaccines in U.S. Veterans. *N Engl J Med.* Published online 2021 December 1. doi: 10.1056/NEJMoa2115463.
179. Borges MC, Palacios R, Brango HA, et al. Projeto S: A stepped-wedge randomized trial to assess CoronaVac effectiveness in Serrana, Brazil. *SSRN.* Published online 2021 November 29. doi: http://dx.doi.org/10.2139/ssrn.3973422
180. Reischig T, Kacer M, Vlas T, et al. Insufficient response to mRNA SARS-CoV-2 vaccine and high incidence of severe COVID-19 in kidney transplant recipients during pandemic. *Am J Transplant.* Published online 2021 December 3. doi: 10.1111/ajt.16902

181. Goldberg Y, Mandel M, Bar-On YM, et al. Protection and waning of natural and hybrid COVID-19 immunity. *N Engl J Med* 2022. Published online 2021. doi: 10.1056/NEJMoa2118946.
182. Coburn SB, Humes E, Lang R, et al. COVID-19 infections post-vaccination by HIV status in the United States. *medRxiv*. Published online May 25. December 6. doi: 10.1101/2021.12.02.21267182
183. Björk J, Bonander C, Moghaddassi M, et al.. Surveillance of COVID-19 vaccine effectiveness – a real-time case-control study in southern Sweden. *medRxiv*. Published online 2021 December 9. doi:10.1101/2021.12.09.21267515.
184. Volkov O. Predicted Symptomatic Effectiveness of Pfizer-BioNTech BNT162b2 Vaccine Against Omicron Variant of SARS-CoV-2. *medRxiv*. Published online 2021 December 11. doi:10.1101/2021.12.09.21267556.
185. Kshirsagar M, Mukherjee S, Nasir M, Becker N, Lavista Ferres JM, Richardson B. Risk of hospitalization and mortality after breakthrough SARS-CoV-2 infection by vaccine type and previous SARS-CoV-2 infection utilizing medical claims data. *medRxiv*. Published online 2021 December 09. doi:10.1101/2021.12.08.21267483.
186. Naranbhai V, Garcia-Beltran WF, Chang CC, et al. Comparative immunogenicity and effectiveness of mRNA-1273, BNT162b2 and Ad26.COV2.S COVID-19 vaccines. *The Journal of Infectious Diseases*. Published online 2021 December 09. doi:10.1093/infdis/jiab593.
187. Levin-Rector A, Firestein L, Mcgibbon E, et al.. Reduced Odds of SARS-CoV-2 Reinfection after Vaccination among New York City Adults, June–August 2021. *medRxiv*. Published online 2021 December 11. doi:10.1101/2021.12.09.21267203.
188. Garjani A, Patel S, Bharkhada D, et al. Impact of mass vaccination on SARS-CoV-2 infections among multiple sclerosis patients taking immunomodulatory disease-modifying therapies in England. *Mult Scler Relat Disord.* 2021 Dec 5;57:103458. doi: 10.1016/j.msard.2021.103458.
189. Xie, J., Feng, et al. Comparative effectiveness of the BNT162b2 vs ChAdOx1 vaccine against Covid-19. *Nat Commun*. Published online 2022 March 21. Doi: https://doi.org/10.1038/s41467-022-29159-x
190. Varrelman, T. J., Rader, B., Astley, C. M., & Brownstein, J. S. (2021). Syndromic Surveillance-Based Estimates of Vaccine Efficacy Against COVID-Like Illness from Emerging Omicron and COVID-19 Variants. *MedRxiv*, Published online 2021 December 18. doi: https://doi.org/10.1101/2021.12.17.21267995
191. Demongeot, J., Griette, Q., Magal, P., & Webb, G. F. (2021). Vaccine efficacy for COVID-19 outbreak in New York City. *MedRxiv*, Published online 2021 December 22. doi: https://doi.org/10.1101/2021.12.18.21268024
192. Manley, H. J., Aweh, G. N., Hsu, C. M., Weiner, D. E., Miskulin, D., Harford, A. M., Johnson, D., & Lacson, E. K. (2021). SARS-CoV-2 vaccine effectiveness and breakthrough infections in maintenance dialysis patients. *MedRxiv*, Published online 2021 December 21. doi: https://doi.org/10.1101/2021.12.20.21268124
193. Eggink, D., Andeweg, S. P., Vennema, H., (2021). Increased risk of infection with SARS-CoV-2 Omicron compared to Delta in vaccinated and previously infected individuals, the Netherlands, 22 November to 19 December 2021. *Eurosurveillance* Published online 2022 January 27. doi:10.2807/1560-7917.es.2022.27.4.2101196.

194. Chadeau-Hyam, M., Eales, O., Bodinier B, et al. Breakthrough SARS-CoV-2 infections in double and triple vaccinated adults and single dose vaccine effectiveness among children in autumn 2021 in England: REACT-1 study. *eClinicalMedicine*. 2022(48):101419. doi: https://doi.org/10.1016/j.eclinm.2022.101419
195. Chico-Sánchez P, Gras-Valenti P, Algado-Sellés N, et al. Efectividad de la vacuna BNT162b2 para prevenir la COVID-19 en personal sanitarioEffectiveness of BNT162b2 vaccine to preventing COVID-19 in healthcare personnel. *Gac Sanit.* Published online 2021 November 26.doi: https://doi.org/10.1016/j.gaceta.2021.11.003.
196. Ferguson N, Ghani A, Cori A, et al. Report 49: Growth, population distribution and immune escape of Omicron in England. Imperial College London (16-12-2021). Published online 2021 December 16. doi: https://doi.org/10.25561/93038.
197. Ngyen L B L, Bauer R, Lesieur Z, et al. Vaccine effectiveness against COVID-19 hospitalization in adults in France: A test negative case control study. Infect Dis Now. Published online 2021 December 14. doi. https://doi.org/10.1016/j.idnow.2021.12.002.
198. Elliott P, Bodinier B, Eales O, et al. Rapid increase in Omicron infections in England during December 2021: REACT-1 study. *MedRxiv*. Published online 2021 December 24. doi: https://doi.org/10.1101/2021.12.22.21268252.
199. Nguyen V G, Yavlinsky A, Beale S, et al. Comparative effectiveness of ChAdOx1 versus BNT162b2 vaccines against SARS-CoV-2 infections in England and Wales: A cohort analysis using trial emulation in the Virus Watch community data. *MedRxiv*. Published online 2021 December 23. doi: https://doi.org/10.1101/2021.12.21.21268214.
200. Drawz P E, DeSilva M, Bodurtha P, et al. Effectiveness of BNT162b2 and mRNA-1273 Second Doses and Boosters for SARS-CoV-2 infection and SARS-CoV-2 Related Hospitalizations: A Statewide Report from the Minnesota Electronic Health Record Consortium. *MedRxiv*. Published online 2022 January 10. doi: https://doi.org/10.1101/2021.12.23.21267853
201. Tabak Y P, Sun X, Brennan T, et al. Incidence and Estimated Vaccine Effectiveness Against Symptomatic SARS-CoV-2 Infection Among Persons Tested in US Retail Locations, May 1 to August 7, 2021. *JAMA Netw Open*. 2021;4(12):e2143346. doi:10.1001/jamanetworkopen.2021.43346.
202. Lev-Tzion R, Focht G, Lujan R, et al. COVID-19 vaccine is effective in inflammatory bowel disease patients and is not associated with disease exacerbation. *Clin Gastroenterol Hepatol*. Published online 2021 December 16. doi: https://doi.org/10.1016/j.cgh.2021.12.026
203. Coggiola M, Clemente G, Frammartino R, et al. SARS-CoV-2 infection: efficacy of extensive vaccination of the healthcare workforce in a large Italian hospital. *Med Lav.* 2021;112(6):465-76. doi: https://doi.org/10.23749/mdl.v112i6.12124
204. Yamamoto S, Maeda K, Matsuda K, et al. COVID-19 breakthrough infection and post-vaccination neutralizing antibody among healthcare workers in a referral hospital in Tokyo: a case-control matching study. *Clin Infect Dis.* Published online 2021 December 24. doi: https://doi.org/10.1093/cid/ciab1048
205. Pletz MW, Trommer S, Kolanos S, et al. Group vaccination five days before a COVID-19 outbreak in a long-term care facility. *Vaccines.* 2021;9(12):1450. doi: https://doi.org/10.3390/vaccines9121450

206. Hitchings MDT, Ranzani OT, Lind ML, et al. Change in COVID-19 risk over time following vaccination with CoronaVac: A test-negative case-control study. *medRxiv*. Published online 2021 December 24. doi: https://doi.org/10.1101/2021.12.23.21268335
207. Suah, J L, Tok P S K, Ong S M, et al. PICK-ing Malaysia's Epidemic Apart: Effectiveness of a Diverse COVID-19 Vaccine Portfolio. *Vaccines* 2021, 9, 1381. https://doi.org/10.3390/vaccines9121381.
208. Tuite A, Nelson L, Fisman D. Timing of Breakthrough Infection Risk After Vaccination Against SARS-CoV-2. *medRxiv*. Published online 2022 January 05. doi: https://doi.org/10.1101/2022.01.04.22268773.
209. Mattiuzzi C & Lippi G. COVID-19 vaccination is highly effective to prevent SARS-CoV-2 circulation. *Research Square*. Published online 2022 January 5. doi: https://doi.org/10.21203/rs.3.rs-1227382/v1
210. Premikha M, Chiew CJ, Wei WE, et al. Comparative effectiveness of mRNA and inactivated whole virus vaccines against COVID-19 infection and severe disease in Singapore. *SSRN.* Published online 2022 January 5. doi: http://dx.doi.org/10.2139/ssrn.3995282
211. Kuodi P, Gorelik Y, Zayyad H, et al. Association between vaccination status and reported incidence of post-acute COVID-19 symptoms in Israel: a cross-sectional study of patients infected between March 2020 and November 2021. *medRxiv*. Published online 2022 January 6. doi: : https://doi.org/10.1101/2022.01.05.22268800
212. Simon MA, Luginbuhl RD, Parker R. Reduced incidence of long-COVID symptoms related to administration of COVID-19 vaccines both before COVID-19 diagnosis and up to 12 weeks after. *medRxiv*. Published online 2021 November 18. doi: https://doi.org/10.1101/2021.11.17.21263608
213. Wisnivesky JP, Govindarajulu U, Bagiella E et al. Association of vaccination with the persistence of post-COVID symptoms. *SSRN.* Published online 2021 October 5. doi: http://dx.doi.org/10.2139/ssrn.3936501
214. Choe YJ, Yi S, Hwang I et al. Safety and effectiveness of BNT162b2 mRNA Covid-19 vaccine in adolescents. *Vaccine*. Published online 2021 December 24. doi: https://doi.org/10.1016/j.vaccine.2021.12.044
215. Shmuelian Z, Warszawer Y, Or O, et al. BNT162b2 post-exposure-prophylaxis against COVID-19. *medRxiv*. Published online 2022 January 8. doi: https://doi.org/10.1101/2022.01.07.22268869
216. Lippi G, Mattiuzzi C, Henry BM. Real-world analysis of age-dependent efficacy of COVID-19 vaccination. *Research Square*. Published online 2022 January 12. doi: 10.21203/rs.3.rs-1248612/v1
217. Aslam S, Liu J, Sigler R, et al. COVID-19 vaccination is protective of clinical disease in solid organ recipients. Transpl Infect Dis. Published online 2022 January 5. doi: https://doi.org/10.1111/tid.13788
218. Callaghan C, Mumford L, Curtis RMK, et al. Effectiveness of the Pfizer-BioNTech BNT162b2 and Oxford-AstraZeneca ChAdOx1-S vaccines against SARS-CoV-2 in solid organ and islet transplant recipients. *Transplantation*. Published online 2022 January 4. doi: 10.1097/TP.0000000000004059
219. Mielke N, Johnson S, Bahl A. Fully vaccinated and boosted patients requiring hospitalization for COVID-19: an observational cohort analysis. *medRxiv*. Published online 2022 January 5. doi: https://doi.org/10.1101/2022.01.05.22268626

220. Reynolds MW, Secora A, Joules A, et al. Evaluating real-world COVID-19 vaccine effectiveness using a test-negative case-control design. *medRxiv*. Published online 2022 January 6. doi: https://doi.org/10.1101/2022.01.06.22268726
221. Zheutlin A, Ott M, Sun R, et al Durability of protection post-primary COVID-19 vaccination in the US: matched case-control studys. *medRxiv*. Published online 2022 May 9. doi: https://www.medrxiv.org/content/10.1101/2022.01.05.22268648v2.
222. Gaio V, Silva A, Amaral P, et al. COVID-19 vaccine effectiveness among healthcare workers in Portugal: results from a hospital-based cohort study, December 2020 to November 2021. *medRxiv*. Published online 2022 January 7. doi: https://doi.org.10.1101/2022.01.07.22268889
223. Ioannou G, Locke E, Green P, et al. Comparison of Moderna versus Pfizer-Biontech COVID-19 vaccine outcomes: A target-trial emulation study in the US Veterans Affairs Healthcare System. *SSRN.* Published online 2022 January 7. doi: http://dx.doi.org/10.2139/ssrn.4003207
224. Rifai A, Wahono CS, Pratama MZ, et al. Association between the effectiveness and immunogenicity of inactivated SARS-CoV-2 vaccine (CoronaVac) with the presence of hypertension among health care workers. *Clin Exp Hypertens*. 2022 Jan 7;1-7. doi: 10.1080/10641963.2021.2022687
225. Bosetti, P., Tran Kiem, C. et al. Impact of booster vaccination on the control of COVID-19 Delta wave in the context of waning immunity: application to France in the winter 2021/22. *Eurosurveillance.* Published online 2022 January 6. doi: https://doi.org/10.2807/1560-7917.es.2022.27.1.2101125
226. Grgič Vitek, M., Klavs, I,et al.Vaccine effectiveness against severe acute respiratory infections (SARI) COVID-19 hospitalisations estimated from real-world surveillance data, Slovenia, October 2021. *Eurosurveillance.* Published online 2022 January 6. doi: https://doi.org/10.2807/1560-7917.es.2022.27.1.2101110
227. Lyngse FP, Molbak K, Denwood M, et al. Effect of vaccination on household transmission of SARS-CoV-2 Delta VOC. *medrxiv*. Published online 2022 January 6. doi: https://doi.org/10.1101/2022.01.06.22268841
228. Bell S, Campbell J, Lambourg E, et al. The Impact of Vaccination on Incidence and Outcomes of SARS-CoV-2 Infection in Patients with Kidney Failure in Scotland. *Journal of the American Society of Nephrology*. Published online 2022 February 2. doi:10.1681/asn.2022010046.
229. Malhotra S, Mani K, Lodha R, et al. SARS-CoV-2 Reinfection Rate and Estimated Effectiveness of the Inactivated Whole Virion Vaccine BBV152 Against Reinfection Among Health Care Workers in New Delhi, India. *JAMA Netw Open*. Published online 2022 January 7. doi:10.1001/jamanetworkopen.2021.42210.
230. New York State Department of Health. Pediatric COVID-19 update: January 7, 2022. Published online 2022 January 7. https://health.ny.gov/press/releases/2022/docs/pediatric_covid-19_hospitalization_report.pdf.
231. León TM, Dorabawila V, Nelson L, et al. COVID-19 Cases and Hospitalizations by COVID-19 Vaccination Status and Previous COVID-19 Diagnosis — California and New York, May–November 2021. *MMWR Morb Mortal Wkly Rep*. Published online 2022 January 19. DOI: http://dx.doi.org/10.15585/mmwr.mm7104e1external icon

232. Amodia E, Vella G et al. Effectiveness of mRNA COVID-19 Vaccination Against SARS-CoV-2 Infection and COVID-19 Disease in Sicily Over an Eight-Month Period. *SSRN*. Published online 2022 January 13. doi: http://dx.doi.org/10.2139/ssrn.4001786
233. John, B.V., Deng, Y., Schwartz, K.B., Taddei, T.H., Kaplan, D.E., Martin, P., Chao, H.-H. and Dahman, B. (2022), Post-Vaccination COVID-19 Infection is Associated with Reduced Mortality in Patients With Cirrhosis. *Hepatology*. Published online 2022 January 12. doi: https://doi.org/10.1002/hep.32337
234. Sultan I, Tbakhi A, Abuatta O et al. Distinct Vaccine Efficacy Rates Among Health Care Workers During a COVID-19 Outbreak in Jordan. *medRxiv.* Published online 2022 January 16. doi: https://doi.org/10.1101/2022.01.15.22269356
235. Brunner-Ziegler, S., Spath, T., Kornek, G., König, F., Parschalk, B., Schnetzinger, M., Straßl, R. P., Savic, R., Foit, A., Resch, H., & Thalhammer, F. (2022). Postvaccination infections among staff of a tertiary care hospital after vaccination with severe acute respiratory syndrome coronavirus 2 vector and mRNA-based vaccines. *Clinical Microbiology and Infection*. Published online 2021 December 13. doi: https://doi.org/10.1016/j.cmi.2021.11.023
236. Stock, S.J., Carruthers, J., Calvert, C. *et al.* SARS-CoV-2 infection and COVID-19 vaccination rates in pregnant women in Scotland. *Nat Med*. Published online 2022 January 13. doi: https://doi.org/10.1038/s41591-021-01666-2
237. Naleway, AL, Grant, L, Caban-Martinez, AJ, et al. Incidence of SARS-CoV-2 infection among COVID-19 vaccinated and unvaccinated healthcare personnel, first responders, and other essential and frontline workers: Eight US locations, January–September 2021. *Influenza Other Respi Viruses*. Published online 2022 January 13 doi:10.1111/irv.12956
238. Puranik A, Lenehan PJ, Silvert E, et al. Comparative effectiveness of mRNA-1273 and BNT162b2 against symptomatic SARS-CoV-2 infection. *Med (N Y)*. Published online 2022 January 14. doi:10.1016/j.medj.2021.12.002
239. Keegan LT, Truelove S, Lessler J. Analysis of Vaccine Effectiveness Against COVID-19 and the Emergence of Delta and Other Variants of Concern in Utah. *JAMA Netw Open.* Published online 2021 December 23. doi:10.1001/jamanetworkopen.2021.40906
240. Kislaya I, Rodrigues EF, Borges V, Gomes JP, Sousa C, Almeida JP, et al. Comparative effectiveness of coronavirus vaccine in preventing breakthrough infections among vaccinated persons infected with Delta and Alpha variants. *Emerg Infect Dis*. Published online 2021 December 07.doi: https://doi.org/10.3201/eid2802.211789
241. Serrano-Coll, H., Miller, H., Guzmán, C. *et al.* Effectiveness of the CoronaVac® vaccine in a region of the Colombian Amazon, was herd immunity achieved? *Trop Dis Travel Med Vaccines*. Published online 2022 January 15 https://doi.org/10.1186/s40794-021-00159-x
242. UK Health Security Agency (UKHSA). SARS-CoV-2 variants of concern and variants under investigation in England: Technical briefing 34. "Update on the SARS-CoV-2 Immunity and Reinfection Evaluation in healthcare workers (SIREN) study." Published online 2022 January 14. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1048395/technical-briefing-34-14-january-2022.pdf.

