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)

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
198	Oliver et al* (March 9,2022)	Canada	Retrospective cohort	13,579 individuals in hemodialysis	Alpha^	Included	BNT162b2 & mRNA-1273	Documented infection	41 (24-54)	14+	69 (58-78)	7+	~22 weeks
								Severe disease	46 (23-63)		83 (70-90)		
								Hospitalization	40 (13-58)		82 (69-90)		
								Deaths	71 (40-86)		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	19 (9-28)	14-20	50 (44-55)	>6	~26.5 weeks
									16 (8-24)	>27			
								Hospitalization	69 (43-83)	14-20	88 (81-93)		
									75 (56-85)	>27			
							AZD1222	Documented infection	7 (-5-19)	14-20	25 (15-33)		~18 weeks
									17 (9-25)	>27			
								Hospitalization	48 (26-64)	14-20	81 (71-88)		
									72 (62-80)	>27			
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)	14+	—		
195	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^	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	Omicron^	Included	BNT162b2	Documented infection	31 (28-34)	14-74	49 (48-50)	14-74	~54 weeks
									53 (46-59)	75+	11 (10-12)	135+	
								Hospitalisation	41 (-3-66)	14-74	46 (28-60)	14-74	
									4 (-287-76)	75+	34 (24-42)	135+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
							mRNA-1273	Documented infection	49 (42-55)	14-74	48 (44-52)	14-74	
									60 (36-75)	75+	20 (17-22)	135+	
								Hospitalisation	56 (-78-89)	14-74	51 (-20-80)	14-74	
									-160 (-1743-64)	75+	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	67 (65-69)	14-74	82 (81-83)	14-74	~54 weeks
									61 (51-69)	75+	54 (53-55)	135+	
								Hospitalisation	53 (40-63)	14-74	80 (72-85)	14-74	
									61 (-20-87(	75+	81 (79-82)	135+	
							mRNA-1273	Documented infection	68 (61-74)	14-74	71 (65-76)	14-74	
									67 (34-84)	75+	68 (66-69)	135+	
								Hospitalisation	49 (13-71)	14-74	100 (CI omitted)	14-74	
									100 (CI omitted)	75+	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	20.8 (11.6-29)	12+	70 (65.3-74.1)	7+	~16 weeks
							mRNA-1273		52.8 (30.7-67.8)	14+	70.3 (52.2-81.5)	14+	
							AZD1222		40.3 (31.8-47.7)	21+	—		
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		Unknown	BNT162b2	Emergency department visit	—	—	73.9 (66.3-79.8)	14+	~31 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
				patients (aged 18+)	Non-VOC, Alpha,†† Delta^		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	24.7(-98.8-71.4)	14+	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.	
								Pneumonia	16.3(-164.3-73.2)		54.7 (-3.4-80.2)	14+	
											39.6 (-35.4-73.1)	≤3 mos.	
								Severe disease	7.5(-655.6-88.7)		–		
							CoronaVac	Symptomatic disease	29.9(-44.3-66.0)		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	52.6(-25.2-82.1)		64.9 (22.8-84.0)	14+	
											73.8 (17.9-91.6)	≤3 mos.	
											47.4 (-44.3-80.8)	4-6 mos.	
								Severe disease	59.7(-209.9-94.7)		–		
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)		
188	Gazit et al* (February 15, 2022)	Israel	Retrospective cohort	107,413 members	Alpha and Delta^	Included	BNT162b2 CoronaVac	Documented infection	82(80-85)	—		14+	~40 weeks
								Symptomatic infection	76(71-80)				
187	Halasa et al (February 15, 2022)	USA	Test-negative case control	176 case-infants and 203 control-infants< 6 months hospitalized in 20 pediatric hospitals	Delta^	Included	BNT162b2 & mRNA-1273	Hospitalization in infants <6 month with maternal vaccination anytime during pregnancy up to 14 days before delivery	—	—	61 (31-78)	14+	~26 weeks
								Hospitalization in infants <6 months with			32 (-43-68)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								maternal vaccination in first 20 weeks of pregnancy					
								Hospitalization in infants <6 months with maternal vaccination 21 weeks gestation up to 14 days before delivery			80 (55-91)		
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	61.8 (58.2-65.1)	10+	81.2 (78.6-83.5)	7+	~16.5 weeks
								Death	72.3 (66.9-76.8)	10+	85.3 (80.4-88.9)	7+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd 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	76(61-86)	14+	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	60.6 (25.5-79.2)	14+	68.9 (61.9-74.7)	14+	~31 weeks
							mRNA-1273		37.2 (27.1-69.0)		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 (February 8,2022)	Qatar	Test-negative case control	133,417 individuals	**Omicron specifically^**	Included	BNT162b2	Symptomatic disease	26.1 (5.8-42)	14+	61.9 (49.9-71.1)	1st month	~54 weeks
											16.5 (3.1-28.1)	≥12 months	
								Severe, critical or fatal disease	46.8 (-1.6-89.2)		73.7 (46.8-87.0)	1-6 months	
											80.7 (71.3-87.0)	≥7 months	
							mRNA-1273	Symptomatic disease	-1.6 (-56.8-34.1)		44.8 (16.0-63.8)	1-3 months	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
											-9.3 (-16.3- -2.8)	≥7 months	
								Severe, critical or fatal disease	100		76.9 (19.2-93.4)	1-6 months	
											64.0 (39.1-78.7)	≥7 months	
178	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	Hospitalization	—	14+	65 (51-75)	14+	~3 weeks
					Delta specifically^		BNT162b2 & mRNA-1273				85 (83-87)	≤150	~27 weeks
											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)		
					Alpha, Delta, Omicron^		BNT162b2 & mRNA-1273		77 (71-81)		–		
177	Suryatma et al (February 4,2022)	Indonesia	Test-negative case control	14,168 adults aged ≥18	Non-VOC, Alpha††	Excluded	CoronaVac	Documented infection	10.5 (-12-28.6)	14+	66.7 (58.1-73.5)	14+	~24 weeks
								Hospitalization	34.1 (16.4-48.1)		71.1 (62.9-77.6)		
								Death	58.6 (28.3-76.1)		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	49 (36-58)	21+	83 (70-90)	14+	~13 weeks
							CoronaVac		-15 (-45-15)		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.	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								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 (January 29,2022)	Greece	Retrospective cohort	9100 COVID-19 intubations and 14755 COVID-19	Non-VOC, Alpha, Delta^	Included	BNT162b2	Intubation (age 15-59)	--	--	98.1 (97.5-98.6)	14+	~ 48 weeks
											95.5 (94.3–96.5)	6 mos	
								Intubation (age 60-79)			96.7 (95.9–97.4)	14+	
											92 (91.0–92.9)	6 mos	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
				deaths in Greece aged ≥15 years				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 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+	
											96.7 (87.9–99.1)	14+	
								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 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 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 (age 15-59)			81.7 (57.5–92.1)	14+	
								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	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
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	51 (40-60)	14+	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	34 (28-40)	14+	86 (83-89)	7+	~7 weeks
168	Bedston et al*(January 21, 2022)	UK	Prospective cohort	93,292 HCWs	Alpha^	Excluded	BNT162b2	Documented infection	52 (45-58)	3-6 weeks	86 (74-91)	2-5 weeks	~37 weeks
									39 (24-50)	7+ 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	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
166	Amodio et al (January 13,2021)	Italy	Retrospective cohort	3,966,976 adults aged≥ 18 years	Alpha, Delta††	Excluded	BNT162b2 & mRNA-1273	Documented infection	—	—	81.3 (80.3-82.3)	2 months	~37 weeks
											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 (January 18, 2022)	USA	Test-negative case control	8694 hospital admissions, and 11,719 ED admissions in Southern California	**Omicron specifically^**	Excluded	BNT162b2	ED admission	—	—	60 (43–72)	<3 mos.	~44 weeks
											41 (32-50)	≥6 mos.	