243. Lewnard J A, Hong V X, Patel M M, et al. Clinical outcomes among patients infected with Omicron (B.1.1.529) SARS-CoV-2 variant in southern California. *medRxiv*. Published online 2022 January 11. doi: https://doi.org/10.1101/2022.01.11.22269045.
244. Hussey H, Davies M, Heekes A, et al. Assessing the clinical severity of the Omicron variant in the Western Cape Province, South Africa, using the diagnostic PCR proxy marker of RdRp target delay to distinguish between Omicron and Delta infections – a survival analysis. *medRxiv*. Published online 14 January 2022. doi: https://doi.org/10.1101/2022.01.13.22269211.
245. Nguyen, M., Paul, E., Mills, P. K., & Paul, S.. (2022). Risk of COVID-19 Reinfection and Vaccine Breakthrough Infection, Madera County, California, *MedRxiv*. Published online 2022 January 23. doi: https://doi.org/10.1101/2022.01.22.22269105
246. Wang L, Davis PB, Kaelber DC, Volkow ND, Xu R. Comparison of mRNA-1273 and BNT162b2 Vaccines on Breakthrough SARS-CoV-2 Infections, Hospitalizations, and Death During the Delta-Predominant Period. *JAMA.* Published online January 20, 2022. doi:10.1001/jama.2022.0210
247. Hu Z, Tao B, Li Z, et al.. Effectiveness of inactivated COVID-19 vaccines against severe illness in B.1.617.2 (Delta) variant-infected patients in Jiangsu, China. *International Journal of Infectious Diseases*. Published online 2022 January 13. doi:10.1016/j.ijid.2022.01.030.
248. Abu-Raddad LJ, Chemaitelly H, Bertollini R. Effectiveness of mRNA-1273 and BNT162b2 Vaccines in Qatar. *New England Journal of Medicine*. Published online 2022 January 20. doi:10.1056/nejmc2117933.
249. Chadeau-Hyam M, Wang H, Eales O, et al. SARS-CoV-2 infection and vaccine effectiveness in England (REACT-1): a series of cross-sectional random community surveys. *The Lancet Respiratory Medicine*. Published online 2022 January 24. doi:10.1016/s2213-2600(21)00542-7.
250. Rahman S, Rahman MM, Miah M, et al. COVID-19 reinfections among naturally infected and vaccinated individuals. *Scientific Reports*. Published online 2022 January 26. doi:10.1038/s41598-022-05325-5.
251. Quach C, Blanchard AC, Lamarche J, Audy N, Lamarre V. Should healthcare workers with SARS-CoV-2 household exposures work? A Cohort Study. *MedRxiv*. Published online 2022 January 24 doi:10.1101/2022.01.23.22269719.
252. Cocchio S, Zabeo F, Facchin G, et al. The Effectiveness of a Diverse COVID-19 Vaccine Portfolio and Its Impact on the Persistence of Positivity and Length of Hospital Stays: The Veneto Region's Experience. *Vaccines*. 2022;10(1):107. doi:10.3390/vaccines10010107.
253. Smoliga, James M., Comparison of Estimated Relative Risk for Symptomatic Infection of Alpha, Delta, and Omicron Variants of SARS-CoV-2 Following Two-Dose versus Three-Dose (Booster) Vaccine Series. Published online January 19, 2022. Available at *SSRN*: https://ssrn.com/abstract=4012890 or http://dx.doi.org/10.2139/ssrn.4012890
254. Peralta-Santos A, Rodrigues EF, Moreno J, et al. Omicron (BA.1) SARS-CoV-2 variant is associated with reduced risk of hospitalization and length of stay compared with Delta (B.1.617.2). *MedRxiv*. Published online 2022 January 25. doi:10.1101/2022.01.20.22269406.

255. Rodrigues EF, Moreno J, Leite PP, et al. B.1.617.2 SARS-CoV-2 (Delta) variant is associated with increased risk of hospitalization and death compared with B.1.1.7 SARS-CoV-2 (Alpha) variant. *MedRxiv.* Published online 2022 January 23. doi:10.1101/2022.01.21.22268602.
256. Goldhaber-Fiebert JD, Prince L, Chin ET, et al. Waning of Vaccine-Conferred Protection against SARS-CoV-2 Infection: Matched Case-Control Test-Negative Design Study in Two High-Risk Populations. *MedRxiv.* Published online 2022 January 23. doi:10.1101/2022.01.21.22269664.
257. Malhotra S, Mani K, Lodha R, et al. Effectiveness of BBV152 vaccine against SARS-CoV-2 infections, hospitalizations, and deaths among healthcare workers in the setting of high delta variant transmission in New Delhi, India. *MedRxiv*. Published online 2022 January 24. doi:10.1101/2022.01.22.22269701.
258. Murata GH, Murata AE, Campbell HM, Mao JT. ESTIMATING THE EFFECT OF VACCINATION ON THE CASE-FATALITY RATE FOR COVID-19. *MedRxiv*. Published online 2022 March 6. doi: https://doi.org/10.1101/2022.01.22.22269689
259. Barchuk A, Bulina A, Cherkashin M, et al. COVID-19 vaccines effectiveness against symptomatic SARS-CoV-2 during Delta variant surge: a population-based case-control study in St. Petersburg, Russia. *medRxiv*. Published online 2022 May 2. doi:10.1101/2022.01.24.22269714.
260. Mirahmadizadeh A, Heiran A, Lankarani KB, et al. Effectiveness of Coronavirus Disease 2019 Vaccines in preventing infection, hospital admission, and death: A Historical Cohort Study Using Iranian Registration Data During Vaccination program. *Forum Infect Dis*. 2022;9(6):ofac177. doi:10.1093/ofid/ofac177
261. Agbarya A, Sarel I, Ziv-Baran T, et al. Efficacy of the mRNA-Based BNT162b2 COVID-19 Vaccine in Patients with Solid Malignancies Treated with Anti-Neoplastic Drugs. *Cancers*. Published online 2021 August 20. doi:10.3390/cancers13164191.
262. Bliznashki S. A Cross-Country Analysis of the Effectiveness of COVID-19 Vaccines in Reducing Mortality Rates within the EU. MedRxiv. Published online 2022 January 23. doi:10.1101/2022.01.23.22269604.
263. Farah Z, Haddad N, Abou El-Naja H, Saleh M, Mrad P, Ghosn N. Effectiveness of Pfizer-BioNTech Vaccine Against COVID-19 Associated Hospitalizations among Lebanese Adults ≥75 years- Lebanon, April-May 2021. MedRxiv. Published online 2022 January 24. doi:10.1101/2022.01.19.22269514.
264. Accorsi EK, Britton A, Fleming-Dutra KE, et al. Association Between 3 Doses of mRNA COVID-19 Vaccine and Symptomatic Infection Caused by the SARS-CoV-2 Omicron and Delta Variants. *JAMA.* Published online January 21, 2022. doi:10.1001/jama.2022.0470
265. Johnson AG, Amin AB, Ali AR, et al. COVID-19 Incidence and Death Rates Among Unvaccinated and Fully Vaccinated Adults with and Without Booster Doses During Periods of Delta and Omicron Variant Emergence — 25 U.S. Jurisdictions, April 4–December 25, 2021. MMWR Morb Mortal Wkly Rep Published online 2022 January 21. DOI: http://dx.doi.org/10.15585/mmwr.mm7104e2.
266. Maeda H, Saito N, Igarishi A, et al Effectiveness of mRNA COVID-19 vaccines against symptomatic SARS-CoV-2 infections during the Delta variant epidemic in Japan: Vaccine Effectiveness Real-time Surveillance for SARS-CoV-2 (VERSUS). *Clin Infect Dis*. Published online 2022 April 19. https://doi.org/10.1093/cid/ciac292.

267. UK Office for National Health Statistics. Self-reported long COVID after two doses of a coronavirus (COVID-19) vaccine in the UK: 26 January 2022. Published online 2022 January 26. https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/selfreportedlongcovidaftertwodosesofacoronaviruscovid19vaccineintheuk/26january2022.

268. Corrao G, Franchi M, Cereda D, et al. Persistence of protection against SARS-CoV-2 clinical outcomes up to 9 months since vaccine completion: a retrospective observational analysis in Lombardy, Italy. *Lancet Infect Dis.* Published online 2022 January 27. doi: https://doi.org/10.1016/S1473-3099(21)00813-6

269. Veneti L, Bøås H, Bråthen Kristoffersen A, et al. Reduced risk of hospitalisation among reported COVID-19 cases infected with the SARS-CoV-2 Omicron BA.1 variant compared with the Delta variant, Norway, December 2021 to January 2022. *Eurosurveillance*. Published online 2022 January 27. doi:10.2807/1560-7917.es.2022.27.4.2200077.

270. Kislaya, I., PERALTA SANTOS, A., Borges, V et al.Comparative complete scheme and booster effectiveness of COVID-19 vaccines in preventing SARS-CoV-2 infections with SARS-CoV-2 Omicron (BA.1) and Delta (B.1.617.2) variants. *MedRxiv*, Published online 2022 January 31. doi: https://doi.org/10.1101/2022.01.31.22270200

271. Lyngse FP, Kirkeby CT, Denwood M, et al. Transmission of SARS-CoV-2 Omicron VOC subvariants BA.1 and BA.2: Evidence from Danish Households. *MedRxiv*. Published online 2022 January 30. doi:10.1101/2022.01.28.22270044.

272. Vieillard-Baron A, Flicoteaux R, Salmona M, et al. EPIDEMIOLOGICAL CHARACTERISTICS AND SEVERITY OF OMICRON VARIANT CASES IN THE APHP CRITICAL CARE UNITS. *MedRxiv*. Published online 2022 January 28. doi:10.1101/2022.01.25.22269839.

273. Chavan M, Gayatri S, Patil S, et al. 'Anatomy of SARS-CoV-2 outbreak of 'vaccinated': An observational case-control study of Covid-19 breakthrough infections in medical college students at Rural Medical College, India. *MedRxiv*. Published online 2022 January 28. doi:10.1101/2022.01.27.22269902.

274. John BV, Deng Y, Khakoo NS, Taddei TH, Kaplan DE, Dahman B. Coronavirus Disease 2019 Vaccination Is Associated With Reduced Severe Acute Respiratory Syndrome Coronavirus 2 Infection and Death in Liver Transplant Recipients. *Gastroenterology*. Published online 2022 February 01. doi:10.1053/j.gastro.2021.11.001.

275. Nikonov E.L., Boychenko Yu.Ya., Kuznetsova A.V. The effectiveness of the use of the Gam-COVID-Vac vaccine in the Khabarovsk Territory from October 2020 to June 2021 according to registers. Preventive medicine. doi: https://doi.org/10.17116/profmed20212411162

276. Nguyen M, Paul E, Mills PK, Paul S. Risk of COVID-19 Reinfection and Vaccine Breakthrough Infection, Madera County, California, 2021. *MedRxiv*. Published online 2022 January 23. doi:10.1101/2022.01.22.22269105.

277. Alsaffar W A, Alwesaibi A A, Alhaddad M J, et al. The Effectiveness of COVID-19 Vaccines in Improving the Outcomes of Hospitalized COVID-19 Patients. *Cureus*, Published online 2022 January 22. doi: 10.7759/cureus.21485

278. Sevinc SA, Metin S, Basi NB, Ling J, Cinar AS, Oba S. Effectiveness of Inactivated SARS-CoV-2 Vaccine (CoronaVac) on Survival at Intensive Care Unit: A Cross-sectional Study. *Epidemiology and Infection*. Published online 2022 February 9. doi:10.1017/s0950268822000267.
279. Jalali N, Brustad HK, Frigessi A, et al.. Increased household transmission and immune escape of the SARS-CoV-2 Omicron variant compared to the Delta variant: evidence from Norwegian contact tracing and vaccination data. *Research Square*. Published online 2022 February 18 . doi: 10.21203/rs.3.rs-1370541/v1
280. Bouwmans P, Messchendorp AL, Sanders JS, et al. Long-term efficacy and safety of SARS-CoV-2 vaccination in patients with chronic kidney disease, on dialysis or after kidney transplantation: a national prospective observational cohort study. *BMC Nephrology*. Published online 2022 February 5 doi:10.1186/s12882-022-02680-3.
281. Corrao G, Franchi M, Rea F, et al. Protective action of natural and induced immunization against the occurrence of delta or alpha variants of SARS-CoV-2 infection: a test-negative case-control study. *BMC Medicine*. Published online 2022 February 8. doi:10.1186/s12916-022-02262-y.
282. Nunes MC, Sibanda S, Baillie VL, Kwatra G, Aguas R, Madhi SA. SARS-CoV-2 Omicron symptomatic infections in previously infected or vaccinated South African healthcare workers. *Vaccines*. 2022;10(3):459. https://doi.org/10.3390/vaccines10030459
283. Nguyen VG, Yavlinsky A, Beale S, et al. Comparative effectiveness of different primary vaccination courses on mRNA based booster vaccines against SARs-COV-2 infections: A time-varying cohort analysis using trial emulation in the Virus Watch community cohort. *medRxiv*. Published online 2022 February 6 doi:10.1101/2022.02.04.22270479.
284. Kahn F, Bonander C, Moghaddassi M, et al. Risk of severe COVID-19 from the Delta and Omicron variants in relation to vaccination status, sex, age and comorbidities – surveillance results from southern Sweden. *Euro Surveill*. Published online 2022 March 3 . doi: https://doi.org/10.2807/1560-7917.ES.2022.27.9.2200121
285. Andeweg SP, De Gier B, Eggink D, et al. Protection of COVID-19 vaccination and previous infection against Omicron BA.1, BA.2 and Delta SARS-CoV-2 infections. *medRxiv*. Published online 2022 May 12 doi:10.1101/2022.02.06.22270457.
286. Nyberg T, Ferguson NM, et al. Comparative Analysis of the Risks of Hospitalisation and Death Associated with SARS-CoV-2 Omicron (B.1.1.529) and Delta (B.1.617.2) Variants in England. *Lancet*. 2022;399(10332):1303-1312. doi: February 4. doi: https://doi.org/10.1016/S0140-6736(22)00462-7
287. Risk M, Shen C, Hayek S S, et al. Comparative Effectiveness of COVID-19 Vaccines against the Delta Variant. *Clin Inf Dis.* Published online 2022 February 7. doi: 10.1093/cid/ciac106.
288. Passaretti C, Priem J S, Agner T, et al. Reducing the rates of household transmission: The impact of COVID-19 vaccination in healthcare workers with a known household exposure. *Vaccine*. Published online 2022 January 19. doi: 10.1016/j.vaccine.2022.01.020.
289. Mayr F, Talisa VB, Shaikh O, et al. Effectiveness of Homologous or Heterologous Covid-19 Boosters in Veterans. *New England Journal of Medicine*. Published online 2022 February 9. doi: 10.1056/NEJMc2200415.