								Hospitalisation			70 (41-84)	<3 mos.	
											68 (56–76)	≥6 mos.	
					Delta specifically^			ED admission			80 (69–87)	<3 mos.	
											63 (57–69)	≥6 mos.	
								Hospitalisation			88 (71–95)	<3 mos.	
											74 (65–80)	≥6 mos.	
164	Young-Xu et al (January 18,2022)	USA	Matched test-negative case control	14,868 veterans 18 or older as cases and 54,347	**Omicron specifically^**	Excluded	BNT162b2 & mRNA-1273	Documented infection	—	—	25 (20-30)	14+	~~48 weeks
					Delta specifically^			Documented infection			41 (37-44)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
				veterans as controls	Delta and Omicron^			Death			76 (62-85)		
163	Suah et al (January 16,2022)	Malaysia	Retrospective cohort	227,071 individuals aged ≥15	Delta^	Excluded	BNT162b2	Documented infection: Vaccinated April to June	—	—	79.1 (75.8-81.9)	9-26 weeks	~26 weeks
								Documented infection: Vaccinated July to August			90.8 (89.4-92)	2-13 weeks	
							CoronaVac	Documented infection: Vaccinated April to June			30 (18.4-39.9)	9-26 weeks	
								Documented infection: Vaccinated July to August			74.4 (70.4-77.8)	2-13 weeks	
162	Gazit et al* (November 24, 2021)	Israel	Retrospective cohort	4024 adult household members of SARS-CoV-2 index cases	Alpha^	Excluded	BNT162b2	Documented infection	–	–	80.3 (73.5-85.4)	7+	~7.5 weeks
161	Olson et al* (January 12,2022)	USA	Case control	445 case patients and 777 control patients aged 12-18 years	Delta^	Unknown	BNT162b2	Hospitalization	97 (86-100)	14+	94 (90-96)	14+	~18 weeks
								ICU admission	–		98 (93-99)		
			Test-negative case control					Hospitalization	98 (88-100)		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	56 (49-63)	14+ including <14 days post dose 2	59 (55-63)	14+	~20 weeks
											78 (70-84)	14-30	~2 weeks
											54 (45-62)	120+	~20 weeks
								Symptomatic infection	61 (53-69)		62 (57-66)	14+	
											80 (70-86)	14-30	~2 weeks
											53 (5-77)	120+	~20 weeks
159#	Tseng et al (February 18, 2022) *[update from January 21 preprint]*	USA	Test-negative case control	26,683 cases and 109,662 controls among Kaiser Permanente Southern California	**Omicron specifically^**	Included	mRNA-1273	Documented infection	20.4 (9.5-30)	14+	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+	
								Documented infection	56.7 (40.7-68.4)		63.6 (59.9-66.9)	14+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
				members aged 18+	Delta specifically^						80.2 (68.2-87.7)	14-90	~11 weeks
											61.3 (55-66.7)	>270	~47.5 weeks
								Hospitalization	71.2 (-68.7-97.4)		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	52 (49-55)	>7 days including <14 days post dose 2	85 (84-86)	14-89	~25 weeks
											58 (52-64)	150-180	
								Symptomatic disease	56 (52-60)		90 (89-91)	14-89	
											65 (58-71)	150-180	
			Test negative case control					Documented infection	62 (60-64)		84 (82-85)	14-89	
											50 (43-57)	150-180	
156	Petráš et al* (December 22, 2021)	Czech Republic	Retrospective cohort	11,016 staff of three hospitals in Prague	Alpha, Delta††	Excluded	BNT162b2	Documented infection: Overall	47.7 (19.2-66.2)	>14	88.3 (83.2-91.8)	>14	~30 weeks
								Symptomatic disease: Overall	76.4 (46-89.7)		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 (December 27, 2021)	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	18.8 (10.7-26.1)	14+	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	35.3 (7.9-54.5)		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		34.2 (30.1-38.1)		56 (51.4-60.2)	14+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								Symptomatic reinfection			55.5 (50.5-60.1)	14-90	~11 weeks
											56.8 (46.6-65.1)	>90	~37 weeks
								Hospitalization or death	56.9 (45.2-66.1)		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	45 (39.7-49.9)		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	61.8 (40.8-75.3)		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
									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

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
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	BNT162b2	Symptomatic disease	91.4 (65.1-97.9)	14+ (up to dose 2)	–	–	–
							AZD1222		75.4 (67.2-81.6))	28+ (up to dose 2)	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)	14+	–	–	
								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	Katikireddi et al* (December 20, 2021)	Scotland	Retrospective cohort	2,534,527 adults (aged 18+)	Delta^	Excluded	AZD1222	Hospitalization or death	49.3 (43.3-54.6)	14+	83.7 (79.7-87.0)	14-27	~20 weeks
											53.6 (48.4-58.3)	140-153	
145	Kissling et al (December 23,2021)	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	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
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)	31 (26-35)	14+	65 (63–68)	7+	~28 weeks
								Documented infection (June 30tht 2021)			69 (67–70)		
								Death (March 31st 2021)	55 (42–64)		89 (84–92)		
								Death (June 30tht 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	Tartof et al* (February 14, 2021) *[Updated version of previous December 21st preprint]*	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	
											88 (85-90)	217+	
140#		South Africa		477,234 HCWs		Included	Ad26.COV2.S	Hospitalization	67 (62-71)	28+	–	–	16 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Bekker et al (December 20,2021)		Retrospective matched cohort		Beta, Delta, Kappa^			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	60.3 (57-63.3)	14+	85.3 (83.5-86.9)	30+	~35 weeks
											-29.5 (-84-8.8)	240+	
								Symptomatic disease	78.3 (75.2-81.1)		94.4 (92.8-95.6)	30+	
											20 (-29-59.3)	240+	
								Asymptomatic disease	54.6 (47.7-60.6)		79.9 (75.5-83.4)	30+	
											-28.4 (-129.3-28.1)	240+	
								Hospitalization and death	82.1 (73.1-88.1)		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		14+	83 (78.4-86.6)	14+	32 weeks
								Post-hospitalization death			94.8 (93.3 – 96)		
								Death			88.3 (84.1-91.4)		
							AZD1222	Hospitalization without death			90.8 (85.5-94.2)		
								Post-hospitalization death			97.5 (95.8-98.5)		
								Death			93.9 (89.3-96.6)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
							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 (December 15, 2021) *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+	
											83 (68-91)	14-41	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								Hospitalization in 80+ years old			63 (37-78)	124+	
								Death in 65-79 years old			95 (88-98)	14-41	
								Death in 80+ years old			93 (87-96)	70+	
							AZD1222	Symptomatic infection in 65-79 years old			87 (71-93)	14-41	
								Hospitalization in 65-79 years old			75 (64-82)	124+	
								Death in 65-79 years old			95 (90-97)	14-41	
											93 (86-96)	70+	
											89 (52-94)	14+	
											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.	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
											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 (February 18, 2022) *[Update to December 11, 2021 preprint]*	UK	Test-negative case control	617,259 eligible tests for 12-15-year-olds and 225,670 for 16-17-year-olds	**Omicron specifically^**	Excluded	BNT162b2	Symptomatic disease(12-15 years)	49.6(43.9-54.8)	14-20	73(66.4-78.3)	14+	~33 weeks
									17.2(12.0-22.1)	84+			
								Symptomatic disease(16-17 years)	51.4(42.7-58.8)	14-20	71.3(69.3-73.1)	14-34	
									12.5(6.9-17.8)	105+	22.6(14.5-29.9)	70+	
					Delta specifically^			Symptomatic disease(12-15 years)	74.5(73.2-75.6)	14-20	87.2(73.7-93.8)	14+	
									53.1(41.6-62.4)	84+			
								Symptomatic disease(16-17 years)	75.9(74.3-77.3)	14-20	93.1 (91.6-94.4)	14-34	
									30.9(25.4-36.0)	105+	83.7(72-90.5)	70+	
								Hospitalisation(12-15 years)	83.4(54-94)	28+	–	–	
								Hospitalisation(16-17 years)	76.3(61.1-85.6)	28+			
131		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	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Bajema et al* (December 10,2021) *Updated analysis of reference #94*										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	___	28+	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	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
					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)		
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	45 (8-66)	14+	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	41.0 (39.5-42.4)	0+ (up to <7 days post dose 2)	84.0 (83.3-84.7)	14+	~19 weeks
								Death	64.3 (61.8-66.6)		90.3 (88.9-91.5)		
							Sinopharm	Documented infection	34.0 (31.8-36.1)		72.8 (71.2-74.4)		~10.5 weeks
								Death	39.4 (34.1-44.3)		86.0 (83.7-87.9)		
							Sputnik V	Documented infection	48.7 (47.1-50.2)		88.1 (86.5-84.9)		~11 weeks
								Death	78.0 (74.3-81.2)		97.8 (95.5-98.9)		
							AZD1222	Documented infection	49.2 (47.7-50.6)		73.7 (71.1-76.0)		~11.5 weeks
								Death	71.3 (67.9-74.4)		85.8 (73.5-92.4)		
							mRNA-1273	Documented infection	60.8 (58.6-63.0)		88.2 (85.8-90.3)		~15 weeks
								Death	68.7 (62.5-73.8)		93.8 (90.3-96.1)		
125	Hall et al* (February 16, 2022)	United Kingdom	Prospective cohort	35,768 HCWs (18+ years) undergoing routine	Non-VOC, Alpha, Delta^	Excluded	BNT162b2	Documented infection	59 (42-71)	21-27	Dose interval <6 weeks: 89 (78-94)	14-73	~8 weeks
											Dose interval <6 weeks:	194-265	~36 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	[Update to (December 1, 2021 preprint]			asymptomatic testing							53 (28-69)		
									63 (46-75)	56-280	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	63 (-80-92)	21-27	58 (23-77)	14-73	~8 weeks
									9 (-87-55)	56-249	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	46.2 (31.6-57.7)	21+	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	−1 (−51 – 33)	21+	50 (33-62)	14+	~4 weeks
											46 (22-62)	28+	
											57 (21-76)	42+	
						Excluded					47 (29-61)	14+	
122	Paixao et al (November 12,2021)	Brazil	Test-negative case control	19,838 pregnant women	Gamma and Delta††	Excluded	CoronaVac	Symptomatic disease	5.0 (-18.2–23.7)	14+	41.0 (27.0-52.2)	14+	~28.5 weeks
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 (October 27,2021)	United Arab Emirates	Retrospective cohort	176,640 individuals aged 15+	Non-VOC and Alpha^	Included	BBIBP-CorV	Hospitalization	-35 (-45– -26)	14+	74 (72-76)	14+	~34 weeks
								ICU admissions	0 (-17–15)		91 (88-93)		
								Deaths	12 (-95–61)		96 (69-99)		
119		Finland	Retrospective cohort	427,905 HCWs aged 16-69 years	Non-VOC, Alpha, Delta^	Excluded	BNT162b2	Documented infection	40 (33-46)	42+	83 (80-85)	14-90	~11 weeks
											55 (45-64)	181+	~29.5 weeks
								Hospitalization	82 (68-90)		99 (97-100)	14-90	~11 weeks
											98 (89-100)	181+	~38 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Poukka et al* (January 31, 2022) *[Published version of November 8, 2021]*						mRNA-1273	Documented infection	61 (45-72)		84 (68-92)	14-90	~11 weeks
											69 (-124-96)	91-180	~24 weeks
								Hospitalization	89 (22-98)		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	22 (-3-42)	42+	89 (73-95)	14-90	~11 weeks
											63 (-166-95)	91-180	~24 weeks
								Hospitalization	88 (10-98)	42+	100 (CI omitted)	14-90	~11 weeks
											100 (CI omitted)	181+	~25 weeks
							Heterologous AZD1222 + mRNA	Documented infection	—	—	80 (72-86)	14-90	~11 weeks
											62 (30-79)	91-180	~24 weeks
								Hospitalization			100 (CI omitted)	14-90	~11 weeks
											100 (CI omitted)	181+	~25 weeks
					Non-VOC, Alpha^		BNT162b2 & mRNA-1273 (homologous or heterologous)	Documented infection	38 (23-50)	42+	77 (71-82)	14-90	~11 weeks
											55 (34-69)	91-180	~24 weeks
								Hospitalization	90 (27-99)		95 (64-99)	14-90	~11 weeks
											100 (CI omitted)	91-180	~24 weeks
							AZD1222	Documented infection	15 (-15-37)	42+	100 (CI omitted)	14-90	~11 weeks
											100 (CI omitted)	91-180	~24 weeks
								Hospitalization	100 (-inf-100)	42+	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	45 (37-51)	42+	85 (81-88)	14-90	~11 weeks
											56 (46-65)	181+	~29.5 weeks
								Hospitalization	83 (68-91)		100 (97-100)	14-90	~11 weeks
											98 (88-100)	181+	~38 weeks
							AZD1222	Documented infection	49 (-16-77)		88 (71-95)	14-90	~11 weeks
											62 (-177-95)	91-180	~24 weeks
								Hospitalization	42 (-330-92)		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

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
											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	100 (CI omitted)	14+ up to 13 days post dose 2	95 (79-99)	14+	~25 weeks
								Death in ≥ 60 years	75 (26-91)		87 (77-93)		
							AZD1222	Death in 40-59 years	96 (85-99)		88 (76-93)		
								Death in ≥ 60 years	97 (86-99)		90 (84-94)		