290. Fabiani M, Puopolo M, Morciano C, et al. Effectiveness of mRNA vaccines and waning of protection against SARS-CoV-2 infection and severe covid-19 during predominant circulation of the delta variant in Italy: retrospective cohort study. BMJ. Published online 2022 February 10. doi: 10.1136/bmj-2021-069052.
291. Mastrovito B, Naimi C, Kouam L, et al. Investigation of outbreak of cases infected with the SARS-CoV-2 B.1.640 variant in a fully vaccinated elderly population, Normandy, France, November to December 2021. *Euro Surveill.* Published online 2022 February 10. doi: https://doi.org/10.2807/1560-7917.ES.2022.27.6.2200078
292. Ponsford MJ, Evans K, Carne EM, et al. COVID-19 vaccine uptake and efficacy in a national immunodeficiency cohort. *J Clin Immunol.* Published online 2022 February 11. doi: https://doi.org/10.1007/s10875-022-01223-7
293. Ko YK, Murayama H, Yamasaki L, et al. Evaluating the age-specific effectiveness of COVID-19 vaccines against death and the impact of healthcare burden on age-specific case fatality risk in Tokyo, Japan. *SSRN*. Published online 2022 February 11. doi: http://dx.doi.org/10.2139/ssrn.4032463
294. Britton A, Fleming-Dutra KE, Shang N, et al. Association of COVID-19 vaccination with symptomatic SARS-CoV-2 infection by time since vaccination and Delta variant predominance. *JAMA.* Published online 2022 February 14. doi: 10.1001/jama.2022.2068
295. Wei J, Pouwels KB, Stoesser N, et al. Antibody responses and correlates of protection in the general population after two doses of the ChAdOx1 or BNT162b2 vaccines. *Nat Med.* Published online 2022 February 14. doi: https://doi.org/10.1038/s41591-022-01721-6
296. Marks KJ, Whitaker M, Anglin O, et al. Hospitalizations of children and adolescents with laboratory-confirmed COVID-19 – COVID-NET, July 2021-January 2022. *MMWR Morb Mortal Wkly Rep.* 2022;71:271-278. doi: http://dx.doi.org/10.15585/mmwr.mm7107e4
297. Bayhan GI & Guner R. Effectiveness of CoronaVac in preventing COVID-19 in healthcare workers. *Hum Vaccin Immonother*. Published online 2022 February 16. doi: 10.1080/21645515.2021.2020017
298. Hammerman A, Sergienko R, Friger M, et al. Effectiveness of the BNT162b2 vaccine after recovery from Covid-19. *N Eng J Med.* Published online 2022 February 16. doi: 10.1056/NEJMoa2119497
299. Paredes MI, Lunn S, Famulare M, et al. Associations between SARS-CoV-2 variants and risk of COVID-19 hospitalization among confirmed cases in Washington State: a retrospective cohort study. *medrixiv*. Published online 2022 February 16. doi: https://doi.org/10.1101/2021.09.29.21264272
300. Anta AF, Rufino J, Baquero C, et al. Using Survey Data to Estimate the Impact of the Omicron Variant on Vaccine Efficacy against COVID-19 Infection. *Research Square*. Published online 2022 February 15. doi: 10.21203/rs.3.rs-1356083/v1.
301. Liu, B, Sandrine S, et al. Effectiveness of COVID-19 Vaccination Against SARS-CoV-2 Omicron Variant in Two Outbreaks in Indoor Entertainment Settings in Australia. SSRN. Published online 2022 February 18. doi: http://dx.doi.org/10.2139/ssrn.4026084
302. Pavan V. Thakkar, Kanecia O. Zimmerman, M et al. COVID-19 Incidence Among 6th-12th Grade Students by Vaccination Status. *Pediatrics* Published online 2022 February 22. doi: 10.1542/peds.2022-056230

303. Rane MS, Robertson M, Kulkarni S, Frogel D, Gainus C, Nash D. Effectiveness of Covid-19 vaccines against symptomatic and asymptomatic SARS-CoV-2 infections in an urgent care setting. *MedRxiv*. Published online 2022 February 22. doi:10.1101/2022.02.21.22271298.

304. Oster Y, Benenson S, Nir-Paz R, Buda I, Cohen MJ. The effect of a third BNT162b2 vaccine on breakthrough infections in health care workers: a cohort analysis. *Clinical Microbiology and Infection*. Published online 2022 February 07. doi:10.1016/j.cmi.2022.01.019.

305. Krisztina HJ, Ferenci T, Ferenczi A, Túri G, Röst G, Oroszi B. Real-time monitoring of the effectiveness of six COVID-19 vaccines in Hungary in 2021 using the screening method. *MedRxiv*. Published online 2022 February 19. doi:10.1101/2022.02.18.22271179.

306. Marrone G, Nicolay N, Bundle N, et al.. Risk reduction of severe outcomes in vaccinated COVID-19 cases: an analysis of surveillance data from Estonia, Ireland, Luxembourg and Slovakia, January to November 2021. *Eurosurveillance*. Published online 2022 February 17. doi:10.2807/1560-7917.es.2022.27.7.2200060.

307. Flacco M, Soldato G, et al. Risk of SARS-CoV-2 reinfection 18 months after primary infection: population-level observational study. *medRxiv.* Published online 2022 February 19. doi: https://doi.org/10.1101/2022.02.19.22271221

308. Grima AA, Murison KR, Simmons AE, Tuite AR, Fisman DN. Relative Virulence of SARS-CoV-2 Among Vaccinated and Unvaccinated Individuals Hospitalized with SARS-CoV-2. *MedRxiv*. Published online 2022 February 17. doi:10.1101/2022.02.15.22271016.

309. Egan C, Turtle L, Thorpe M, Harrison EM, Semple MG, Docherty AB. Hospital admission for symptomatic COVID -19 and impact of vaccination: analysis of linked data from the Coronavirus Clinical Information Network and the National Immunisation Management Service. *Anaesthesia*. Published online 2022. doi:10.1111/anae.15677

310. Toker I, Toker A, et al. Vaccination status among patients with the need for emergency hospitalizations related to COVID-19. *The American Journal of emergency medicine.* Published online 2022 February 03. *doi:* https://doi.org/10.1016/j.ajem.2022.01.067

311. Abhilash KPP, Mathiyalagan P, Krishnaraj VRK, et al. Impact of prior vaccination with CovishieldTM and Covaxin® on mortality among symptomatic COVID-19 patients during the second wave of the pandemic in South India during April and May 2021: a cohort study. Vaccine. 2022. doi: https://doi.org/10.1016/j.vaccine.2022.02.023.

312. Ge, J., Digitale, J. C., Pletcher, M. J., Lai, J. C., & Consortium, the N. (2022). Breakthrough SARS-CoV-2 Infection Outcomes in Vaccinated Patients with Chronic Liver Disease and Cirrhosis: A National COVID Cohort Collaborative Study. *MedRxiv*, Published online 2022 February 26. https://doi.org/10.1101/2022.02.25.22271490

313. Tai, C. G., Maragakis, L. L., Connolly, S., DiFiori, J., Sims, L., Adams, E., Anderson, D. J., Merson, M. H., Ho, D. D., Grad, Y., & Mack, C. D. (2022). Booster protection against Omicron infection in a highly vaccinated cohort. *MedRxiv*, Published online 2022 February 26. https://doi.org/10.1101/2022.02.24.22271347

314. Perrella, A., Bisogno, M., D'Argenzio, Trama, U., Coscioni, E., Orlando, V., & group, C. C. (2022). SARS-CoV-2 Infection Breakthrough among the non-vaccinated and vaccinated: a Real World Evidence study based on Big Data. *MedRxiv*, Published online 2022 February 24. https://doi.org/10.1101/2022.02.22.21266830

315. Ayoubkhani, D., Bosworth, M. L., King, S., Pouwels, K. B., Glickman, M., Nafilyan, V., Zaccardi, F., Khunti, K., Alwan, N. A., & Walker, A. S. (2022). Risk of Long Covid in people infected with SARS-CoV-2 after two doses of a COVID-19 vaccine: community-based, matched cohort study. *MedRxiv*. Published online 2022 February 24.. https://doi.org/10.1101/2022.02.23.22271388
316. Whittaker R, Kristofferson AB, Salamanca BV, et al.. Length of hospital stay and risk of intensive care admission and in-hospital death among COVID-19 patients in Norway: a register-based cohort study comparing patients fully vaccinated with an mRNA vaccine to unvaccinated patients. *Clinical Microbiology and Infection*. Published online 2022 January 24. doi:10.1016/j.cmi.2022.01.033.
317. Wienkes H, Vilen K, Lorentz A, et al. Transmission of and Infection With COVID-19 Among Vaccinated and Unvaccinated Attendees of an Indoor Wedding Reception in Minnesota. JAMA Netw Open. 2022;5(2):e220536. doi:10.1001/jamanetworkopen.2022.0536.
318. Baker JM, Nakayama JY, O'Hegarty M, et al. SARS-CoV-2 B.1.1.529 (Omicron) Variant Transmission Within Households — Four U.S. Jurisdictions, November 2021–February 2022. MMWR Morb Mortal Wkly Rep 2022;71:341–346. DOI: http://dx.doi.org/10.15585/mmwr.mm7109e1.
319. Ward I L, Bermingham C, Ayoubkhani D, et al. Risk of COVID-19 related deaths for SARS-CoV-2 Omicron (B.1.1.529) compared with Delta (B.1.617.2). *MedRxiv*, Published online 2022 February 25. https://doi.org/10.1101/2022.02.24.22271466.
320. Belan M, Charmet T, Schaeffer L, et al. SARS-CoV-2 Exposures of Healthcare Workers from Primary Care, Long-Term Care Facilities and Hospitals: A Nationwide Matched Case-Control Study. *MedRxiv*, Published online 2022 February 27. https://doi.org/10.1101/2022.02.26.22271545.
321. Dorabawila V, Hoefer D, Bauer U E, et al. Effectiveness of the BNT162b2 vaccine among children 5-11 and 12-17 years in New York after the Emergence of the Omicron Variant. *MedRxiv*. Published online 2022 February 28. https://doi.org/10.1101/2022.02.25.22271454
322. Botton J, Semenzato L, Jabagi M, et al. Effectiveness of Ad26.COV2.S Vaccine vs BNT162b2 Vaccine for COVID-19 Hospitalizations. JAMA Netw Open. 2022;5(3):e220868. doi:10.1001/jamanetworkopen.2022.0868.
323. Castillo, Milena Suarez, Khaoua H, Courtejoie N. Vaccine effectiveness and duration of protection against symptomatic and severe Covid-19 during the first year of vaccination in France. *medRxiv*. Published online 2022 March 3. https://doi.org/10.1101/2022.02.17.22270791
324. Mousa M, Albreiki M, Alshehhi F, et al. Similar effectiveness of the inactivated vaccine BBIBP-CorV (Sinopharm) and the mRNA vaccine BNT162b2 (Pfizer-BioNTech) against COVID-19 related hospitalizations during the Delta outbreak in the United Arab Emirates. *J Travel Med*. Published online 2022 March 4. https://doi.org/10.1093/jtm/taac036
325. Quattrocchi A, Tsioutis C, Demetriou A, et al. Effect of vaccination on SARS-CoV-2 reinfection risk: a case-control study in the Republic of Cyprus. *Public Health.* March 2022;204:84-86.
326. Nygaard U, Mette H et al. Multisystem Inflammatory Syndrome in Children Following the SARS-CoV-2 Delta Variant in Denmark: Clinical Phenotype and Risk by Vaccination Status and Compared to the Pre-Delta COVID-19 Era. *SSRN*. Published online 2022 March 9. doi: https://ssrn.com/abstract=4031587

327. Syed M A, Qotba H A, Al Nuaimi A S. Effectiveness of COVID-19 vaccines in Qatar. *Journal of Infection*. Published online 2022 March 2. https://doi.org/10.1016/j.jinf.2022.02.034.
328. Sathiavageesan S, Sundaram V, Sundaram N, et al. Fulminant Onset COVID-Predictors and Outcome. *SSRN*. Published online 2022 Mar 1. http://dx.doi.org/10.2139/ssrn.4046674.
329. Song Q, Bates B, Shao YR, et al. Risk and Outcome of Breakthrough COVID-19 Infections in Vaccinated Patients With Cancer: Real-World Evidence From the National COVID Cohort Collaborative. *Journal of Clinical Oncology*. Published online 2022 March 14. doi:10.1200/jco.21.02419.
330. Molteni E, Canas LS, Kläser K, et al. Vaccination against SARS-CoV-2 in UK school-aged children and young people decreases infection rates and reduces COVID-19 symptoms. *medRxiv*.Published online 2022 March 13. 2022. doi:10.1101/2022.03.13.22272176.
331. Nittayasoot, N., Thammawijaya, P., Tharmaphornpilas, P. et al. Rapid method through routine data to evaluate real-world vaccine effectiveness against coronavirus disease 2019 (COVID-19) infection: lessons from Thailand. *Health Res Policy Sys* 20, 29 (2022). https://doi.org/10.1186/s12961-022-00821-6.
332. Arriola CS, Soto G, Westercamp M, et al. Effectiveness of whole virus COVID-19 vaccine at protecting health care personnel against SARS-CoV-2 infections in Lima, Peru". medRxiv. Published online 2022 March 18. doi:10.1101/2022.03.16.22271100.
333. Chemaitelly H, Ayoub H, AlMukdad S, et al. Protection of prior natural infection compared to mRNA vaccination against SARS-CoV-2 infection and severe COVID-19 in Qatar. *medRxiv*. Published online 2022 Mar 18. https://doi.org/10.1101/2022.03.17.22272529.
334. Tang F, Hammel I S, Andrew M K, et al. Vaccine Effectiveness Against All-Cause Death Varies According to Frailty Status in Veterans with SARS-CoV-2 Infection During the Delta Surge. *SSRN*. Published online 2022 Mar 18. http://dx.doi.org/10.2139/ssrn.4060786.
335. McMenamin M E, Nealon J, Lin Y, Wong J Y, et al. Vaccine effectiveness of two and three doses of BNT162b2 and CoronaVac against COVID-19 in Hong Kong. *medRxiv*. Published online 2022 Mar 22. https://doi.org/10.1101/2022.03.22.22272769.
336. Lafuente-Lafuente C, Rainone A, Guérin O, et al. COVID-19 Outbreaks in Nursing Homes Despite Full Vaccination with BNT162b2 of a Majority of Residents. *Gerontology*. Published online 2022 Mar 21. DOI: 10.1159/000523701.
337. Kirsebom FCM, Andrews N, Stowe J, et al. COVID-19 vaccine effectiveness against Omicron BA.2 variant in England. *medRxiv*.Published online 2022 March 24. 2022. doi:10.1101/2022.03.22.22272691
338. Simmons AE, Amoako A, Grima AA, et al. Vaccine effectiveness against hospitalization among adolescent and pediatric SARS-CoV-2 cases in Ontario, Canada. *medRxiv*.Published online 2022 March 25. 2022. doi:10.1101/2022.03.24.22272919
339. Taylor CA, Witaker M, Anglin O, et al. COVID-19-associated hospitalizations among adults during SARS-CoV-2 Delta and Omicron variant predominance, by race/ethnicity and vaccination status – COVID-NET, 14 states, July 2021-January 2022. *Morb Motal Wkly Rep*. 2022;71:466-473. doi:http://dx.doi.org/10.15585/mmwr.mm7112e2
340. Gushchin VA, Tsyganova EV, Ogarkova DA, et al. Sputnik V protection from COVID-19 in people living with HIV under antiretroviral therapy. *eClinicalMedicine*. 2022 Apr;46(101360). doi: 10.1016/j.eclinm.2022.101360

341. Malhotra S, Kalaivani M, Lodha R, et al. COVID-19 infection, and reinfection, and vaccine effectiveness against symptomatic infection among health care workers in the setting of omicron variant transmission in New Delhi, India. *SSRN*. Published online 2022 March 22. doi: http://dx.doi.org/10.2139/ssrn.4063803
342. Abarca K, Iturriaga C, Urzua M, et al. Safety and efficacy of two immunization schedules with an inactivated SARS-CoV-2 vaccine in adults. A randomized non-inferiority clinical trial. *medRxiv*.Published online 2022 March 28. 2022. doi:10.1101/2022.02.07.22270215
343. Petrovic V, Vukovic V, Markovic M, et al. Early effectiveness of four SARS-CoV-2 vaccines in preventing COVID-19 among adults aged ≥60 years in Vojvodina, Serbia. *Vaccines*. 2022;10(3):389. doi: 10.3390/vaccines10030389
344. Pal N, Nag D, Halder J, et al. Impact of vaccination on SARS-CoV-2 infection: Experience from a tertiary care hospital. *Asian Pac J Trop Med*. 2022;15:90-2. doi: 10.4103/1995-7645.338430
345. Kodera S, Rashed EA, Hirata A. Estimation of real-world vaccination effectiveness of mRNA COVID-19 vaccines against Delta and Omicron variants in Japan. *Vaccines*. 2022;10(3):430. doi: 10.3390/vaccines10030430
346. Behera P, Singh AK, Subba SH, et al. Effectiveness of COVID-19 vaccine (Covaxin) against breakthrough SARS-CoV-2 infection in India. *Hum Vaccin Immunother.* Published online 2022 Mar 23. Doi: 10.1080/21645515.2022.2034456
347. Hermosilla E, Coma E, Xie J, et al. Comparative effectiveness and safety of homologous two-dose ChAdOx1 versus heterologous vaccination with ChAdOx1 and BNT162b2. *Nat Commun*. 2022;13,1639. doi: 10.1038/s41467-022-29301-9
348. Kaur U, Bala S, Joshi A, et al. Persistent health issues, adverse events of significant concern, and effectiveness of COVID-19 vaccination- findings from a real-world cohort study of healthcare workers in north India. *medRxiv*.Published online 2022 March 30. doi:10.1101/2022.03.26.22272613
349. Akaishi T, Kushimoto S, Katori Y, et al. Effectiveness of mRNA COVID-19 vaccines in Japan during the nationwide pandemic of the Delta variant. *Tohoku J Exp Med.* Published online 2022 March 31. doi: 10.1620/tjem.2022.J012.
350. Fano V, Crielesi A, Coviello E. Effectiveness of the Comirnaty and the Vaxzevria vaccines in preventing SARS-CoV-2 infection among residents in Lazio region (Italy). *Vaccine*. Pulished online 2022 March 22. https://doi.org/10.1016/j.vaccine.2022.02.063
351. Jaber S, Saadh M J. Efficacy of COVID-19 Vaccines. *SSRN*. Pulished online 2022 March 22. https://ssrn.com/abstract=4055114.
352. Winkelman TNA, Rai NK, Bodurtha PJ, et al. Trends in COVID-19 vaccine administration and effectiveness through October 2021. *JAMA*. Published online 2022 March 31. doi: 10.1001/jamanetworkopen.2022.5018
353. Heudel P, Favier B, Solodky ML, et al. Survival and risk of COVID-19 after SARS-CoV-2 vaccination in a series of 2391 cancer patients. *Eur J Cancer*. 2022 April;165:174-183. doi: https://doi.org/10.1016/j.ejca.2022.01.035
354. Perumal N, Steffen A, Altmann D, et al. Effectiveness of mRNA booster vaccination against mild and severe COVID-19 during Delta and Omicron variant circulation in Germany: An analysis of national surveillance data. *SSRN*. Pulished online 2022 April 1. https://dx.doi.org/10.2139/ssrn.4072476