					Delta specifically^		BNT162b2	Death	92 (66-98)		90 (83-94)		
							AZD1222		96 (89-99)		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	59 (52-65)	14-20	90 (88-92)	7-21	~12 weeks
									66 (59-72)	21-27			
								Symptomatic disease	57 (39-71)	14-20	93 (88-97)		
									82 (73-91)	21-27			
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)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
~~114#~~	Skowronski et al (October 26,2021)	Canada	Test-negative case control	380,532 specimens in British Columbia including 27,439 cases (estimates also available for Quebec, but not included here)	Non-VOC, Alpha, Delta, Gamma^	Excluded	BNT162b2	Documented infection	—	—	90 (90-90)	14+	~37 weeks
											90 (89-90)	28-55	
											81 (78-83)	168+	
								Hospitalization			98 (97-98)	14+	
											98 (98-99)	28-55	
											98 (94-99)	168+	
							mRNA-1273	Documented infection			91 (90-91)	14+	
											94 (93- 94)	28-55	
											71 (65-75)	168+	
								Hospitalization			97 (96-98)	14+	
											99 (96-100)	28-55	
											96 (83-99)	168+	
							AZD1222	Documented infection			71 (69-74)	14+	
											74 (67-79)	28-55	
											69 (64-72)	84+	
								Hospitalization			94 (90-96)	14+	
											88 (62-96)	28-55	
											95 (89-98)	84+	
							Heterologous mRNA	Documented infection			91 (90- 92)	14+	
											93(91-94)	28-55	
											93(80-97)	112-139	
								Hospitalization			98 (96-99)	14+	
											97 (92-100)	28-55	
											97 (94-99)	84-111	
							Heterologous AZD1222 + mRNA	Documented infection			90 (89-91)	14+	
											91 (89-92)	28-55	
											92 (44-99)	112-139	
								Hospitalization			99 (98-100)	14+	
											99 (91-100)	28-55	
					Delta specifically^		BNT162b2	Documented infection			91 (91-92)	14+	
											92 (92-93)	28-55	
											80 (76, 84)	196+	
								Hospitalization			98 (97-98)	14+	
											99 (98-99)	28-55	
											98 (91-99)	168+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
							mRNA-1273	Documented infection			92 (91-93)	14+	
											94 (93- 95)	28-55	
											80 (73-85)	168+	
								Hospitalization			97 (96- 98)	14+	
											99 (96-100)	28-55	
											84 (63-93)	112-139	
							AZD1222	Documented infection			70 (66-73)	14+	
											68 (60-75)	28-55	
											65 (57-72)	84+	
								Hospitalization			92 (86-95)	14+	
											84 (51-95)	28-55	
											92 (81-97)	84+	
							Heterologous mRNA	Documented infection			98 (97-99)	14+	
											93 (91-94)	28-55	
											88 (82-91)	196+	
								Hospitalization			98 (97-99)	14+	
											96 (88-99)	28-55	
											98 (85-100)	168+	
							Heterologous AZD1222 + mRNA	Documented infection			91 (89-92)	14+	
											90 (88-92)	28-55	
											85 (77-90)	84-111	
								Hospitalization			99 (97-100)	14+	
											99 (90-100)		
					Alpha specifically^		BNT162b2	Documented infection			96 (93-98)	14+	
								Hospitalization			96 (83-99)		
							mRNA-1273	Documented infection			95 (85-98)		
								Hospitalization			—		
							AZD1222	Documented infection			74 (29-90)		
								Hospitalization			—		
							Heterologous mRNA	Documented infection			96 (93-98)		
								Hospitalization			97 (87-99)		
							Heterologous AZD1222 + mRNA	Documented infection			74 (29-90)		
								Hospitalization			—		
					Gamma specifically^		BNT162b2	Documented infection			93 (89-95)		
								Hospitalization			95 (83-99)		
							mRNA-1273	Documented infection			95 (85, 99)		
							AZD1222	Documented infection			90 (61, 98)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
							Heterologous mRNA	Documented infection			94 (75, 99)		
							Heterologous AZD1222 + mRNA	Documented infection			96 (70, 99)		
113	Lin et al (October 26,2021)	USA	Retrospective cohort	10,600,823 cases registered in North Carolina	Alpha and Delta^	Unknown	BNT162b2	Symptomatic disease	—	—	94.5 (94.1-94.9)	2 months	~33 weeks
											66.6 (65.2-67.8)	7 months	
								Hospitalization			96.4 (95.1-97.4)	2 months	
											88.7 (86.9-90.3)	7 months	
								Death			98 (95.5-99.1)	2 months	
											90.5 (87-93.1)	7 months	~32 weeks
							mRNA-1273	Symptomatic disease			95.9 (95.5-96.2)	2 months	
											80.3 (79.3-81.2)	7 months	
								Hospitalization			97.2 (96.1-98)	2 months	
											94.1 (92.7-95.2)	7 months	
								Death			98.6 (97.3-99.3)	3 months	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
											95.5 (93.4-96.9)	7 months	~29 weeks
							Ad26.COV2.S	Symptomatic disease			74.8 (72.5-76.9)	1 month	
											59.4 (57.2-61.5)	5 months	
								Hospitalization			85.8 (74.9-91.9)	2 months	
								Death			85.9 (49.3-96.1)	3 months	
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+	
							AZD1222 and any mRNA vaccine				89 (79-94)	15-30	
											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	31 (12.7-45.5)	>21	59 (33.1-74.8)	14+	~31 weeks
								Symptomatic disease	31.6 (12-46.8)		65.1 (40.9-79.4)		
								Asymptomatic infection	26.6 (-53.8-65)		—		
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		Puerto Rico	Retrospective cohort	87,704 PCR confirmed		Unknown	BNT162b2	Hospitalization (45-74y)	—	—	92 (90.8-93)	14+	~20 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Irizarry et al(November 17, 2021) *[Updated version of Robles-Fontan et al (October 20,2021)]*			infections for individuals 12 years or older	Non-VOC, Alpha, Beta and Delta^^			Hospitalization (75-84y)			93.3 (91.3-95)		
								Hospitalization (85+y)			97.1 (95.8-98)		
								Death (45-74y)			86 (81-89)		
								Death (75-84y)			87 (80-92)		
								Death (85+y)			95.2 (91.5-97)		
							mRNA-1273	Hospitalization (45-74y)			82 (78-85)		
								Hospitalization (75-84y)			91.5 (89-94)		
								Hospitalization (85+y)			97.2 (96-98)		
								Death (45-74y)			69 (52-79)		
								Death (75-84y)			87 (79-92)		
								Death (85+y)			96.2 (93.9-98)		
							Ad26.COV2.S	Hospitalization (45-74y)			96.1 (95-97)		
								Hospitalization (75-84y)			98 (96.7-99)		
								Hospitalization (85+y)			99.2 (98.6-99.5)		
								Death (45-74y)			93.8 (90-96)		
								Death (75-84y)			96.6 (91.7-98)		
								Death (85+y)			99.3 (98.6-99.6)		
							BNT162b2	Documented infection[xx]			87 (85-89)	14+	
											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+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
											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	—	14+	90.3 (87.1-92.7)	14+	~9 weeks
								Post-hospitalization death			98.5 (97.8-98.9)		
								Death without prior hospitalization			89.2 (85.6-91.9)		
							CoronaVac	Hospitalization			67.2 (63.7-70.4)		~11 weeks
								Post-hospitalization death			77.1 (75.5-78.6)		
								Death without prior hospitalization			69.8 (66.7-72.6)		
							AZD1222	Hospitalization			75.4 (48.2-88.3)		~7 weeks
								Post-hospitalization death			96.3 (88.4-98.8)		
								Death without prior hospitalization			88.7 (64.8-96.4)		
							Ad26.COV2.S	Hospitalization	80(19.9-95.0)		—		~4 weeks
								Death without prior hospitalization	75(0.0-93.8)		—		
106	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		USA	Test-negative case control	10,283 matched adult		Excluded	BNT162b2 & mRNA-1273	Overall: Documented infection	—	—	58.9 (52-64.8)	14+	~35 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Liu et al (October 7, 2021)			residents (18+) of New York City	Non-VOC, then Alpha, then Delta††			Immunocompromised: Documented infection	—	—	56.8 (44.7-66.2)		
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	77.0 (60.7-86.5)	14+	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	90.1 (82.9-94.2)	14+	98.4 (96.9-99.1)	14+	~25 weeks
					Gamma specifically^			Documented infection	74.2 (43.8-88.1)	14+	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	57 (52-61)	14+	69 (66-72)	14+	~31 weeks
									57 (51-61)	<90	70 (67-73)	<90	~11 weeks
									—	—	63 (58-68)	≥ 90	~18 weeks
								Symptomatic disease	66 (60-71)	14+	72 (69-75)	14+	~31 weeks
								Hospitalization	86 (69-94)		93 (88-96)		
							mRNA-1273	Documented infection	66 (56-73)	14+	82 (78-86)	14+	~28 weeks
									65 (56-73)	<90	—	—	~11 weeks
									—		67 (50-78)	≥ 90	~15 weeks
								Symptomatic disease	71 (61-79)	14+	85 (80-89)	14+	~28 weeks
								Hospitalization	73 (-10–93)		98 (82-100)		
							AZD1222	Documented infection	41 (34-48)	14+	54 (48-60)	14+	~16 weeks
									40 (31-47)	<90	54 (47-60)	<90	~11 weeks
									52 (37-64)	≥ 90	—	≥ 90	~3 weeks
								Symptomatic disease	46 (37-54)	14+	56 (48-63)	14+	16 weeks
								Hospitalization	78 (54-89)		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)				
								Documented infection	—		86 (70-93)	14+	~21 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
							1 dose of AZD1222+ 1 dose of BNT162b2				85 (69-93)	<90	~11 weeks
								Symptomatic disease			91 (71-97)	14+	~21 weeks
								Hospitalization			95 (79-99)		
					Alpha^ specifically		BNT162b2	Documented infection	54 (37-67)	14+	71 (61-78)	14+	~31 weeks
							mRNA-1273		60 (14-81)		86 (56-95)		~28 weeks
							AZD1222		37 (21-50)		38 (-42–73)		16 weeks
							Ad26.COV2.S		77 (27-93)		—		~23 weeks
					Delta^ specifically		BNT162b2	Documented infection	63 (51-73)	14+	67 (59-74)	14+	~31 weeks
							mRNA-1273		72 (51-84)		77 (64-85)		~28 weeks
							AZD1222		53 (26-70)		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	15 (12-18)	0+ up to 13 days post dose 2	85 (79-89)	14+	~20.5 weeks
							AZD1222		6 (2-9)		60 (41-73)		~8 weeks
					Delta^ specifically	Included	BNT162b2	Documented infection	33 (31-35)		81 (77-84)		~29 weeks
							AZD1222		31 (28-34)		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	
								Symptomatic disease - immunocompromising condition	39.1 (−45.0-74.4)	14+ through Dose 2 or	—	—	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								Symptomatic disease - pregnancy	77.1 (32.2- 92.2)	later (at least 1 dose)	—	—	
							BNT162b2	Symptomatic disease	77.6 (70.9-82.7)	14+ up to <7 post 2nd dose	88.8 (84.6-91.8)	7+	
							mRNA-1273		88.9 (78.7-94.2)		96.3 (91.3-98.4)		
98#	Skowronski et al* (January 27, 2022) *[Published version of September 22,2021 preprint]*	Canada	Test-negative case control	11,861 test-positive cases and 99,544 test-negative controls among adults 50-69 years in British Columbia	Alpha, Gamma, Delta^	Excluded	BNT162b2	Documented infection	70 (68-72)	21+	—	—	—
									55 (48-61)	14-20			
									65 (57-71)	98+			
								Hospitalization	81 (75-85)	21+			
							mRNA-1273	Documented infection	75 (71-78)	21+			
									67 (57-75)	14-20			
									54 (38-66)	98+			
								Hospitalization	85 (76-91)	21+			
							mRNA-1273 or BNT162b2	Hospitalization	74 (60-83)	14-20			
									65 (47-77)	98+			
							AZD1222	Documented infection	60 (54-65)	21+			
									25 (10-37)	14-20			
									62 (36-77)	98+			
								Hospitalization	93 (85-97)	21+			
									67 (30-84)	14-20			
									74 (-4-94)	84+			
					Alpha specifically^		BNT162b2	Documented infection	77 (73-80)	21+			
								Hospitalization	85 (72-92)				
							mRNA-1273	Documented infection	84 (77-89)				
								Hospitalization	78 (44-91)				
							AZD1222	Documented infection	69 (61-75)				
					Gamma specifically^		BNT162b2	Documented infection	77 (72-81)				
								Hospitalization	89 (79-94)				
							mRNA-1273	Documented infection	85 (76-90)				
								Hospitalization	96 (71-99)				
							AZD1222	Documented infection	67 (58-74)				
								Hospitalization	93 (78-98)				
					Delta specifically^		BNT162b2	Documented infection	58 (52-63)				
								Hospitalization	73 (60-82)				
							mRNA-1273	Documented infection	70 (64-76)				
								Hospitalization	86 (72-93)				
							AZD1222	Documented infection	41 (15-59)				
								Hospitalization	61 (-8-86)				

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
					Non-VOC specifically^		BNT162b2	Documented infection	88 (75-95)				
							mRNA-1273		78 (31-93)				
							AZD1222		93 (70-98)				
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	54.3 (50.6-57.8)	14-20	97.3 (96.7-97.8)	22-28	2 weeks
								Symptomatic disease	58.3 (54.7-61.6)		97.9 (97.4-98.3)		
								Hospitalization	74.5 (69.1-79.0)		99.0 (98.4-99.3)		
								Severe/critical disease	77.3 (71.2-82.1)		99.2 (98.6-99.5)		
								Death	71.7 (64.1-77.7)		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	45.9 (44.2-47.6)	28+	94.9 (93.6-95.9)	14-63	~33.5 weeks
									—		94.8 (88.4-97.7)	70+	~33.5 weeks
								Hospitalization	85.2 (81.6-88.1)	28+	97.7 (90.8-99.4)	14-63	~33.5 weeks
								Death	73.1 (65-79.3)	28+	96.6 (94.4.-96.5)	14+	~33.5 weeks
							AZD1222	Symptomatic disease	45.1 (43.4-46.7)	28+	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	82.5 (78.7-85.7)	28+	95.1 (86.7-98.2)	14-63	~20.5 weeks
									—		100 (CI omitted, no deaths among vaccinated)	70+	~20.5 weeks