355. Bello-Chavolla OY, Antonio-Villa NE, Valdes-Ferrer SI, et al. Effectiveness of a nation-wide COVID-19 vaccination program in Mexico. *medRxiv*. Published online 2022 April 5. doi:10.1101/2022.04.04.22273330
356. Green MA, Hungerford DJ, Hughes DM, et al. Changing patterns of SARS-CoV-2 infection through Delta and Omicron waves by vaccination status, previous infection and neighborhood deprivation: A cohort analysis of 2.7M people. *medRxiv*. Published online 2022 April 21. doi:10.1101/2022.04.05.22273169
357. Medina-Pestana J, Covas DT, Viana LA, et al. Inactivated whole-virus vaccine triggers low response against SARS-CoV-2 infection among renal transplant patients: Prospective Phase 4 study results. *Transplantation.* 2022 April;106(4):853-861. doi: 10.1097/TP.0000000000004036
358. Gazit S, Shlezinger R, Perez G, et al. SARS-CoV-2 naturally acquired immunity vs. vaccine-induced immunity, reinfections versus breakthrough infections: a retrospective cohort study. *Clin Infect Dis*. Published online 2022 April 5. doi: https://doi.org/10.1093/cid/ciac262
359. Shah SA, Robertson C, Rudan I, et al. BNT162b2 and ChAdOx1 nCoV-19 vaccinations, incidence of SARS-CoV-2 infections and COVID-19 hospitalisations in Scotland in the Delta era. *J Glob Health*. 2022;12:05008. doi: 10.7189/jogh.12.05008
360. Grenfell R F Q, Almeida N B F, Filgeiras P S, et al. Immunogenicity, Effectiveness, and Safety of Inactivated Virus (CoronaVac) Vaccine in a Two-Dose Primary Protocol and BNT162b2 Heterologous Booster in Brazil (Immunita-001): A One Year Period Follow Up Phase 4 Study. *SSRN*. Pulished online 2022 Mar 31. http://dx.doi.org/10.2139/ssrn.4070408.
361. Más-Bermejo P I, Dickinson-Meneses F O, Almenares-Rodríguez K, et al. Cuban Abdala Vaccine: Effectiveness in Preventing Severe Disease and Death from COVID-19 in Havana, Cuba; a Cohort Study. *SSRN*. Published online 2022 April 5. http://dx.doi.org/10.2139/ssrn.4072478.
362. Fabiani M, Puopolo M, Filia A, et al. Effectiveness of an mRNA vaccine booster dose against SARS-CoV-2 infection and severe COVID-19 in persons aged ≥60 years and other high-risk groups during predominant circulation of the Delta variant in Italy, 19 July to 12 December 2021, Expert Review of Vaccines, DOI: 10.1080/14760584.2022.2064280.
363. Palinkas A, Sandor J, et al. All-Cause-Mortality by COVID-19 Vaccination Status in Hungary: Nationwide Retrospective Cohort Investigation. *SSRN*. Published online 2022 April 7. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4046772
364. Mazuecos A, Villanego F, Zarraga S, et al. Breakthrough Infections Following mRNA SARS-CoV-2 Vaccination in Kidney Transplant Recipients [published online ahead of print, 2022 Apr 7]. *Transplantation*. doi:10.1097/TP.0000000000004119
365. Cordtz R, Kristensen S, Westermann R, et al.. COVID-19 infection and hospitalisation risk according to vaccination status and DMARD treatment in patients with rheumatoid arthritis. *Rheumatology*. 2022. doi:10.1093/rheumatology/keac241
366. Premikha M, Chiew CJ, Wei WE, et al.. Comparative Effectiveness of mRNA and Inactivated Whole Virus Vaccines against COVID-19 Infection and Severe Disease in Singapore. *Clinical Infectious Diseases*. 2022. doi:10.1093/cid/ciac288.

367. Bieber A, Sagy I, Novack L, et al.. BNT162b2 mRNA COVID-19 vaccine and booster in patients with autoimmune rheumatic diseases: a national cohort study. *Annals of the Rheumatic Diseases*. 2022:annrheumdis-202. doi:10.1136/annrheumdis-2021-221824.
368. Bjork J, Bonander C, Moghaddassi M et al. COVID-19 vaccine effectiveness against severe disease from the Omicron BA.1 and BA.2 subvariants: surveillance results from southern Sweden, December 2021 to March 2022. *Euro Surveill*. 2022;27(18):pii=2200322. https://doi.org/10.2807/1560-7917.ES.2022.27.18.2200322.
369. Grebe E, Yu E, Bravo M et al. COVID-19 vaccine effectiveness against SARS-CoV-2 infection in the United States prior to the Delta and Omicron-associated surges: a retrospective cohort study of repeat blood donors. *medRxiv*. Published online 2022 April 16. doi: https://doi.org/10.1101/2022.04.15.22273412
370. Murali S, Sakthivel M et al. Effectiveness of ChAdOx1 nCoV-19 Corona Virus Vaccine (Covishield™) in preventing SARS-CoV2 infection, Chennai, Tamil Nadu, India, 2021. *medRxiv*. Published online 2022 April 16. doi: https://doi.org/10.1101/2022.04.15.22273859
371. Lang R, Humes E, Coburn S, et al. Analysis of severe illness after post-vaccination COVID-19 breakthrough among adults with and without HIV in the United States. *medRxiv*. Published online 2022 April 16. doi: https://doi.org/10.1101/2022.04.15.22273913
372. Nabirova D, Horth R, Smagul M, et al. Effectiveness of Four Vaccines in Preventing SARS-CoV-2 Infection in Kazakhstan. medRxiv. Published online 2022 April 18. doi: https://doi.org/10.1101/2022.04.14.22273868
373. Bager P, Wohlfahrt J, Bhatt S et al. Risk of hospitalisation associated with infection with SARS-CoV-2 omicron variant versus delta variant in Denmark: an observational cohort study. *Lancet Infect Dis.* Published online 2022 April 22. https://doi.org/10.1016/S1473-3099(22)00154-2.
374. Menni C, Valdes AM, Polidori L et al. Symptom prevalence, duration, and risk of hospital admission in individuals infected with SARS-CoV-2 during periods of omicron and delta variant dominance: a prospective observational study from the ZOE COVID Study. *Lancet*. 2022;399(10335):1618-1624. http://doi.org/10.1016/S0140-6736(22)00327-0
375. Murari T, Fonseca L, Pereira H et al. Retrospective cohort study of COVID-19 in patients of the Brazilian public health system with SARS-COV-2 Omicron variant infection. *Research Square.* Published online 2022 April 13. https://doi.org/10.21203/rs.3.rs-1531296/v1
376. Salvatore M, Hu MM, Beesley LJ et al. COVID-19 outcomes by cancer status, type, treatment, and vaccination. *medRxiv*. Published online 2022 April 26. https://doi.org/10.1101/2022.04/19.22274047
377. Meller ME, Pfaff BL, Borgert AJ, et al. Optimized infection control practices augment the robust protective effect of vaccination for ESRD patients during a hemodialysis facility SARS-CoV-2 outbreak. *medRxiv* 2022; published online April 25. https://doi.org/10.1101/2022.03.18.22272356.
378. Yan Y, Naito T, Tabe Y, et al. Increased delta variant SARS-CoV-2 infections in a highly vaccinated medical center in Japan. *Vaccine* 2022. Published online April 12. https://doi.org/10.1016/j.vaccine.2022.04.029.

379. Fan X, Lu S, Bai L, et al. Preliminary Study of the Protectiveness of Vaccination Against the COVID-19 in the Outbreak of VOC Omicron BA.2 — Jilin City, Jilin Province, China, March 3–April 12, 2022. China CDC Weekly. Published online April. 21. https://weekly.chinacdc.cn/fileCCDCW/journal/article/ccdcw/newcreate/220093.pdf.
380. Medic S, Anastassopoulou C, Lozanov-Crvenkovic Z et al. Risk and severity of SARS-CoV-2 reinfections during 2020-2022 in Vojvodina, Serbia: a population-level study. *medRxiv*. Published online 2022 April 22. https://doi.org/10.1101/2022.04.08.22273571
381. Nabirova D, Horth R, Smagul M et al. Effectiveness of Sputnik V, Qazvac, Hayat-Vax, and Coronavac vaccines in preventing COVID-19 in Kazakhstan, February-September 2021. *SSRN*. Published online 2022 April 24. http://dx.doi.org/10.2139/ssrn.4077889
382. Choueiri TK, Labaki C, Bakouny Z et al. Breakthrough SARS-CoV-2 infections among patients with cancer following two and three doses of COVID-19 mRNA vaccines. *SSRN*. Published online 2022 April 21. http://dx.doi.org/10.2139/ssrn.4089485
383. Trobajo-Sanmartín C, Martínez-Baz I, Miqueleiz A, et al. Differences in Transmission between SARS-CoV-2 Alpha (B.1.1.7) and Delta (B.1.617.2) Variants. *Microbiol Spectr.* 2022;10(2):e0000822. doi:10.1128/spectrum.00008-22.
384. Chevallier P, Jullien M, Peterlin P, et al. Effectiveness of a third dose of BNT162b2 anti-SARS-CoV-2 mRNA vaccine over a 6-month follow-up period in allogenic hematopoietic stem cells recipients. *Hematological oncology*. 2022. doi:10.1002/hon.3006.
385. Sutharattanapong N, Thotsiri S, Kantachuvesiri S, Wiwattanathum P. Benefits of Inactivated Vaccine and Viral Vector Vaccine Immunization on COVID-19 Infection in Kidney Transplant Recipients. *Vaccines*. 2022;10(4):572. doi:10.3390/vaccines10040572.
386. DeVoe C, Pandey S, Shariff D, et al. COVID-19 in Vaccinated Versus Unvaccinated Hematologic Malignancy Patients. *Transplant infectious disease.* 2022. doi:10.1111/tid.13835.
387. Solera JT, Árbol BG, Alshahrani A, et al. Impact of Vaccination and Early Monoclonal Antibody Therapy on COVID-19 Outcomes in Organ Transplant Recipients During the Omicron Wave. *Clin Infect Dis*. 2022:ciac324. doi:10.1093/cid/ciac324.
388. Seo WJ, Kang J, Kang HK, et al. Impact of prior vaccination on clinical outcomes of patients with COVID-19. Em*erg Microbes Infect.* 2022:1-37. doi:10.1080/22221751.2022.2069516.
389. Hall VG, Al-Alahmadi G, Solera JT, et al. Outcomes of SARS-CoV-2 infection in unvaccinated compared with vaccinated solid organ transplant recipients: A propensity matched cohort study. *Transplantation*. Published online 2022 May 3. doi:10.1097/TP.0000000000004178
390. Islam N, Sheils NE, Jarvis MS, Cohen K. Comparative effectiveness over time of the mRNA-1273 (Moderna) vaccine and the BNT162b2 (Pfizer-BioNTech) vaccine. *Nature Communications*. 2022;13(1). doi:10.1038/s41467-022-30059-3.
391. Wang X, Chang H, Tian H, et al. Epidemiological and clinical features of SARS-CoV-2 Infection in children during the outbreak of Omicron Variant in Shanghai, March 7-March 31, 2022. *medRXiv* 2022. Published online May 2. https://doi.org/10.1101/2022.04.28.22274421.
392. Husin M, Tok P S K, Suah J L, et al. Real-world effectiveness of BNT162b2 vaccine against SARS-CoV-2 infection among adolescents (12 to 17-year-olds) in Malaysia. InInternational Journal of Infectious Diseases (2022). Pulished online April 30. doi:https://doi.org/10.1016/j.ijid.2022.04.053

393. Prasad N, Derado G, Nanduri SA, et al. Effectiveness of a COVID-19 additional primary or booster vaccine dose in preventing SARS-CoV-2 infection among nursing home residents during widespread circulation of the Omicron variant – United States, February 14-March 27, 2022. *MMWR Morb Mortal Wkly Rep*. 2022;71:633-637. doi: http://dx.doi.org/10.15585/mmwr.mm7118a4
394. Braeye T, Loenhout JAF, Brondeel R, et al. COVID-19 vaccine effectiveness against symptomatic infection and hospitalization in Belgium, July 2021-April 2022. *medRxiv*. Published online 2022 May 11. doi: https://doi.org/10.1101/2022.05.09.22274623
395. Sormani MP, Schiavetti I, Inglese M, et al. Breakthrough SARS-CoV-2 infections after COVID-19 mRNA vaccination in MS patients on disease modifying therapies during the Delta and the omicron waves in Italy. *eBioMedicine*. 2022;80:104042. doi: https://doi.org/10.1016/j.ebiom.2022.104042
396. Simsek M, Yasin AI, Besiroglu M, et al. The efficacy of BNT162b2 (Pfizer-BioNTech) and CoronaVac vaccines in patients with cancer. *J Med Virol*. Published online 2022 May 5. doi: https://doi.org/10.1002/jmv.27835
397. Nadeem I, ul Munamm SA, Rasool MU, et al. Safety and efficacy of Sinopharm vaccine (BBIBP-CorV) in elderly population of Faisalabad district of Pakistan. *Postgrad Med J*. Published online 2022 May 4. doi: 10.1136/postgradmedj-2022-141649
398. Mukherjee A, Panayotov G, Sen R, et al. Measuring vaccine effectiveness from limited public health datasets: Framework and estimates from India's second COVID wave. *Sci. Adv*. 8 2022; eabn4274. DOI: 10.1126/sciadv.abn4274.
399. Zürcher K, Abela IA, Stange M, et al. Alpha variant coronavirus outbreak in a nursing home despite high vaccination coverage: molecular, epidemiological and immunological studies. *Clinical Infectious Diseases*, 2022; ciab1005, https://doi.org/10.1093/cid/ciab1005.
400. Kim C, Kang G, Kang SG, Lee H. COVID-19 outbreak response at a nursing hospital in South Korea in the post-vaccination era, including an estimation of the effectiveness of the first shot of the Oxford-AstraZeneca COVID-19 vaccine (ChAdOx1-S). *Osong Public Health Res Perspect* 2022; Volume 13(2); 2022. https://doi.org/10.24171/j.phrp.2021.0262
401. Freund O, Tau L, Weiss TE, et al. Associations of vaccine status with characteristics and outcomes of hospitalized severe COVID-19 patients in the booster era. *PLOS ONE*. 17(5):e0268050. https://doi.org/10.1371/journal.pone.0268050
402. Myers LC, Kipnis P, Greene J, et al. Adults hospitalized with breakthrough COVID-19 have lower mortality than matched unvaccinated adults. *J Intern Med*. 2022;00:1-8. https://doi.org/10.1111/joim.13504
403. Murillo-Zamora E, Trujillo X, Huerta M, et al. COVID-19 vaccines provide better protection against related pneumonia than previous symptomatic infection. *Int J Infect Dis*. 2022;120:142-145. https://doi.org/10.1016/j.ijid.2022.04.047
404. Vo AD, La J, Wu JTY, et al. Factors associated with severe Covid-19 despite vaccination: A nationwide, retrospective cohort study. *Research Square*. Published online 2022 May 16. https://doi.org/10.21203/rs.3.rs-1654435/v1
405. Veerapu N, Inmdar DP, Kumar BPR, et al. COVID-19 vaccines effectiveness against SARS-CO-V-2 infection among persons attending RT-PCR centre at a Medical College Hospital in Telangana: A case control study. *medRxiv*. Published online 2022 May 16. https://doi.org/10.1101/2022.05.15.22273945

406. Fleming-Dutra KE, Britton A, Shang N, et al. Association of prior BNT162b2 COVID-19 vaccination with symptomatic SARS-CoV-2 infection in children and adolescents during Omicron predominance. *JAMA.* Published online 2022 May 13. https://doi.org/10.1001/jama.2022.7493
407. Yi S, Choe YJ, Lim DS, Lee HR, Kim J, Kim YY, Kim RK, Jang EJ, Lee S, Park E, Kim SJ, Park YJ. Impact of national Covid-19 vaccination Campaign, South Korea. *Vaccine*. 2022 May 8:S0264-410X(22)00572-2. doi: 10.1016/j.vaccine.2022.05.002.
408. Lin KY, Wu PY, Liu WD, Sun HY, Hsieh SM, Sheng WH, Huang YS, Hung CC, Chang SC. Effectiveness of COVID-19 vaccination among people living with HIV during a COVID-19 outbreak. *J Microbiol Immunol Infect*. 2022 May 5:S1684-1182(22)00060-3. doi: 10.1016/j.jmii.2022.04.006.
409. Naylor, K.L., Kim, S.J., Smith, G., McArthur, E., Kwong, J.C., Dixon, S.N., Treleaven, D. and Knoll, G.A. (2022), Effectiveness of first, second, and third COVID-19 vaccine doses in solid organ transplant recipients: A population-based cohort study from Canada. *Am J Transplant*. Accepted Author Manuscript. https://doi.org/10.1111/ajt.17095.
410. Mues K E, Kirk B, Patel D A, et al. Real-world comparative effectiveness of mRNA-1273 and BNT162b2 vaccines among immunocompromised adults in the United States. *medRxiv* 2022. Published online May 19. https://doi.org/10.1101/2022.05.13.22274960.
411. Grgič Vitek M, Klavs I, Učakar V, et al.. mRNA vaccine effectiveness against hospitalisation due to severe acute respiratory infection (SARI) COVID-19 during Omicron variant predominance estimated from real-world surveillance data, Slovenia, February to March 2022. *Eurosurveillance*. 2022;27(20). doi:10.2807/1560-7917.es.2022.27.20.2200350.
412. Mattiuzzi C, Lippi G. Real-world effectiveness of COVID-19 vaccination among children in Italy. International Journal of Infectious Diseases. 2022. https://doi.org/10.1016/j.ijid.2022.05.045.
413. Wang H, Chen Z, Wang Z, et al. mRNA based vaccines provide broad protection against different SARS-CoV-2 variants of concern. *Emerg Microbes Infect*. Published online 2022 May 23. doi: https://doi.org/10.1080/22221751.2022.2081616
414. Agrawal R, Agrawal Y, Mathur S, et al. ChAdOx1-S and BBV152 vaccines – Effectiveness on post-vaccination and COVID-19 outcomes. *Research Square*. Published online 2022 May 24. doi: https://doi.org/10.21203/rs.3.rs-1687460/v1
415. Brosh-Nissimov T, Maor Y, Elbaz M, et al. Hospitalized patients with breakthrough COVID-19 following vaccination during two distinct waves in Israel, January to August 2021: a multicentre comparative cohort study. *Euro Surveill*. 2022;27(20):pii=2101026. doi: https://doi.org/10.2807/1560-7917.ES.2022.27.20.2101026
416. Kikuchi K, Nangaku M, Ryuzaki M, et al. Effectiveness of SARS-CoV-2 vaccines on hemodialysis patients in Japan: a nationwide cohort study. *Ther Apher Dial*. Published online 2022 May 24. doi: 10.1111/1744-9987.13887
417. Sezen YI, Senoglu S, Karabela SN, et al. Risk factors and the impact of vaccination on mortality in COVID-19 patients. *Bratisl Med J* . 2022;123(6):440-443. doi: 10.4149/BLL_2022_068
418. Murillo-Zamora E, Trujillo X, Huerta M, et al. First-generation BNT162b2 and AZD1222 vaccines protect from COVID-19 pneumonia during the Omicron variant emergence. *Public Health*. 2022;27:105-107. doi: https://doi.org/10.1016/j.puhe.2022.04.001