								Death	79.1 (68.8-86)	28+	100 (CI omitted, no deaths among vaccinated)	14+	~20.5 weeks
							mRNA-1273	Symptomatic disease	58.1 (11.7-80.1)	28+		—	—
					Delta specifically^		BNT162b2	Symptomatic disease	51.2 (50.7-51.7)	28+	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	91.1 (89.7-92.3)	28+	96.6 (96.2-96.9)	14+	~33.5 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
									—		98.4 (97.9-98.8)	14-63	~8 weeks
									—		92.7 (90.3-94.6)	140+	~33.5 weeks
								Death	88.6 (78.8-93.9)	28+	95.6 (94.4-96.6)	14+	~33.5 weeks
									—		98.2 (95.9-99.2)	14-63	~8 weeks
									—		90.4 (85.1-93.8)	140+	~33.5 weeks
							AZD1222	Symptomatic disease	45.1 (43.4-46.7)	28+	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	80.7 (78-83)	28+	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	86.9 (77.5-92.4)	28+	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	64.9 (64-65.7)	28+	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	93.7 (89.9-96)	28+	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 (September 12, 2021)	USA	Retrospective Cohort	501,947 individuals ≥18 years	Alpha††	Excluded	Ad26.COV2.S	Documented infection	79 (77-80)	14+	—	—	~14 weeks
								Hospitalization	81 (79-84)				
								Immunocompromised: Documented infection	64 (57-70)				
								Immunocompromised: Hospitalization	68 (54-77)				

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
					Delta^			June-July: Documented infection	78 (73-82)				
								June-July: Hospitalization	85 (73-91)				
92	Grannis et al (September 10,2021)	USA	Test-negative	32,867 events from 187 hospitals and 221 emergency departments/urgent care visits	Delta^	Included	BNT162b2	Hospitalization	—	—	80 (73-85)	14+	4 weeks
								Emergency/Urgent care visit			77 (74–80)		
							mRNA-1273	Hospitalization			95 (92-97)		
								Emergency/Urgent care visit			92 (89-93)		
							Ad26.COV2.S	Hospitalization	60 (31-77)	14+	—	—	
								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	71 (33-94)	21-27	96 (89-100)	7-56	~11 weeks
								Symptomatic infection	76 (30-100)		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	33 (18-46)	14+	87 (85-90)	14+	~22 weeks
								Emergency department or urgent care visit	58 (46-68)		89 (85-91)		
							mRNA-1273	Hospitalization	68 (59-75)		91 (89-93)		20 weeks
								Emergency department or urgent care visit	73 (64-79)		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	56 (47-64)	14+	90 (88-92)	14+	~22 weeks
								Hospitalization, patients with ≥ 1 chronic non-respiratory condition	54 (45-61)		88 (86-90)		
								Hospitalization, overall	—		88 (84-92)	14-27	~2 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
											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	80.2(57.5-90.8)	14+	95.2(80.0-98.8)	14+	~10 weeks
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)	44 (-6-71)	20+ up to <14 post 2nd dose	91 (72-98)	14+	~10 weeks
					Alpha^††			Asymptomatic infection (April-May)	46 (53-83)		71 (53-83)		~19 weeks
					Delta^††			Asymptomatic infection (June-August)	63 (44-76)		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	—	14+	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	85.5(75.9-91.3)	14+ up to <7 post 2nd dose	84.8 (73.2-91.4)	14+	~16 weeks
								Symptomatic infection	81.7(62.7-91)		87.1 (69.3-94.6)		
				Only 7190 HCWs				Documented infection	87.8 (76.5-93.7)		84.4 (69.7-92.0)		
								Symptomatic infection	83.1 (60.0-92.9)		86.5 (62.9-95.1)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
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	78 (61-87)	14+ up to <14 post 2nd dose	94 (88-97)	14+	~14.5 weeks
								Death, 65-79 y	77 (56-88)		96 (92-98)		
								Hospitalization, 80+ y	55 (36-69)		82 (72-89)	14+	~22.5 weeks
								Death, 80+ y	56 (35-70)		81 (74-87)	14+	
82#	Chemaitelly et al* (October 6, 2021) *[Update to Aug 27 preprint]* *Note: See Duration of Protection Table for further context*	Qatar	Test-negative case control	142,300 cases and 848,240 controls among residents of Qatar (12+)	Alpha^ then Beta^ (Jan-Jun), then Delta^ (Jul-Sep)	Included	BNT162b2	Documented infection	36.8 (33.2-40.2)	14+	73.2 (71.3-75.0)	28-63	7 weeks
											22.3 (-1.7-40.7)	175+	~32 weeks
								Symptomatic infection	47.9 (43.6-51.9)		72.5 (69.6-75.1)	28-63	7 weeks
											27.8 (-1.4-48.7)	175+	~32 weeks
								Asymptomatic infection	22.2 (12.1-31.2)		66.9 (61.9-71.3)	28-63	7 weeks
											-33.3 (-181.8-36.9)	175+	~32 weeks
								Severe, critical, or fatal disease	66.1 (56.8-73.5)		96.8 (93.9-98.3)	28-63	7 weeks
											55.6 (-44.3-86.3)	175+	~32 weeks
					Alpha specifically^		BNT162b2	Documented infection	47.9 (15.5-67.9)	14+	88.6 (79.2-93.7)	28-63	7 weeks
											80.0 (-71.2-97.7)	147+	~32 weeks
					Beta specifically^		BNT162b2	Documented infection	25.8 (-2.0-46.1)		63.9 (52.6-72.5)	28-63	7 weeks
											40.0 (-151.1-85.7)	147+	~32 weeks
					Delta specifically^		BNT162b2	Documented infection	63.4 (42.6-76.6)		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*	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			83 (75-88)	55-98	13 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Protection Table for further context							May 2021 (~2 mos prior)					
								Documented infection, 40-59 y fully vaccinated Jan 2021 (~6 mos prior)			57 (53-61)	168-203	28 weeks
								Documented infection, 60+ y fully vaccinated May 2021 (~2 mos prior)			82 (70-89)	55-98	13 weeks
								Documented infection, 60+ y fully vaccinated Jan 2021 (~6 mos prior)			57 (52-62)	168-203	28 weeks
								Severe disease, 40-59 y fully vaccinated Mar 2021 (~4 mos prior)			98(94-99)	109-159	22 weeks
								Severe disease, 40-59 y fully vaccinated Jan 2021 (~6 mos prior)			93 (86-97)	168-203	28 weeks
								Severe disease, 60+ y fully vaccinated Mar 2021 (~4 mos prior)			92 (87-95)	109-159	22 weeks
								Severe disease, 60+ y fully vaccinated Jan 2021 (~6 mos prior)			85(81-88)	168-203	28 weeks
80#	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	58 (54-61)	14+	73 (72-74)	7+	~29 weeks
											88 (86-89)	7-36	~3 weeks
											47 (43-51)	157+	~29 weeks
								Hospitalization	54 (43-63)		90 (89-92)	7+	~29 weeks
											87 (82-91)	7-36	~3 weeks
											88 (82-92)	157+	~29 weeks
					Delta specifically^			Documented infection	74 (55-85)		75 (71-78)	7+	~29 weeks
											93 (85-97)	7-36	~3 weeks