419. Demir E, Dheir H, Safak S, et al. Differences in clinical outcomes of COVID-19 among vaccinated and unvaccinated kidney transplant recipients. *Vaccine.* 2022;40(24):3313-3319. doi: https://doi.org/10.1016/j.vaccine.2022.04.066
420. Lee L Y W, Starkey T, Ionescu M C, et al. Vaccine effectiveness against COVID-19 breakthrough infections in patients with cancer (UKCCEP): a population-based test-negative case-control study. *Lancet Oncology* 2022. Published online May 23. https://doi.org/10.1016/S1470-2045(22)00202-9.
421. Accorsi E, Britton A, Shang N, et al. Effectiveness of Homologous and Heterologous Covid-19 Boosters against Omicron. *N Engl J Med* 2022; published online May 25. DOI:10.1056/NEJMc2203165.
422. Nisar M I, Ansari N, Malik A, et al. Assessing the Effectiveness of COVID-19 Vaccines in Pakistan: A Test-Negative Case-Control Study. SSRN 2022; published online May 27. https://ssrn.com/abstract=4112153.
423. Al-Aly Z, Bowe B, Xie Y, et al. Long COVID after breakthrough SARS-CoV-2 infection. *Nat Med* 2022; published online May 25. https://doi.org/10.1038/s41591-022-01840-0.
424. Matveeva O, Ershov A. Retrospective cohort study of the effectiveness of the Sputnik V and EpiVacCorona vaccines against the SARS-CoV-2 Delta variant in Moscow (June-July 2021). *Research Square*. Published online 2022 May 27. doi: https://doi.org/10.21203/rs.3.rs-1700347/v1
425. Nielsen KF, Moustsen-Helms IR, Schelde AB, et al. Vaccine effectiveness against SARS-CoV-2 reinfection during periods of Alpha (B.1.1.7), Delta (B.1.617.2) or Omicron (B.1.1.529) dominance: A Danish nationwide study. *medRxiv*. Published online 2022 June 1. doi: 10.1101/2022.06.01.22275858
426. El Otmani, H., Nabili, S., Berrada, M. et al. Prevalence, characteristics and risk factors in a Moroccan cohort of Long-Covid-19. Neurol Sci (2022). https://doi.org/10.1007/s10072-022-06138-0.
427. Valladares-Garrido MJ, Zeña-Ñañez S, Peralta CI, Puicón-Suárez JB, Díaz-Vélez C, Failoc-Rojas VE. COVID-19 Vaccine Effectiveness at a Referral Hospital in Northern Peru: A Retrospective Cohort Study. Vaccines. 2022; 10(5):812. https://doi.org/10.3390/vaccines10050812
428. Hara M, Furue T, Fukuoka M, Iwanaga K, Matsuishi E, Miike T, Sakamoto Y, Mukai N, Kinugasa Y, Shigyo M, Sonoda N, Tanaka M, Arase Y, Tanaka Y, Nakashima H, Irie S, Hirota Y. Real-World Effectiveness of the mRNA COVID-19 Vaccines in Japan: A Case–Control Study. Vaccines. 2022; 10(5):779. https://doi.org/10.3390/vaccines10050779
429. Corral-Gudion L, Del-Amo-Merino M P, Eiros-Bouza J M, et al. The Omicron wave and the waning of COVID-19 vaccine effectiveness. Influence of vaccine booster and age on confirmed infection incidence. *Eur J Intern Med*. 2022 May 26;S0953-6205(22)00204-7. doi: 10.1016/j.ejim.2022.05.025.
430. Tai CG, Maragakis LL, Connolly S, et al. Association Between COVID-19 Booster Vaccination and Omicron Infection in a Highly Vaccinated Cohort of Players and Staff in the National Basketball Association. JAMA. Published online June 02, 2022. doi:10.1001/jama.2022.9479

431. Anton Barchuk, Anna Bulina, Mikhail Cherkashin et al. Gam-COVID-Vac, EpiVacCorona, and CoviVac effectiveness against lung injury during Delta and Omicron variant surges in St. Petersburg, Russia: test-negative case-control study. *Research Square* 2022; published online June 2. https://doi.org/10.21203/rs.3.rs-1709300/v1
432. Teran-Tinedo J R, Gonzalez-Rubio J, Najera A, et al. Clinical characteristics and respiratory care in hospitalized vaccinated SARS-CoV-2 patients. *E ClinicalMedicine.* 2022; published online May 20. ttps://doi.org/10.1016/j.eclinm.2022.101453.
433. Ashby D R, Caplin B, Corbett R W, et al. Severity of COVID-19 after Vaccination among Hemodialysis Patients: An Observatioanl Cohort Study. *CJASN* 2022; published online June 1. https://doi.org/10.2215/CJN.16621221.
434. Pinato DJ, Auguilar-Company J, Ferrante D, et al. Outcomes of the SARS-CoV-2 omicron (B.1.1.529) variant outbreak among vaccinated and unvaccinated patients with cancer in Europe: results from the retrospective, multicentre, OnCovid registry study. *Lancet Oncol.* 2022 Jun 2;S1470-2045(22)00273-X.
435. Jung J, Kim JY, Park H, et al. Transmission and infectious SARS-CoV-2 shedding kinetics in vaccinated and unvaccinated individuals. *JAMA Netw Open*. 2022;5(5)e2213606. doi: 10.1001/jamanetworkopen.2022.13606
436. Andrejko KL, Pry J, Myers JF, et al. Waning of two-dose BNT162b2 and mRNA-1273 vaccine effectiveness against symptomatic SARS-CoV-2 infection is robust to depletion-of-susceptibles bias. *medRxiv* 2022; published online June 3. https://doi.org/10.1101/2022.06.03.22275958.
437. Johnson K W, Patel S, Thapi S, et al. Association of Reduced Hospitalizations and Mortality Among COVID-19 Vaccinated Patients with Heart Failure. *Card Fail* 2022; published online June 9. https://doi.org/10.1016/j.cardfail.2022.05.008.
438. Casado JL, Haemmerle J, Vizcarra P et al. Risk of SARS-CoV-2 reinfections in a prospective inception cohort study: Impact of COVID-19 vaccination. *J Clin Med*. 2022;11(12)3352. https://doi.org/10.3390/jcm11123352
439. Scruzzi GF, Aballay LR, Carreno P, et al. Vacunación contra SARS-CoV-2 y su relación con enfermedad y Muerte por COVID-19 en Argentina. *Rev Panam Salud Publica*. 2022;46;e39. https://doi.org/10.26633/RPSP.2022.39
440. Salvini M, Damonte C, Mortara L, et al. Immunogenicity and clinical efficacy of anti-SARS-CoV-2 vaccination in patients with hematological malignancies: Results of a prospective cohort study of 365 patients. *Am J Hematol*. Published online 2022 June 15. doi: 10.1002/ajh.26629
441. Shkoda AS, Gushchin VA, Ogarkova DA, et al. Sputnik V effectiveness against hospitalization with COVID-19 during Omicron dominance. *Vaccines*. 2022;10:938. https://doi.org/10.3390/vaccines10060938
442. Martin CA, Pan D, Melbourne C, et al. Risk factors associated with SARS-CoV-2 infection in a multiethnic cohort of United Kingdom healthcare workers (UK-REACH): A cross-sectional analysis. *PLOS Med*. 2022;19(5):e1004015. https://doi.org/10.1371/journal.pmed.1004015
443. Vicentini M, Venturelli F, Mancuso P, et al. Risk of SARS-CoV-2 reinfection by vaccination status, predominant variant, and time from previous infection: A cohort study in Italy. *SSRN*. Published online 2022 June 9. https://ssrn.com/abstract=4132329

444. Branda F. Impact of the additional/booster dose of COVID-19 vaccine against severe disease during the epidemic phase characterized by the predominance of the Omicron variant in Italy, December 2021-May 2022. *medRxiv*. Published online 2022 June 13. https://doi.org/10.1101/2022.04.21.22273567
445. Monge S, Rojas-Benedicto A, Olmedo C, et al. Effectiveness of a second dose of an mRNA vaccine against SARS-CoV-2 omicron infection in individuals previously infected by other variants. *Clin Infect Dis*. Published online 2022 June 10; ciac429. https://doi.org/10.1093/cid/ciac429
446. Li H, Zhu X, Yu R, et al. The effects of vaccination on the disease severity and factors for viral clearance and hospitalization in omicron-infected patients: a retrospective observational cohort study from recent regional outbreaks in China. *SSRN*. Published online 2022 June 15. https://dx.doi.org/10.2139/ssrn.4137657
447. Brosh-Nissimov T, Hussein K, Wiener-Well Y, et al. Hospitalized patients with severe COVID-19 during the omicron wave in Israel – benefits of a fourth vaccine dose. *Clin Infect Dis*. Published online 2022 June 20; ciac501. https://doi.org/10.1093/cid/ciac501
448. Hirsh KM, Reidenberg BD. COVID-19 vaccine effectiveness in adults with developmental disabilities living in group homes. *Public Health*. Published online 2022 May 20. https://doi.org/10.1016/j.puhe.2022.05.006.
449. Silverman RA, Ceci A, Cohen A, et al. Vaccine Effectiveness during Outbreak of COVID-19 Alpha (B.1.1.7) Variant in Men's Correctional Facility, United States. Emerging Infectious Diseases. 2022;28(7):1313-1320. doi:10.3201/eid2807.220091.
450. Antonelli M, Pujol JC, Spector TD, et al. Risk of long COVID associated with delta versus omicron variants of SARS-CoV-2. The Lancet. Published online 2022 Jun 9. https://doi.org/10.1016/S0140-6736(22)00941-2.

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
95	Liu et al (June 21, 2022)	Australia	Prospective cohort study	2,053,123 adults in Sydney (aged 40+)	Omicron^	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	Ioannou et al (June 16, 2022)	USA	Target trial emulation	490,838 matched pairs of veterans (aged 18+)	Omicron^	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)		
								Death		81.6 (67.8-89.4)		
							Any mRNA primary + BNT162b2 booster	Documented infection	Complete vaccination at least 5 months prior	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	Adams et al (June 14,2022)	USA	Prospective test-negative case control	4,299 hospitalised patients	Omicron specifically^	Included	BNT162b2 primary + BNT162b2 booster	Hospitalization	Unvaccinated	80 (73-85)	7+	~39 weeks
							mRNA-1273 primary + mRNA booster			77 (67-83)		

#	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 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	Richterman et al* (June 6, 2022)	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)		
					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	Hulme et al	UK			Delta	Included				49.6 (48.3-50.8)	1-28	~11 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
	(June 6,2022)		Retrospective cohort	6,990,219 adults aged ≥18 years			BNT162b2 primary + BNT162b2 booster	Documented infection	Complete vaccination with 2 doses of AZD1222 or BNT162b2	49.7 (47.8-51.5)	29-70	
								Hospitalization		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	
										54.8 (53.3-56.3)	29-70	
								Hospitalization		78.2 (75.2-80.8)	1-28	
										83.9 (80-87.1)	29-70	
								Death		77.4 (66.3-84.9)	1-28	
										93.5 (87.6-96.6)	29-70	
90	Carlsen et al* (June 1, 2022)	Norway	Retrospective cohort study	21,643 newborns	Omicron^	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 2nd or 3rd trimester)	Unvaccinated	78 (57-88)	14+	~45 weeks
89	Marra et al (May 27, 2022)	Brazil	Retrospective cohort study	11,427 HCWs 18 years and older	Delta^	Excluded	CoronaVac primary + BNT162b2 booster	Documented infection	Complete vaccination with 2 doses CoronaVac	92.0 (89.1-94.3)	14+	~11 weeks
							AZD1222 primary + BNT162b2 booster		Complete vaccination with 2 doses AZD1222	60.5 (44.9-72.4)		
88	Chin et al (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^	Excluded	BNT612b2 or mRNA-1273	Documented infection	Unvaccinated with no prior infection	43.2 (42.2-47.4)	14+	~32 weeks
						Included before July 01/2021				61.3 (60.7-64.8)		
						Included since July 01/2021				86.8 (82.1-92.7)		
87	Amir et al (May 25, 2022)	Israel	Retrospective cohort	452,485 children 12-15 years of age	Omicron^	Excluded	BNT612b2	Documented infection	Unvaccinated	80.0 (76.7-83.1)	14-60	~7 weeks
									Complete vaccination with 2 doses 120+ days prior	76.2 (72.2-79.6)		

#	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
86	Fano et al* (May 18,2022)	Italy	Retrospective cohort	946,156 individuals aged 12 +	Alpha, Delta^	Excluded	BNT612b2 or mRNA-1273 (3 doses)	Documented infection	Unvaccinated	69.1 (67.5-70.7)	15-19	~26 weeks
										50.8 (46.0-55.1)	75+	
							AZD1222 primary + BNT162b2 or mRNA-1273 booster			59.9 (56.4-63.0)	15-19	
										23.4 (12.1-33.3)	40+	
							Ad26.COV2.S primary + BNT162b2 or mRNA-1273 booster			52.8 (47.2- 57.9)	15-19	
										26.9 (16.3-36.3)	40+	
							Heterologous primary (AZD1222+ BNT612b2 or mRNA-1273) + BNT162b2 or mRNA-1273 booster			28.0 (0.0-48.5)	10-14	
										28.8 (12.9-41.8)	15+	
85	Rennert et al (May 7, 2022)	USA	Propensity matched case control	1,944 students aged 18+	Omicron^	Included	BNT162b2	Documented infection	Unvaccinated	42.8 (22.7-57.6)	7+	~16 weeks
				658 employees aged 18-65			mRNA-1273			48.5 (25-64.7)		
							BNT162b2			74.3 (42.1-88.6)		
							mRNA-1273			60.4 (32.4-76.8)		
84	Amir et al (May 5,2022)	Israel	Restrospective cohort	1,178,090 adults aged 60+	Omicron^	Excluded	BNT162b2 (3 doses)	Hospitalization and death	Complete vaccination with 2 doses of BNT162b2 at least 4 months prior	57.0 (37.5-71.0)	0-30	~31 weeks
										67.8 (59-75.6)	180-210	
							BNT162b2 (4 doses)			89.2 (88.0-91.0)	0-60	
83	Butt et al* (May 3, 2022)	USA	Retrospective cohort	2,384,272 veterans (aged 21+)	Omicron^	Excluded	BNT162b2	Documented infection	Complete vaccination with 2 doses of BNT162b2 by April 30, 2021	11 (7-14)	>7	~19.5 weeks
										30 (23-36)	<28	
										-9 (-22-2)	>84	
								Hospitalization		50 (41-57)	>7	
										62 (43-75)	<28	
										45 (18-63)	>84	
								ICU admission or death		88 (68-96)	>7	
										90 (22-99)	28-56	
										79 (-78-98)	>84	
							mRNA-1273	Documented infection	Complete vaccination	27 (24-30)	>7	
										40 (35-44)	<28	

#	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
									with 2 doses of mRNA-1273 by April 30, 2021	-23 (-65-9)	>84	
								Hospitalization		55 (46-61)	>7	
										55 (38-67)	<28	
										83 (24-96)	>84	
								ICU admission or death		72 (24-90)	>7	
										86 (-17-98)	<28	
										50 (-68-85)	28-56	
							BNT162b2 or mRNA-1273	Documented infection	Complete vaccination with 2 doses of BNT162b2 or mRNA-1273 by April 30, 2021	19 (17-22)	>7	
								Hospitalization		52 (46-57)	>7	
								ICU admission or death		83 (65-92)	>7	
					Delta^		BNT162b2	Documented infection	Complete vaccination with 2 doses of BNT162b2 by April 30, 2021	73 (70-76)		~9.5 weeks
								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	Carazo et al (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)	7+	~24 weeks
								Hospitalization		91 (91-92)		
						Previously infected only		Documented infection		68 (67-68)		
								Hospitalization		84 (82-91)		
81	Suah et al*	Malaysia		319,127 tests	**Omicron^**	Unknown	BNT162b2			52 (50.3-51.9)	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
	(May 2, 2022)		Test-negative case control	306,483 tests	Delta^			Documented infection	Complete vaccination with 2 doses of BNT162b2 4-6 months prior	89.4 (89.2-89.7)		
80	Kirsebom et al (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
										37.2 (-44.1-72.6)	105+	~20 weeks
							AZD1222 + BNT162b2	Symptomatic disease		63.8 (63.0-64.5)	14-34	~3 weeks
										30.6 (26.8-34.3)	105+	~20 weeks
				166,720 adults aged 65+ y	**Omicron specifically^**		AZD1222	Symptomatic disease		51.6 (20.8-70.4)	14-34	~3 weeks
										-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
										23.1 (15.1-30.5)	105+	~20 weeks
								Hospitalization		90.9 (88.7-92.7)	7+	~20 weeks
					Delta specifically^		AZD1222	Hospitalization	Unvaccinated	80.9 (15.6-95.7)	7+	~15 weeks
							AZD1222 + BNT162b2			93.9 (92.8-94.9)		
79	Sharma et al (April 27,2022)	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	Castillo et al (April 21, 2022)	France	Test-negative case control	761,744 cases, 18+ years	**Omicron specifically^**	Included	BNT162b2 or mRNA-1273	Symptomatic infection		64 (63-64)	8-14	~22 weeks
										50 (48-51)	>90	