											53 (39-65)	127+	~29 weeks
								Hospitalization	79 (-49-97)		93 (84-96)	7+	~29 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
					Non-Delta variants specifically^			Documented infection	74 (64-81)		91 (88-92)	7+	~29 weeks
											97 (95-99)	7-36	~3 weeks
											67 (45-80)	127+	~29 weeks
								Hospitalization	75 (21-92)		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	59 (52-65)	21+	78 (68-84)	14+	~28 weeks
								Ct<30	70 (65-74)		94 (91-96)		
							AZD1222	Documented infection	63 (55-69)		79 (56-90)		
								Ct<30	74 (69-79)		86 (71-93)		
				358,983 individuals	Delta^ (May - August)		BNT162b2	Documented infection	57 (50-63)		80 (77-83)		
								Ct<30	62(56-68)		84 (82-86)		
							AZD1222	Documented infection	46(35-55)		67 (62-71)		
								Ct<30	50(41-59)		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		USA	Retrospective cohort	60,707 incarcerated	Non-VOC^	Excluded	BNT162b2 or mRNA-1273	Documented infection, all	74 (64-82)	14+	97 (88-99)	14+	~5 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Chin et al* (January 27, 2022) *[Published version of August 18, 2021 preprint]*			people in California prisons				Documented infection, cohort at moderate/high risk for severe COVID-19	74 (62-82)		92 (74-98)		
							mRNA-1273	Documented infection, all	71 (58-80)		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* (November 2, 2021) *[Update to Aug 11 preprint]*	Qatar	Test-negative case control	Cases with confirmed Delta (~2800 per analysis) or Beta infection and matched controls (~11,200) among residents of Qatar of all ages	Delta specifically^	Included	BNT162b2	Documented infection	42.8 (18.2-60.1)	14+	50.6 (45.4-55.3)	14+	~25 weeks
							mRNA-1273		73.2 (57.3-83.2)		72.0 (66.1-76.9)		
							BNT162b2	Severe, critical, or fatal disease	84.5 (-25.2-98.1)		94.1 (85.9-97.6)		
							mRNA-1273		87.5 (23.4-95.8)		96.1 (71.4-99.5)		
							BNT162b2	Symptomatic COVID-19	56.2 (30.6-72.4)		44.4 (37.0-50.9)		
							mRNA-1273		82.5 (65.2-91.2)		73.9 (65.9-79.9)		
							BNT162b2	Asymptomatic COVID-19	46.7 (-56.2-81.8)		46.0 (32.3-56.9)		
							mRNA-1273		61.8 (-9.6-86.7)		53.6 (33.4-67.6)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
					Beta specifically^		BNT162b2	Documented infection	18.9 (-1.8-35.4)		74.3 (70.3-77.7)		
							mRNA-1273		66.3 (55.8-74.2)		80.8 (69.0-88.2)		
							BNT162b2	Severe, critical, or fatal disease	74.8 (-7.6-94.1)		92.7 (81.5-97.1)		
							mRNA-1273		72.5 (7.7-91.8)		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	16 (-20-42)	1-7	76 (69-81)	14+	~ 26 weeks
								Hospitalization	75 (-30-97.4)		85 (73-93)		
								ICU admission	100 (-430-100)		87 (46-98.6)		
							mRNA-1273	Documented infection	-10 (-50-24)		86 (81-90.6)		
								Hospitalization	25 (-150-79)		91.6 (81-97)		
								ICU admission	100 (-430-100)		93.3 (57-99.8)		
71	de Gier et al* (August 5, 2021)	Netherlands	Retrospective cohort	184,672 household and other close contacts (aged 18+) of 113,582 index cases (aged 18+)	Alpha^	Unknown	AZD1222	Documented infection among household contacts (adj. for vaccination status of index case)	2 (-11-14)	14+	87 (77-93)	7+	~15 weeks
							BNT162b2		-18 (-43-2)		65 (60-70)		
							mRNA-1273		33 (-27-64)		91 (79-97)		
							Ad26.COV2.S		12 (-71-54)		—		
70	Lefèvre et al (July 31,2021)	France	Retrospective cohort	378 LTCF residents	Beta specifically^	Included	BNT162b2	Documented infection	55 (13-76)	14+ up to 6 days after 2nd dose	49 (14-69)	7+	~16 weeks
								Hospitalization and death	86 (32-97)		86 (67-94)		
69	Alali et al (July 29,2021)	Kuwait	Retrospective cohort	3,246 HCWs	Alpha^	Excluded	BNT162b2	Documented infection	91.4 (65.1-97.9)	14+	94.5 (89.4-97.2)	7+	~18 weeks
							AZD1222	Documented infection	75.4 (67.2-81.6)	28+	—		
68	Gram et al	Denmark	Retrospective cohort	5,542,079 adults	Alpha^	Excluded		Documented infection	39 (23-52)	14-20	88 (83-92)	14+	~20 weeks
									-47 (-208-30)	105+			

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	(December 17, 2021) *[Published version of July 28 pre-print]*						Heterologous: AZD1222 (1st dose) BNT162b2 or mRNA-1273(2nd dose)	Hospitalization	93 (80-98)	14+	not calculated due to no events in vaccinated group		
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+	42 (31-52)	28+	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	53 (48-58)		77 (66-85)	14+, dose interval 19-29 days	
											89 (86-92)	14+, dose interval 65-84 days	
								Documented infection, 50-64 y	51 (47-55)		88 (67-96)	14+, dose interval 19-29 days	
											92 (91-94)	14+, dose interval 65-84 days	
							AZD1222	Documented infection, 80 y+	42 (29-53)		96(68-99)	14+, dose interva	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
												l 45-64 days	
											82 (68-89)	14+, dose interval 65-84 days	
								Documented infection, 65-79 y	52 (46-56)		73 (25-90)	14+, dose interval 30-44 days	
											74 (69-79)	14+, dose interval 65-84 days:	
								Documented infection, 50-64 y	42 (39-46)		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	61(39-75)	14+	87(74-93)	14+	~16 weeks
							AZD1222	Symptomatic COVID-19	68(39-83)		—		
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	70.3 (68.1-72.4)	14+	85.5 (80.4-89.3)	7+	~20 weeks
								Symptomatic COVID-19	72.8 (70.5-74.9)		92.2 (87.8-95.1)		
							mRNA-1273	Documented infection	68.7 (59.5-75.9)	14+	84.1 (34.9-96.1)	7+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								Symptomatic COVID-19	80.9 (74.3-85.8)		—		
							BNT162b2 and mRNA-1273	Hospitalization	97.2 (92.3-99.0)	14+	—	7+	
					Alpha specifically^	Excluded	BNT162b2 and mRNA-1273	Documented infection	60.0 (53.6-65.5)	14+	92.6 (87.1-95.8)	7+	
					Non-VOC specifically^	Excluded	BNT162b2 and mRNA-1273	Documented infection	77.0 (72.6-80.7)		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	33.4 (26.4-39.7)	28+	77.9 (69.2-84.2)	14+	~9.5 weeks
								Hospitalization	55.1 (46.6-62.2)		87.6 (78.2-92.9)		
								Death	61.8 (48.9-71.4)		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	75 (55-87)	14+ up to 14 days post 2nd dose	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 negative controls aged 16+	Alpha specifically^	Excluded	BNT162b2	Symptomatic COVID-19	47.5 (41.6–52.8)	21+	93.7 (91.6–95.3)	14+	~17 weeks
							AZD1222	Symptomatic COVID-19	48.7 (45.2–51.9)		74.5 (68.4–79.4)		