#	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
							Note: A small proportion(~1%) received an undetermined vaccine product	Hospitalisation	Unvaccinated without prior infection	90 (87-92)	8-14	
										93 (92-94)	>90	
								ICU admission		96 (92-99)	8-14	
										97 (95-99)	>90	
								Death		95 (89-100)	8-14	
										93 (91-96)	>90	
				166,009 cases, 18+ years	Delta specifically^			Symptomatic infection		84 (79-88)	8-14	
										90 (85-94)	>90	
								Hospitalisation		98 (98-99)	8-14	
										99 (99-100)	>90	
								ICU admission		99 (98-99)	8-14	
										99 (99-100)	>90	
								Death		98 (96-100)	8-14	
										99 (99-100)	>90	
77	Cerqueira-Silva et al (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	10 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

#	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
								Severe disease		95.4 (80.9-98.9)	5-8 weeks	6 weeks
										90.2 (-88.4-99.5)	13+ weeks	~22 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
										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	Widdifield et al* (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)		
				7863 individuals with ankylosing spondylitis				Documented infection		82 (20-96)		
				47,199 individuals with psoriasis				Documented infection		96 (72-99)		
				31,311 individuals with inflammatory bowel disease				Documented infection		76 (47-89)		
75	Lind et al (April 25,2022)	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	54 (48-60)	14-59	~14 weeks
						Included				28 (9-43)	90+	
						Excluded				45.8 (20-63.2)	14+	
										58.5 (52.7-63.5)		

#	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
	[Update to April 20, 2022 preprint]		1:1 Matched case control			Included			≥5 months prior	35.1 (-7.5-60.8)		
74	Gram et al (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
										49.9 (46.5-53.1)	120+	
								Hospitalisation		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	
				758,187 adults aged ≥60 years	Omicron^			Documented infection		57.6 (55.8-59.4)	14-30	
										52.8 (49.3-56)	120+	
								Hospitalisation		94.4 (93-95.5)	14-30	
										77.3 (70.9-82.3)	120+	
					Delta^			Documented infection		86.0 (83.3-88.3)	14-30	
										81.2 (72.9-87.0)	61-90	
								Hospitalisation		96.6 (93.9-98.1)	31-60	
										91.4 (79.8-96.4)	91-120	
73	Grewal et al (June 1, 2022) *[Update to April 18,2022 preprint]*	Canada	Test-negative case control	13,654 cases and 205,862 controls amongst LTCF residents aged 60+ in Ontario	**Omicron specifically^**	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	
										37 (31-43)	≥84	
								Symptomatic disease		62 (51-71)	<84	
										55 (45-64)	≥84	
								Hospitalization or death		80 (72-86)	<84	
										77 (69-82)	≥84	
							mRNA-1273 (**4 doses**)	Documented infection		51 (43-58)	≥7	~15 weeks
								Symptomatic disease		73 (63-80)		

#	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 or death		88 (82-92)		
							3 doses BNT162b2 + 1 dose mRNA-1273 (**4 doses**)	Documented infection		51 (42-58)		
								Symptomatic disease		69 (56-78)		
								Hospitalization or death		87 (78-92)		
							2 doses BNT162b2 + 2 doses mRNA-1273 (**4 doses**)	Documented infection		52 (35-64)		
								Symptomatic disease		59 (28-77)		
								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	Vokó et al (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 across age groups.*	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)		

#	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 + 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)		
							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		70.7 (-107.9-95.9)		
							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		82.9 (81.9-83.8)		
							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)		

#	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 + 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)		
							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		99.2 (97.4-99.7)		
							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)		

#	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
							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)		
							Ad26.COV2.S + BNT162b2			90.9 (84.6-94.6)		
							Ad26.COV2.S (2 doses)	Hsopitalization		76.7 (-65.9-96.7)		
							Ad26.COV2.S + BNT162b2			92.2 (68.8-98)		
71	Petrie et al (April 16, 2022)	USA	Prospective cohort	884 participants >12 years	Omicron^	Included	BNT162b2 or mRNA-1273	Documented infection	Complete vaccination with two doses at least ≥5 months prior	66 (46-79)	14+	~ 25 weeks
						Excluded				70 (51-81)		
70	Magen et al* (April 13,2022)	Israel	Target trial	364,244 individuals aged ≥60	Omicron^	Excluded	BNT162b2 (4 doses)	Documented infection	Complete vaccination with three doses of BNT162b2 at least 4 months prior	52 (49-54)	14-30	~4 weeks
								Symptomatic disease		61 (58-64)		
								Hospitalization		72 (63-79)		
								Severe disease		64 (48-77)		
								Death		76 (48-91)		
69	Cerqueira-Silva (April 13, 2022)	Brazil	Test-negative case control	423,068 cases and 816,924 controls	Omicron ^	Previously infected only	BNT162b2	Symptomatic infection	Unvaccinated, previously infected	56.4 (53.7-59.0)	14-69	~28 weeks
								Hospitalization		43.3 (25.8-56.6)	70+	
							AZD1222	Symptomatic infection		75.0 (53.3-86.7)	14-69	
								Hospitalization		60.5 (59.1-61.9)	14-69	
										32.6 (29.4-35.7)	70+	
							Ad26.COV2.S	Symptomatic infection		84.5 (79.4-88.4)	14-69	
								Hospitalization		81.2 (72.5-87.1)	70+	
										22.8 (18.8-26.6)	14-69	
							CoronaVac	Symptomatic infection		84 (56.5-94.1)	14-69	
										62.7 (61.0-64.3)	14-69	
										37.9 (35.8-40.0)	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
								Hospitalization		76.6 (68.1-82.8)	14-69	
										75.7(69.6-80.7)	70+	
			Matched case control			Previously infected only	BNT162b2	Symptomatic infection		58.1 (55.3-60.6)	14-69	
										29.8 (3.3-49.0)	70+	
								Hospitalization		85.2 (55.7-95.1)	14-69	
							AZD1222	Symptomatic infection		61.3 (59.9-62.7)	14-69	
										36.4 (33.3-39.4)	70+	
								Hospitalization		89.7 (81.5-94.3)	14-69	
										86.3 (71.6-93.4)	70+	
							Ad26.COV2.S	Symptomatic infection		24.5 (20.6-28.2)	14-69	
										16.2 (-4.7-33.0)	70-139	
								Hospitalization		92.3(64.7-98.3)	14-69	
							CoronaVac	Symptomatic infection		62.9 (61.2-64.5)	14-69	
										41.1 (39.1-43.1)	70+	
								Hospitalization		81.0 (64.0-90.0)	14-69	
										84.5 (74-90.8)	70+	
68	Cohen et al (April 13, 2022)	Israel	Retrospective cohort	29,612 HCWs	**Omicron^**	Excluded	BNT162b2 (**4 doses**)	Documented infection	**Complete vaccination with three doses of BNT162b2 at least 4 months prior**	44(37-50)	7+	~4 weeks
67	Institute of pubic health (April 12,2022)	Chile	Test-negative case control	2,181 cases and 979 controls	Gamma and Delta^	Included	BNT162b2	Hospitalization	Unvaccinated	88.3(79.5-93.3)	14+	~24 weeks
							Sinovac			67.2(59.1-73.7)		
66	Plumb et al (April 12,2022)	USA	Test-negative case control	11,283 hospitalized adults	**Omicron ^**	Included	BNT162b2 or mRNA-1273	Hospitalization	Unvaccinated	67.6 (61.4–72.8)	14+	~25 weeks
					Delta ^					57.8 (32.1–73.8)		
65	Kim et al (April 10, 2022)	USA	Test-negative case control	2,208 cases and 1639 controls	**Omicron specifically^**	Included	BNT162b2 or mRNA-1273	Symptomatic infection	Complete vaccination with two doses at least 150 days prior	62 (48-72)	7+	~33 weeks
					Delta specifically^					96 (93-98)		
64	Buchan et al (April 7,2022)	Canada	Test-negative case control	29,855 individuals, 12-17 years	**Omicron specifically^**	Included	BNT162b2	Symptomatic infection	Unvaccinated	56 (34-70)	0-6	~3 weeks
										62 (49-72)	7+	
63	Kwon et al (April 6,2022)	USA	Test-negative case control	440 solid organ transplant recipients;	Alpha and Delta^	Included	BNT162b2 or mRNA-1273	Hospitalization in solid organ transplant recipient (SOTR)	Unvaccinated	77 (48-90)	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
				1684 patients with other immunocompromising conditions; 8301 immunocompetent individuals				Hospitalization in immunocompromised adults		92 (85-95)		
								Hospitalization in immunocompetent adults		96 (94-98)		
								Supplemental oxygen/oxygen support in SOTR		84 (57-94)		
								Supplemental oxygen/oxygen support in immunocompromised		93 (85-97)		
								Supplemental oxygen/oxygen support in immunocompetent		97 (94-98)		
62	Yoon et al (April 6,2022)	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	Ranzani et al (April 1, 2022)	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
										-14.2 (-16.7 to -11.6)	90+	~24 weeks
								Hospitalization or death		42 (19.1-58.5)	8-59	~6 weeks
										14.8 (5.4-23.2)	90+	~24 weeks
							CoronaVac primary + BNT162b2 booster	Symptomatic disease		53.5 (52.9-54.2)	8-59	~6 weeks
										24.6 (23.7-25.4)	90+	~24 weeks
								Hospitalization or death		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
										0.4 (-2.2-2.9)	60+	~24 weeks
								Hospitalization or death		71.3 (60.3-79.2)	8-59	~6 weeks
										65.4 (61.5-68.8)	60+	~24 weeks
								Symptomatic disease		56.8 (56.3-57.4)	8-59	~6 weeks
										34.9 (34.3-35.6)	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
							CoronaVac primary + BNT162b2 booster	Hospitalization or death		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
										45.5 (18.1-63.7)	60+	~24 weeks
								Hospitalization or death		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
										84.3 (80.9-87.2)	60+	~24 weeks
								Hospitalization or death		91.7 (90.4-92.9)	8-59	~6 weeks
										88.4 (80.7-93)	60+	~24 weeks
60	Glatman-Freedman et al* (March 31, 2022)	Israel	Retrospective cohort	1,561,812 booster recipients aged 16+, and unvaccinated controls	Delta, **Omicron^**	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	Starrfelt et al (March 30, 2022)	Norway	Retrospective cohort	4,301,995 adults (18+ y)	Delta^	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	Hansen et al (March 30, 2022)	Denmark	Retrospective cohort	3,090,833 participants aged 12+	**Omicron^**	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

#	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		90.2 (87.3-92.5)	14-30	~2 weeks
										77.3 (63.1-86.1)	121+	~18 weeks
57	Natarajan et al (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 visit	Unvaccinated	54 (43-63)	7+	~15 weeks
								Hospitalization		67 (52-77)		
							Ad26.COV2.S primary + any mRNA booster	Emergency Dept/ Urgent Care visit		79 (74-82)		
								Hospitalization		78 (70-84)		
							Any mRNA primary + any mRNA booster	Emergency Dept/ Urgent Care visit		83 (82-84)		
								Hospitalization		90 (88-91)		
56	Wang et al (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
										50 (45-55)	180+	unknown
					Delta^					91 (90-92)	14-179	~23.5 weeks
										71 (67-74)	180+	xx
55	Arbel et al* (April 25, 2022) *[update to Mar 24, 2022 preprint]*	Israel	Retrospecitve cohort	563,465 older adults (aged 60+)	Omicron^	Excluded	BNT162b2 (4 doses)	Death	Complete vaccination with three doses of BNT162b2 at least 4 months prior	78 (72-83)	7+	~5 weeks
54	Gazit et al* (May 24, 2022) *[Update to March 24 preprint]*	Israel	Matched test-negative case control	97,499 adults aged ≥60 years	Omicron^	Excluded	BNT162b2(4 doses)	Documented infection	Complete vaccination with three doses of BNT162b2 at least 4 months prior	57.7 (55.6-59.7)	7-13	~10 weeks
								Severe COVID-19		22 (4.9-36.1)	63-69	
			Unmatched multiple test analysis							77.5 (69.7-83.2)	7-27	
								Documented infection		86.5 (63.4-95)	49-69	
										46 (43.7-48.3)	7-13	
								Severe COVID-19		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	Stowe et al (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
										69.0 (50.3-80.7)	105+	
							AZD1222 primary + mRNA-1273 booster	Hospitalization with ARI		97.2 (86.1-99.4)	7-13	
										89.2 (82.5-93.3)	36-69	
										85.2 (47.1-95.8)	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		66.0 (44.5-79.2)	105+	
							BNT162b2 primary + mRNA-1273 booster	Hospitalization with ARI		94.3 (85-97.8)	14-34	
										89.8 (77.9-95.3)	70+	
				Adults aged 65+			AZD1222 primary + BNT162b2 booster	Hospitalization with ARI		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+	
							BNT162b2 primary + BNT162b2 booster	Hospitalization with ARI		86.4 (69.1-94)	7-13	
										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	Tenforde et al (March 25,2022)	USA	Case-control	7,544 hospitalised patients	**Omicron^**	Included	BNT162b2 or mRNA-1273 primary series + BNT162b2 or mRNA-1273 booster	Invasive mechanical ventilation or in-hospital death	Unvaccinated	94 (88-97)	7+	~20 weeks
					Delta^					95 (91-97)		
					Alpha^					94 (91-96)		
51	Altarawneh et al* (June 15, 2022) *[Update to March 31, 2022 study]*	Qatar	Test-negative case control	158,484 individuals	**Omicron BA.1 specifically^**	Previously infected only	BNT162b2	Symptomatic infection	Unvaccinated	74.4 (63.4-82.2)	7+	~19 weeks
								Hospitalization and death		100 (30.6-100)		
							mRNA-1273	Symptomatic infection		77.2 (38.5-91.5)		
								Hospitalization and death		100 (CI omitted)		
						Excluded	BNT162b2	Symptomatic infection		59.6 (52.9-65.3)		
								Hospitalization and death		97.5 (71.7-99.8)		
							mRNA-1273	Symptomatic infection		56.5 (38.1-69.4)		
								Hospitalization and death		100 (-432.5-100)		
							BNT162b2	Symptomatic infection		77.3 (72.4-81.4)		

#	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 BA.2 specifically^	Previously infected only		Hospitalization and death		100 (82.6-100)		
							mRNA-1273	Symptomatic infection		69.8 (50.1-81.7)		
								Hospitalization and death		100 (CI omitted)		
						Excluded	BNT162b2	Symptomatic infection		52.2 (48.1-55.9)		
								Hospitalization and death		98.2 (91.9-99.6)		
							mRNA-1273	Symptomatic infection		52.9 (43-61.2)		
								Hospitalization and death		100 (-3800-100)		
					Omicron specifically	Previously infected only	BNT162b2	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	Montez-Rath et al (March 18,2022)	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	Baum et al (March 13, 2022)	Finland	Retrospective cohort	897,932 older adults (aged 70+)	Non-VOC, Alpha, Delta, Omicron^ Delta^	Excluded	BNT162b2 (3 doses)	Hospitalization	Unvaccinated	96 (95-97)	14-60	~20.5 weeks
										92 (89-94	61+	
								ICU admission		97 (94-99)	14-60	
										90 (76-96)	61+	
								Hospitalization		94 (89-96)	14-60	
										59 (13-81)	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
							BNT162b2 primary + mRNA-1273 booster	ICU admission		89 (68-96)	14-60	
							mRNA-1273 primary series + BNT162b2 booster	Hospitalization		94 (83-98)	14-60	
							mRNA-1273 (3 doses)	Hospitalization		98 (95-99)	14-60	
										93 (82-98)	61+	
							AZD1222 primary series + BNT162b2 booster	Hospitalization		97 (89-99)	14-60	
										91 (33-99)	61+	
								ICU admission		48 (-297-93)	61+	
							AZD1222 primary series + mRNA-1273 booster	Hospitalization		100 (CI omitted)	14-60	
										42 (-319-92)	61+	
					Delta^		BNT162b2 (3 doses)	Hospitalization		96 (93-98)	14-60	~13 weeks
										93 (71-98)	61+	
							BNT162b2 primary series + mRNA-1273 booster			73 (-8-93)	14-60	
							mRNA-1273 primary series + BNT162b2 bppster			82 (27-96)	14-60	
										100 (CI omitted)	61+	
							mRNA-1273 (3 doses)			97 (48-100))	14-60	
										100 (CI omitted)	61+	
							AZD1222 primary series + BNT162b2 booster			83 (-22-98)	14-60	
					Omicron^		BNT162b2 (3 doses)	Hospitalization		95 (94-97)	14-60	~20.5 weeks
										90 (87-93)	61+	
							BNT162b2 primary series + mRNA-1273 booster			94 (89-97)	14-60	
										48 (-13-76)	61+	
							mRNA-1273 primary series + BNT162b2 booster			96 (82-99)	14-60	
										100 (CI omitted)	61+	
							mRNA-1273 (3 doses)			97 (92-99)	14-60	
										92 (79-97)	61+	
							AZD1222 primary series + BNT162b2 booster			98 (89-100)	14-60	
										90 (27-99)	61+	
										100 (CI omitted)	14-60	

#	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
							AZD1222 primary series + mRNA-1273 booster			40 (-336-92)	61+	
48	Shrotri et al (March 12, 2022)	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)		
				19,515 long-term care facility staff			BNT162b2 or mRNA-1273	Documented infection		79.3 (70-85.7)		
								Hospitalization		100 (no CIs)		
							AZD1222	Documented infection		75.9 (61.5-84.8)		
								Hospitalization		93.4 (25.2-99.4)		
47	Butt et al* (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	Norddahl et al (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)		

#	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
45	Klein et al (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	Šmíd et al (Febraury 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	Documented infection		90 (90-91)	14-74	
										80 (78-83)	75+	
								Hospitalization		98 (97-98)	14-74	
										96 (94-97)	75+	
							mRNA-1273	Documented infection		93 (92-94)	14-74	
										91 (83-96)	75+	
								Hospitalization		98 (97-99)	14-74	
										98 (86-99.8)	75+	
43	Patalon et al * (June 9, 2022) *[Published version of February 26, 2022 preprint]*	Israel	Test-negative case control	351,120 individuals	Omicron^	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	Monge et al* (June 2, 2022) *[Published version of February 14, 2022 preprint]*	Spain	Retrospective cohort	2,083,857 matched pairs among adults aged 40+	Omicron^	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			58.6 (55.5-61.6)		

#	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					
							Ad26.COV2.S primary + BNT162b2 or mRNA-1273 booster			48 (42.5-53.7)		
41	Regev-Yochay (February 15, 2022)	Israel	Open-label, non-randomized clinical trial	1,050 HCWs	Omicron^	Excluded	BNT162b2 (4 doses)	Infection	Complete vaccination with three doses of BNT162b2 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 (4th dose)	Infection		11 (-43 to 43)	8-23	~1 week
								Symptomatic disease		31 (-18 to 60)	8-23	
40	Ferdinands et al (February 11, 2022)	USA	Test-negative case control	241,204 ED/UC encounters and 93,408 hospitalizations	Omicron^	Included	BNT162b2, mRNA-1273 primary series + BNT162b2 and mRNA-1273 booster	ED/UC encounter	Unvaccinated	87 (85–88)	<2 mos	~25 weeks
										31 (−50–68)	≥5 mos.	
								Hospitalization		91 (88–93)	<2 mos.	
										78 (67–85)	≥4 mos	
					Delta^			ED/UC encounter		97 (96-97)	<2 mos.	
										89 (64-97)	≥4 mos	
								Hospitalization		96 (95-97)	<2 mos.	
										76 (14-93)	≥4 mos	
49	Hayek et al* (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	Cerqueira-Silva et al (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
										82.6 (76.9-86.9)	>30	
								Severe disease		91 (88.5-93.5)	7-13	
										96.8 (94.1-98.3)	>30	
								Hospitalisation		91.2 (88.3-93.4)	7-13	
										96.7 (93.9-98.2)	>30	
								Death		92.2 (87.4-95.2)	7-13	
										97.1 (90.5-99.1)	>30	
					Delta^			Documented infection	Complete vaccination with CoronaVac 2nd	76.1 (73.7- 78.4)	7-13	
										84.5 (81.0- 87.4)	>30	
								Death or hospitalizations		72.4 (65.5-77.9)	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
									dose >180 days	87.7 (80.5-92.3)	>30	
37	Chemaitelly et al (March 13, 2022) *[Update to February 8 preprint]*	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
										40.5 (30.8-48.8)	≥1 mo.	
							mRNA-1273			51.5 (32.3- 65.2)	<1 mo.	
										45.3 (17.8 -63.5)	≥1 mo.	
					Omicron BA.2 specifically^		BNT162b2			43.7 (36.5- 50.0)	<1 mo.	
										40.2 (34.2- 45.7)	≥1 mo.	
							mRNA-1273			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.	
										39.4(34.4-44.0)	≥1 mo.	
							mRNA-1273			43.6(33.2-52.4)	<1 mo.	
										47.5(34.1-58.1)	≥1 mo.	
							BNT162b2	Severe, critical or fatal disease		90.9 (78.6- 96.1)	1-6 weeks	
										90.1 (80.6-95.0)	≥7 weeks	
							mRNA-1273			81.8 (-49.5-97.8)	1-6 weeks	
										100.0 (Omitted)	≥7 weeks	
36	Lauring et al* (March 9, 2022) [February 7,2022]	USA	Test-negative case control	5582 COVID-19 cases and 5962 test negative and syndrome negative controls	**Omicron specifically^**	Excluded	BNT162b2, mRNA-1273 primary series + BNT162b2 and mRNA-1273 booster	Hospitalization(overall)	Unvaccinated	86 (77-91)	7+	~3 weeks
					Delta specifically^			Hospitalization (overall)		94 (92-95)		~25 weeks
								Hospitalization (immune-compromised)		87 (78-92)		
35	Sritipsukho et al (February 3,2022)	Thailand	Test-negative case control	1,118 cases and 2,235 controls	Delta^	Excluded	CoronaVac primary dose + AZD1222 booster	Documented infection	Unvaccinated	86 (74-93)	7+	~6 weeks
							CoronaVac primary dose + BNT162b2 booster			98 (87-100)		~8 weeks
34	Bar-On et al (April 5, 2022) *[Update to February 1, 2022 preprint]*	Israel	Retrospective cohort	1,252,331 persons aged over 60 years	**Omicron^**	Excluded	BNT162b2 **(four doses)**	Documented infections	**Complete vaccination with three doses at least 4 months prior**	33.3 (33.3-37.5)	8-14	2 weeks
								Severe illness		9.2 (0-16.7)	50-56	
										58.3 (50.0-65.5)	8-14	
										76.7 (61.5-85.9)	36-42	

#	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
33	Roberts et al (January 31,2022)	USA	Test-negative case control	74,060 adults	Non-VOC, Alpha, Delta††	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	Lytras et al* (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
31	Willet et al (Janaury 26,2022)	Scotland	Test-negative case control	6166 Omicron cases and 4911 Delta cases	**Omicron specifically^** Delta specifically^	Included	BNT162b2 mRNA-1273 BNT162b2 mRNA-1273	Documented infection	Unvaccinated	43.2 (38.1-47.8) 46.3 (41.3-51.0) 85.9 (84.2-87.4) 86.5 (84.8-88.0)	14+	~11 weeks
30	McConeghy et al (January 28,2022)	USA	Nested trial	200 Nursing homes 127 VA Community living centers	Delta††	Excluded	BNT162b2, mRNA-1273 primary series + BNT162b2 and mRNA-1273 booster	Documented infection Hospitalization Death Combined death or hospitalization Documented infection Hospitalization Combined death or hospitalization	Complete vaccination with two doses of primary mRNA series at least 6 months prior	50.4 (29.4-64.7) 47.7 (-377.7-88.9) 97.2 (88.1-100) 82 (55.5-94) 58.2 (32.3-77.8) 36.6 (-35.4-77.3) 45.8 (-15.5-79.1)	≤42	~12 weeks
29	Tenforde et al* (January 28, 2022)	USA	Test-negative case control	2952 hospitalized adults (18+ y)	Delta^	Included	BNT162b2 or mRNA-1273	Hospitalization: Immunocompromised Hospitalization: non-immunocompromised	Unvaccinated	88 (81-93) 97 (95-99)	7+	~16 weeks ~10 weeks
28	Spensley et al (January 26, 2022)	UK	Prospective cohort	1121 end stage kidney disease patients receiving	**Omicron specifically^**	Included	BNT162b2 primary + BNT162b2 booster AZD1222 + BNT162b2 booster	Documented infection	Unvaccinated	66 (36-81) 47 (2-70)	14+	~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
				in-center haemo-dialysis patients								
27	Abu-Raddad et al* (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
										49.9 (47.6-52.2)	>14	
								Hospitalization or death		76.5 (55.9-87.5)		
								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	
									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	Thompson et al (January 21,2022)	USA	Test-negative case control	222,772 ED encounters and 87,904 hospitalization	**Omicron specifically^**	Excluded	BNT162b2 or mRNA-1273	ED or UC encounters	Unvaccinated	94 (93-95)	14+	~18 weeks
								Hospitalisation		90 (80-94)		
					Delta specifically^			ED or UC encounters		94 (93-94)		
								Hospitalisation		94 (93-95)		
25	Tartof et al* (April 22, 2022) *[Update to January 18, 2022 preprint]*	USA	Test-negative case control	11,123 patients with ED or hospital encounter in Southern California	**Omicron specifically^**	Included	BNT162b2	ED admission	Unvaccinated	75 (70-79)	14+	~23 weeks
										77 (72-81)	14 to <3 mos	
										53 (36-66)	≥ 3 mos	
								Hospitalization		82 (77-87)	14+	
										85 (80-89)	14 to <3 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
										55 (28-71)	≥ 3 mos	
					Delta specifically^			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	Young-Xu et al (March 13,2022) *[Update to January 18 preprint]*	USA	Matched test-negative case control	24,581 veterans 18 or older as cases and 372,636 veterans as controls	**Omicron specifically^**	Excluded	Any mRNA vaccine	Documented infection	Unvaccinated	59(57-61)	14+	~20 weeks
								Hospitalization		87(80-91)		
								Death		94(85-98)		
					Delta specifically^			Documented infection		90(88-92)		
								Hospitalization		95(91-97)		
								Death		96(88-99)		
23	Jara et al* (April 23, 2022) *[Update to January 13,2022 preprint]*	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	Waxman et al* (April 22, 2022) *[update of Jan 11, 2022 preprint]*	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		Israel	Prospective cohort	1928 healthcare	Delta^	Excluded	BNT162b2	Documented infection	Complete vaccination	93 (80-98)	7+	~4 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
	Spitzer et al* (January 10, 2022)			workers at a tertiary medical center in Tel Aviv				Symptomatic infection	with two doses of BNT162b2 at least 1 month prior	93 (75-98)		
								Asymptomatic infection		92 (52-99)		
20	Tseng et al* (February 21, 2022) *[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^**	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+	
								Documented infection: Immuno-compromised		29.4 (0.3-50)	14+	
					Delta specifically^			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)		
								Hospitalization: All		99.7 (96.5-100)		
19	Tan et al* (February 11,2022) *[Published version of January 5,2022 preprint]*	Singapore	Retrospective cohort	703,209 individuals aged 60 years and above	Delta††	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses of BNT162b2 primary series at least 5 months prior	73 (72-75)	12+	~6 weeks
								Symptomatic disease		72 (71-74)		
								Severe disease		95 (92-97)		
							BNT162b2 primary series + mRNA-1273 booster	Documented infection		82 (77-86)		
								Symptomatic disease		82 (76-87)		
								Severe disease		92 (44-99)		
							mRNA-1273 primary series + mRNA-1273 booster	Documented infection		86 (81-90)		
								Symptomatic disease		85 (79-89)		
							mRNA-1273 primary series + BNT162b2 booster	Documented infection		90 (73-96)		
								Symptomatic disease		90 (69-97)		
18	Buchan et al (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	**Omicron specifically^**	Excluded	mRNA primary + BNT162b2 booster	Symptomatic disease	Unvaccinated	60 (55-65)	7+	~9 weeks
							mRNA primary + mRNA-1273 booster			65 (55-72)		
							mRNA primary + BNT162b2 booster	Severe disease		95 (87-98)		

#	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
				test-negative controls			mRNA primary + mRNA-1273 booster			93 (74-98)		
					Delta specifically^		mRNA primary + BNT162b2 booster	Symptomatic disease	Unvaccinated	97 (96-98)		
							mRNA primary + mRNA-1273 booster			97 (95-98)		
							mRNA primary + BNT162b2 booster	Severe disease		99 (98-99)		
							mRNA primary + mRNA-1273 booster			100 (98-100)		
17	Gray et al *(June 9,2022) *[Published version of December 29,2021 preprint]*	South Africa	Test-negative case control	69,092 HCWs	**Omicron^**	Excluded	Ad26.COV.2	Hospitalization	Unvaccinated	84 (67-92)	14-27	~13 weeks
										85 (54-95)	1-2 months	
								ICU admission		69 (26-87)	14-27	
										82 (57-93)	28-87	
16	Lustig et al* (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	Amir et al (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	73.4 (67.1-78.9)	14+	~4 weeks
									Unvaccinated individuals aged 16-18	96.2 (94.8-97.2)		
14	Hansen et al (December 23,2021)	Denmark	Retrospective cohort	41,684 Danish residents aged ≥12 years (booster analysis among 60+ years only)	**Omicron specifically^**	Excluded	BNT162b2	Documented infection	Complete vaccination with two doses of primary series at least 140	54.6 (30.4-70.4)	1-30	~4 weeks
					Delta specifically^		BNT162b2			81.2 (79.2-82.9)		
							mRNA-1273			82.8 (58.8-92.9)		

#	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
									days prior, for 60+ year olds			
13	Tartof et al* (February 14, 2021) *[Updated from December 21st preprint]*	USA	Retrospective matched cohort	3,133,075 individuals ≥ 18 years	Delta specifically^	Included	BNT162b2	Documented infection	Unvaccinated	88 (86-89)	14+	~12 weeks
								Hospitalization		97 (95-98)		
								Documented infection	Complete vaccination with two doses of primary series at least 6 months prior	75 (71-78)		
								Hospitalization		70 (48-83)		
12	Berec et al (December 12,2021)	Czech Republic	Retrospective cohort	6,287,356 individuals	Delta^	Included	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses of primary series at least 6-8 months prior	92 (91-92)	7+	~8 weeks
							mRNA-1273 primary series+ BNT162b2 booster			94 (91-96)		
							AZD1222 primary series + BNT162b2 booster			82 (68-90)		
							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	UKHSA/Andrews et al (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	

#	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 + 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	
							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	
										94.9 (93.6-95.9)	5-9 weeks	
							mRNA-1273 primary series +BNT162b2 booster			97.3 (91.5-99.1)	2-4 weeks	
							mRNA-1273 primary series + mRNA-1273 booster			95.8 (88.8-98.4)	2-4 weeks	
10	Arbel et al (December 8,2021)*	Israel	Prospective cohort	843,208 individuals	Delta^	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	Goldberg et al	Israel	Retrospective cohort		Delta^	Excluded		16-39: Documented infection	Receipt of 2 doses at least	91 (90.1-91,3)	12+	~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
	(December 5, 2021)			5.7 million Israeli individuals			BNT162b2 primary series + BNT162b2 booster	40-59: Documented infection	5 months prior	89 (88.3-89.3)		
								60+: Documented infection		82.2 (81.5-82.8)		
8	Sharma et al (November 30, 2021)	USA	Matched retrospective cohort	129,130 matched pairs of veterans who received a second dose at least 6 months prior	Delta††	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	Andrews et al (December 17, 2021) *[Update to November 15, 2021 Preprint]*	England	Test-negative case control	462,591 adults aged 50+ years in England	Delta††	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)		
							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	Barda et al*(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+	
								Symptomatic disease		91 (89-92)		~7 weeks
								Hospitalization		93 (88-97)		
								Severe disease		92 (82-97)		
								Death		81 (59-97)		
5	Saciuk et al* (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

#	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	Hardt et al (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	Bar-On et al * (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 least 5 months prior	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
								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	Patalon et al* (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
										86 (85-87)	28-65	
			Matched case-control					Documented infection		87 (85-88)	14-20	
										83 (82-85)	28-65	
								Hospitalization		92 (87-95)	14-20	
										97 (95-98)	28-65	
1	Bar-On et al* (October 7,2021)	Israel	Retrospective cohort	1,144,690	Delta^	Excluded		Documented infection	Complete vaccination	92 (90- 93)	12+	~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
	[Update to August 31 Preprint]						BNT162b2 primary series + BNT162b2 booster	Severe disease	with two doses at least 5 months prior	94 (91-96)		

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

2.1 Booster studies that do not meet criteria

1. Bomze D, Sprecher E, Gamzu R. Effect of a nationwide booster vaccine rollout in Israel on SARS-CoV-2 infection and severe illness in young adults. *Travel Med Infect Dis*. Published online 2021 October 30. doi: https://doi.org/10.1016/j.tmaid.2021.102195
2. Lippi G & Mattiuzzi C. Primary COVID-19 vaccine cycle and booster doses efficacy: analysis of Italian nationwide vaccination campaign. *Research Square*. Published online November 30, 2021. doi: 10.21203/rs.3.rs-1116534/v1
3. Mattiuzzi, C., & Lippi, G. Efficacy of COVID-19 vaccine booster doses in older people. *ResearchSquare*. Published online 2021 December 20. doi: https://doi.org/10.21203/rs.3.rs-1185254/v1
4. Robles-Fontán, M. M., & Irizarry, R. A. (2021). Effectiveness of different booster regimens for preventing infection and adverse outcomes in Puerto Rico. *MedRxiv*, Published online 2021 December 21. https://doi.org/10.1101/2021.12.19.21268070
5. Chadeau-Hyam, M., Eales, O., Bodinier B, et al. Breakthrough SARS-CoV-2 infections in double and triple vaccinated adults and single dose vaccine effectiveness among children in autumn 2021 in England: REACT-1 study. *eClinicalMedicine*. 2022(48):101419. doi: https://doi.org/10.1016/j.eclinm.2022.101419
6. Sheikh A, Kerr S, Woolhouse M, et al. Severity of Omicron variant of concern and vaccine effectiveness against symptomatic disease: national cohort with nested test negative design study in Scotland. *Lancet Infect Dis.* Published online 2022 April 22. https://doi.org/10.1016/S1473-3099(22)00141-4.
7. Lippi G & Mattiuzzi C. Real-world analysis of age-dependent efficacy ofCOVID-19 vaccination. *Research Square*. Published online 12 January, 2022. doi: https://doi.org/10.21203/rs.3.rs-1248612/v1.
8. Lewnard J A, Hong V X, Patel M M, et al. Clinical outcomes among patients infected with Omicron (B.1.1.529) SARS-CoV-2 variant in southern California. medRxiv. Published online 2022 January 11. doi: https://doi.org/10.1101/2022.01.11.22269045.
9. McKeigue PM, Porter D, Hollick R, et al. Risk of severe COVID-19 in patients with inflammatory rheumatic diseases treated with immunosuppressive therapy in Scotland. *medRxiv*. Published online 2022 February 14. doi: https://doi.org/10.1101/2022.02.13.22270898.
10. Shen C, Risk M, Schiopu E, et al. Efficacy of COVID-19 vaccines in patients taking immunosuppressants. *Annals of the Rheumatic Diseases* Published Online First: 23 February 2022. doi: 10.1136/annrheumdis-2021-222045.
11. Wan J, Cazer C L, Clarkberg M E, et al. Boosters protect against SARS-CoV-2 infections in young adults during an Omicron-predominant period. *medRxiv*. Published online 2022 Mar 9. https://doi.org/10.1101/2022.03.08.22272056.

12. Korves C, Izurieta H S, Smith J, et al. Relative effectiveness of booster vs. 2-dose mRNA Covid-19 vaccination in the Veterans Health Administration: Self-controlled risk interval analysis. *medRxiv*. Published online 2022 Mar 18. https://www.medrxiv.org/content/10.1101/2022.03.17.22272555v1.
13. Kirsebom FCM, Andrews N, Stowe J, et al. COVID-19 vaccine effectiveness against Omicron BA.2 variant in England. *medRxiv*.Published online 2022 March 24. 2022. doi:10.1101/2022.03.22.22272691
14. Taylor CA, Witaker M, Anglin O, et al. COVID-19-associated hospitalizations among adults during SARS-CoV-2 Delta and Omicron variant predominance, by race/ethnicity and vaccination status – COVID-NET, 14 states, July 2021-January 2022. *Morb Motal Wkly Rep*. 2022;71:466-473. doi:http://dx.doi.org/10.15585/mmwr.mm7112e2
15. Kiss Z, Wittmann I, Polivka L, et al. Nationwide effectiveness of first and second SARS-CoV-2 booster vaccines during the Delta and Omicron pandemic waves in Hungary (HUN-VE 2 Study). *medRxiv*. Published online 2022 March 30. doi:10.1101/2022.03.27.22273000
16. Perumal N, Steffen A, Altmann D, et al. Effectiveness of mRNA booster vaccination against mild and severe COVID-19 during Delta and Omicron variant circulation in Germany: An analysis of national surveillance data. *SSRN*. Pulished online 2022 April 1. https://dx.doi.org/10.2139/ssrn.4072476
17. Nyberg T, Ferguson NM, et al. Comparative Analysis of the Risks of Hospitalisation and Death Associated with SARS-CoV-2 Omicron (B.1.1.529) and Delta (B.1.617.2) Variants in England. *Lancet*. 2022;399(10332):1303-1312. doi: February 4. doi: https://doi.org/10.1016/S0140-6736(22)00462-7
18. Mielke N, Johnson S, Bahl A. Boosters reduce in-hospital mortality in patients with COVID-19: An observational cohort analysis. *Lancet Reg Health Am.* 2022 Apr;8:100227. doi: 10.1016/j.lana.2022.100227
19. Bansal D, Abdulmajeed J, Yassin E, et al. COVID-19 mRNA vaccine effectiveness against severe disease. *SSRN*. Pulished online 2022 April 4. https://ssrn.com/abstract=4074663
20. Freund O, Tau L, Weiss TE, et al. Associations of vaccine status with characteristics and outcomes of hospitalized severe COVID-19 patients in the booster era. *PLOS ONE*. 17(5):e0268050. https://doi.org/10.1371/journal.pone.0268050
21. Nordstrom P, Ballin M, Nordstrom A. Effectiveness of a second COVID-19 vaccine booster on all-cause mortality in long-term care facility residents and in the Oldest Old: A nationwide, retrospective cohort study in Sweden. *SSRN*. Publishsed online 2022 May 12. https://ssrn.com/abstract=4107709
22. Fleming-Dutra KE, Britton A, Shang N, et al. Association of prior BNT162b2 COVID-19 vaccination with symptomatic SARS-CoV-2 infection in children and adolescents during Omicron predominance. *JAMA.* Published online 2022 May 13. https://doi.org/10.1001/jama.2022.7493
23. Grgič Vitek M, Klavs I, Učakar V, et al.. mRNA vaccine effectiveness against hospitalisation due to severe acute respiratory infection (SARI) COVID-19 during Omicron variant predominance estimated from real-world surveillance data, Slovenia, February to March 2022. *Eurosurveillance*. 2022;27(20). doi:10.2807/1560-7917.es.2022.27.20.2200350.

24. Wang H, Chen Z, Wang Z, et al. mRNA based vaccines provide broad protection against different SARS-CoV-2 variants of concern. *Emerg Microbes Infect*. Published online 2022 May 23. doi: https://doi.org/10.1080/22221751.2022.2081616
25. Brosh-Nissimov T, Maor Y, Elbaz M, et al. Hospitalized patients with breakthrough COVID-19 following vaccination during two distinct waves in Israel, January to August 2021: a multicentre comparative cohort study. *Euro Surveill*. 2022;27(20):pii=2101026. doi: https://doi.org/10.2807/1560-7917.ES.2022.27.20.2101026
26. Goggins E, Sharma B, Gautam J, et al. SARS-CoV-2 booster effect and waning immunity in hemodialysis patients. *medRxiv*. Published online 2022 May 25. https://doi.org/10.1101/2022.05.22.22275183

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	Braeye et al* (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	
					Delta^		BNT162b2		46 (44-48)	7-57	
									34 (32-35)	157-207	
							mRNA-1273		51 (48-54)	14-64	
									48 (47-50)	164-214	
							Ad26.COV2.S		25 (23-27)	21-71	
									25 (22-27)	171-221	
							AZD1222		32 (29-35)	14-64	
									31 (29-33)	164-214	
						Previously infected persons only	BNT162b2		74 (69-80)	7-57	
									62 (60-67)	157-207	
							mRNA-1273		72 (60-83)	14-64	
									61 (49-68)	164-214	
							Ad26.COV2.S		71 (61-79)	21-71	
									63 (54-76)	171-221	
							AZD1222		74 (66-81)	14-64	
									60 (55-68)	164-214	
16	Ng et al (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	Jalali et al (February 18, 2022)	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	Hayek et al*(January 27,2022)	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	Lyngse et al (January 6, 2022)	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	Clifford et al (November 24,2021)	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	Ng et al* (November 1, 2021)	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	Singanayagam et al*(October 28,2021)	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	de Gier et al* (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	63 (46-75)	14+ (or 28+ after a single dose of Ad26.COV2.S)	~32 weeks
								Transmission to fully vaccinated household contacts	40 (20-54)		
8	Eyre et al* (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	Included	BNT162b2	Transmission to contacts	68 (52-79)	14+	~20.5 weeks
							AZD1222		52 (22-70)		~8 weeks
					Delta^ specifically		BNT162b2		50 (35-61)		~29 weeks
							AZD1222		24 (18-30)		~16 weeks
7	Meyer et al (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	Braeye et al* (August 19,2021)	Belgium	Retrospective cohort	131,283 index cases and 301,741 high risk contacts	Alpha^	Included	BNT162b2	Transmission	62 (57-67)	14+	~20 weeks
							mRNA-1273		52 (33-69)		
5	de Gier et al* (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	Transmission to any household contacts (adjusted for contact vaccination status)	58 (−12-84)	7+	~15 weeks
							BNT162b2		70 (61-77)		
							mRNA-1273		88 (50-97)		
							Ad26.COV2.S		—		
4	Layan, Gilboa et al* (March 03, 2022) *[Published version of*	Israel	Prospective cohort	215 index cases and 687 household contacts from 210 Israeli households	Original and Alpha¶	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
	July 16,2021 preprint]										
3	Prunas et al* (January 27, 2022) *[Update to July 16, 2021 preprint]*	Israel	Retrospective cohort	2,472,502 Israeli individuals from 1,327,647 households	Original and Alpha¶ (pre-Delta^)	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
					Delta^			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	Harris et al* (June 23, 2021) *[Update to Apr 28 preprint]*	UK	Retrospective cohort, case-control	970,128 household contacts of index case (unvaccinated, vaccinated with AZD1222 or BNT162b)	Alpha£	Unknown	AZD1222	Documented infection	—		
							BNT162b2				
1	Salo et al* (March 4, 2022) *[Update to July 10, 2021 preprint]*	Finland	Retrospective cohort	265,326 HCW and their 298,100 unvaccinated spouses and children (3-18 years)	Alpha††	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	—	—	

[§]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
[±]Unless noted otherwise, days post 1st dose are prior to receiving dose 2.
‡Unclear if 1st dose VE estimates includes any individuals who received a second dose.
*Manuscripts with an asterisk (*) are peer-reviewed publications.
^Indicates predominant variant identified by study authors. If no ^ then variants identified through secondary source when possible. Please see additional footnotes.
[¶]The rise of SARS-CoV-2 variant Alpha in Israel intensifies the role of surveillance and vaccination in elderly | medRxiv
[£]Coronavirus (COVID-19) Infection Survey, UK - Office for National Statistics
[††]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	Jalali et al (February 18, 2022)	Norway	Retrospective cohort	1122 primary cases and 2169 household contacts (aged 16+)	**Omicron 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)	7+	~13.5 weeks
					Delta specifically^					82 (30-99)		
3	Allen et al (February 17,2022)	UK	Retrospective cohort	23,667 cases and 40,123 contacts	**Omicron specifically^**	Excluded	BNT162b2, mRNA-1273, AZD1222, Ad26.COV2.S primary + BNT162b2 or mRNA-1273 booster	Transmission in contacts in household setting	Complete vaccination with two doses of primary series	12(3-21)	14+	~16 weeks
								Transmission in contacts in non-household setting		24(6-39)		
				59,031 cases and 111,469 contacts	Delta specifically^			Transmission in contacts in household setting		32(26-38)		
								Transmission in contacts in non-household setting		49(34-61)		
2	Hayek et al* (January 27,2022)	Israel	Retrospective cohort	231,926 households with 582,050 children	Delta^	Excluded	BNT162b2	Transmission to unvaccinated child from one boosted parent	Fully vaccinated primary cases	20.8(11.4-29.1)	7+	~9.5 weeks
								Transmission to unvaccinated child from two boosted parents		58.1(53.1-62.6)		
1	Lyngse et al (December 27, 2021)	Denmark	Retrospective cohort	11,937 primary cases and their household members	**Omicron** and Delta^	Included	BNT162b2, mRNA-1273, AZD1222, Ad26.COV2.S	Transmission to household members	Fully vaccinated primary cases	46 (29-60)	7+	~7 weeks

5. Review Papers and Meta-analyses

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 Syndrom 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
28. Effectiveness of the WHO-authorized COVID-19 vaccines: A rapid review of global reports till 30 June 2021
29. COVID-19 vaccine effectiveness among immunocompromised populations: a targeted literature review of real-world studies
30. Effectiveness of COVID-19 vaccines against Delta (B.1.617.2) variant: A systematic review and meta-analysis of clinical studies
31. The effectiveness of mRNA-1273 vaccine against COVID-19 caused by Delta variant: A systematic review and meta-analysis
32. Household secondary attack rates of SARS-CoV-2 by variant and vaccination status: an updated systematic review and meta-analysis
33. Systematic review and meta-analysis of COVID-19 vaccines safety, tolerability, and efficacy among HIV-infected patients
34. A systematic review of methodological approaches for evaluating real-world effectiveness of COVID-19 vaccines: Advising resource-constrained settings
35. Immunological and clinical efficacy of COVID-19 vaccines in immunocompromised populations: A systematic review
36. Waning effectiveness of SARS-CoV-2 mRNA vaccines in older adults: A rapid review
37. Short-term effectiveness of COVID-19 vaccines in immunocompromised patients: A systematic literature review and meta-analysis
38. Effectiveness of vaccination against SARS-CoV-2 infection in the Pre-Delta era: A systematic review and meta-analysis
39. Update on COVID-19 vaccination in pediatric solid organ transplant recipients
40. Comparing COVID-19 vaccines for their characteristics, efficacy and effectiveness against SARS-CoV-2 and variants of concern: a narrative review
41. Efficacy of mRNA, adenoviral vector, and perfusion protein COVID-19 vaccines
42. Immunological and clinical efficacy of COVID-19 vaccines in immunocompromised populations: a systematic review
43. Implication of the emergence of the delta (B.1.617.2) variants on vaccine effectiveness
44. The effectiveness of mRNA-1273 vaccine against COVID-19 caused by Delta variant: A systematic review and meta-analysis
45. A review of the safety and efficacy of current COVID-19 vaccines
46. Emerging COVID-19 variants and their impact on SARS-CoV-2 diagnosis, therapeutics and vaccines
47. The efficacy and effectiveness of the COVID-19 vaccines in reducing infection, severity, hospitalization, and mortality: a systematic review
48. The effectiveness of vaccination against long COVID: A rapid evidence briefing
49. Effectiveness and Safety of COVID-19 Vaccine among Pregnant Women in Real-World Studies: A Systematic Review and Meta-Analysis
50. Effectiveness and Durability of COVID-19 Vaccination in 9447 Patients with IBD: A Systematic Review and Meta-Analysis
51. Insight into the biological impact of COVID-19 and its vaccines on human health
52. The Burden of Coronavirus Disease 2019–Related Cases, Hospitalizations, and Mortality Based on Vaccination Status and Mandated Mask Use: Statewide Data From Wisconsin and Narrative Review of the Literature
53. Vaccination for SARS-CoV-2 in hematological patients.

54. Systematic review of the safety, immunogenicity, and effectiveness of COVID-19 vaccines in pregnant and lactating individuals and their infants
55. SARS-CoV-2 and coronavirus disease mitigation: Treatment options, vaccinations and variants
56. Current evidence on efficacy of COVID-19 booster dose vaccination against the Omicron variant. A systematic review
57. Waning effectiveness of SARS-CoV-2 mRNA vaccines in older adults: a rapid review
58. Emerging evidence on heterologous COVID-19 vaccine schedules-To mix or not to mix?
59. COVID-19 Vaccination among Pregnant People in the U.S.: A Systematic Review
60. Protection Duration of COVID-19 Vaccines: Waning Effectiveness and Future Perspective
61. SARS-CoV-2 Mutations and Their Impact on Diagnostics, Therapeutics and Vaccines
62. Breakthrough SARS-CoV-2 infections after vaccination: a critical review
63. SARS-CoV-2 infection and COVID-19 vaccination in pregnancy
64. Effectiveness and safety of SARS-CoV-2 vaccine in Inflammatory Bowel Disease patients: A systematic review, meta-analysis and meta-regression
65. COVID-19 vaccination in cancer patients: a narrative review
66. The impact of evolving SARS-CoV-2 mutations and variants on COVID-19 vaccines
67. Review paper Assessment of COVID-19 vaccination effectiveness
68. Effectiveness and safety of COVID-19 vaccines in patients with inflammatory bowel disease
69. Effectiveness and safety of SARS-CoV-2 vaccines among children and adolescents: A systematic review and meta-analysis
70. COVID-19 vaccine effectiveness: A review of the first 6 months of COVID-19 vaccine availability (1 January-30 June 2021)
71. Effectiveness of BNT162b2 and mRNA-1273 Vaccines against COVID-19 Infection: A Meta-Analysis of Test-Negative Design Studies
72. Evaluation of protection by COVID-19 vaccines after deployment in low and lower-middle income countries
73. The effect of vaccination on transmission of COVID-19- A rapid evidence briefing
74. Expert review of Global Real World Vaccine Effectiveness against SARS-CoV-2
75. COVID-19 disease and vaccination in pregnant and lactating women
76. The importance of vaccination in the context of the COVID-19 pandemic: A brief update regarding the use of vaccines
77. Effectiveness and safety of SARS-CoV-2 vaccine in Inflammatory Bowel Disease patients: a systematic review, meta-analysis and meta-regression
78. Development of COVID-19 vaccine: A summarized review on global trials, efficacy, and effectiveness on variants
79. mRNA- and adenovirus-based vaccines against SARS-CoV-2 in HIV-positive people
80. Safety & effectiveness of COVID-19 vaccines: A narrative review
81. COVID-19 Vaccines and SARS-CoV-2 Transmission in the Era of New Variants: A Review and Perspective
82. Effectiveness of Covid-19 vaccines against SARS-CoV-2 Omicron variant (B.1.1.529): A systematic review with meta-analysis and meta-regression
83. Systematic review and meta-analysis of the effectiveness and perinatal outcomes of COVID-19 vaccination in pregnancy

84. SARS-CoV-2 vaccine effectiveness against infection, symptomatic and severe COVID-19: a systematic review and meta-analysis
85. COVID-19: Vaccines, efficacy and effects on variants
86. COVID-19 Vaccines
87. Effectiveness, immunogenicity, and safety of COVID-19 vaccines for individuals with hematological malignancies: a systematic review
88. Effectiveness of heterologous and homologous covid-19 vaccine regimens: living systematic review with network meta-analysis
89. Facing the Omicron variant – How well do vaccines protect against mild and severe COVID-19? Third interim analysis of a living systematic review
90. Assessing vaccine effectiveness against severe COVID-19 disease caused by omicron variant. Report from a meeting of the World Health Organization
91. Real-Word Effectiveness of Global COVID-19 Vaccines Against SARS-CoV-2 Variants: A Systematic Review and Meta-Analysis
92. Safety and efficacy of COVID-19 vaccines in children and adolescents: a systematic review of randomized controlled trials
93. Reported effectiveness of COVID-19 booster vaccines: A systematic review of early literature and implications for emerging vaccination policy
94. Duration of effectiveness of vaccination against COVID-19 caused by the omicron variant
95. Impact of COVID-19 vaccination on long COVID: a systematic review and meta-analysis
96. Effectiveness of vaccination against SARS-CoV-2 Omicron variant infection, symptomatic disease, and hospitalisation: a systematic review and meta-analysis

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