					Delta specifically^		BNT162b2	Symptomatic COVID-19	35.6 (22.7–46.4)		88.0 (85.3–90.1)		
							AZD1222	Symptomatic COVID-19	30.0 (24.3–35.3)		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	85.0 (84.2-85.8)	0+	97.1 (96.6-97.5)	7+	~6.5 weeks
							BNT162b2	Documented infection	84.0 (82.7-85.1)		96.2 (95.5-96.9)		
							mRNA-1273	Documented infection	85.7 (84.6-86.8)		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

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
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	67 (40-84)	14-20	96 (89-100)	7-56	~18 weeks
									71 (33-94)	21-27‡			
								Symptomatic COVID-19	66 (32-86)	14-20	97 (91-100)		
									76 (30-100)	21-27‡			
								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	62.7 (61.5-63.8)	10+, including <10 days post dose 2	89.4 (88.7-90)	10-90	~11 weeks
											58.3 (45.8-67.9)	90+	~26.5 weeks
					Delta^				72.1 (66.7-75.6)		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) [*Update to July 9,2021 preprint*]	UK	Prospective cohort	5,591,142 patients reporting to 718 English general practices	Alpha^	Included	BNT162b2	Symptomatic COVID-19: Ages 16-64	64.1 (50.1-74.1)	28-90	48.6 (-61.5-83.7)	14-69	~8 weeks
								Symptomatic COVID-19: Ages 65+	57.7 (49.7-64.3)		84.7 (77.7-89.5)		
								Immunosuppressed	24.3 (-5.9-46.0)		59.6 (-35.5-86.3)		
							AZD1222	Symptomatic COVID-19: Ages 16-64	65.3 (56.2-72.5)		67.9 (-1.1-89.8)		
								Symptomatic COVID-19: Ages 65+	59.8 (49.2-68.2)		81.7 (59.6-91.7)		
								Symptomatic COVID-19: Immunosuppressed	22.5 (-15.2-47.9)		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	64.8 (10.9-86.1)	28+ (including some with dose 2)	78.6 (25.5-93.8)	7+	~10 weeks
								Hospitalization	100 (99.3-100)		100.0 (99-100)		
								COVID-19 related death	100 (99.3-100)		100.0 (99-100)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
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
53	Goldshtein et al* (July 12,2021)	Israel	Retrospective cohort	15060 pregnant Israeli women	Original and Alpha¶	Excluded	BNT162b2	Documented infection	54 (33-69)	11-27, including some with dose 2	—		~5 weeks
									78 (57-89)	28+, includes some with dose 2			
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	88.2 (83.8-91.4)	14+ days	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	68.2(64.3-71.7)		96.0 (90.9-98.2)		
				4,497 matched pairs of adults	Alpha and Beta^	Unknown	mRNA-1273	Severe, critical or fatal disease	83.7(74.1-89.7)		89.5 (18.8-98.7)		
								Symptomatic infection	66.0(60.6-70.7)		98.6 (92.0-100)		
								Asymptomatic infection	47.3(37.6-55.5)		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)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd 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	75.4(60.4-84.7)	14+ up to 14 days post 2nd dose	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	15.5 (14.2-16.8)	14+ days	65.9 (65.2-66.6)	14+	8 weeks
								Hospitalization	37.4 (34.9-39.9)		87.5 (86.7-88.2)		
								ICU admission	44.7 (40.8-48.3)		90.3 (89.1-91.4)		
								Death	45.7 (40.9-50.2)		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	63 (56-68)	14+	92 (87-95)	14+	~28 weeks
								Hospitalization or death	77 (67-84)		97 (88-99)		
							mRNA-1273	Symptomatic infection	63 (47-74)		98 (83-100)		~25 weeks
								Hospitalization or death	66 (43-80)		100 (no CI provided)		
							AZD1222	Symptomatic infection	67 (44-81)		100 (no CI provided)		~3 weeks
								Hospitalization or death	92 (45-99)		100 (no CI provided)		
					Alpha specifically^		BNT162b2	Symptomatic infection	67 (65-68)		88 (86-90)		~28 weeks
								Hospitalization or death	82 (81-84)		96 (94-97)		
							mRNA-1273	Symptomatic infection	82 (80-84)		92 (87-95)		~25 weeks
								Hospitalization or death	80 (76-84)		95 (92-97)		
							AZD1222	Symptomatic infection	63 (59-66)		87 (47-97)		~3 weeks
								Hospitalization or death	87 (83-90)		92 (41-99)		
					Beta specifically^		BNT162b2	Symptomatic infection	50 (15-70))		86 (0-98)		~28 weeks
								Hospitalization or death	64 (31-82)		92 (39-99)		
							mRNA-1273	Symptomatic infection	—		100 (no CI provided)		~25 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								Hospitalization or death	59 (-77-90)		100 (no CI provided)		
							AZD1222	Symptomatic infection	84 (-13-98)		100 (no CI provided)		~3 weeks
								Hospitalization or death	61 (-64-91)		—		
					Gamma specifically^		BNT162b2	Symptomatic infection	63 (54-70)		90 (76-96)		~28 weeks
								Hospitalization or death	80 (70-87)		94 (59-99)		
							mRNA-1273	Symptomatic infection	89 (76-95)		100 (no CI provided)		~25 weeks
								Hospitalization or death	88 (63-96)		100 (no CI provided)		
							AZD1222	Symptomatic infection	41 (12-60)		100 (no CI provided)		~3 weeks
								Hospitalization or death	76 (40-90)		100 (no CI provided)		
					Delta specifically^		BNT162b2	Symptomatic infection	57 (53-61)		92 (89-94))		~28 weeks
								Hospitalization or death	81 (76-85)		98 (96-99)		
							mRNA-1273	Symptomatic infection	70 (64-76)		94 (90-97)		~25 weeks
								Hospitalization or death	90 (82-94)		98 (93-100)		
							AZD1222	Symptomatic infection	68 (57-76)		88 (68-96)		~3 weeks
								Hospitalization or death	91 (82-96)		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	45 (36-53)	21+ days	75 (65-82)	7+	16 weeks
								Hospitalization	63 (49-74)		93 (70-98)		
							BNT162b2 & mRNA-1273 (Chronically ill cohort)	Documented infection	40 (26-51)		77 (65-85)		
								Hospitalization	82 (56-93)		90 (29-99)		
							AZD1222 (chronically ill cohort)	Documented infection	42 (32-50)		—		
								Hospitalization	62 (42-75)		—		
47	Saciuk et al*	Israel				Excluded	BNT162b2	Documented infection	—		93.0 (92.6-93.4)	7+	14 weeks

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	(December 30,2021) *[Update to June 27, 2021 preprint]*		Retrospective cohort	1.6 million members of Maccabi HealthCare HMO ≥16	Original and Alpha¶			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, # of PCRs, demographics	Original & Alpha ¥	Excluded	BNT162b2	Documented Infection	61.0 (50.8-69.2)	≥14	88.0 (84.2-91.0)	≥14	~17 weeks (120 days)
								Hospitalization	—		88.3 (72.6-95.9)	≥14	
								ICU Admission	—		100.0 (18.7-100)	≥14	
							mRNA-1273	Documented Infection	66.6 (51.9-77.3)	≥14	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	58 (54-62)	7+	94 (92-95)	7+	~8 weeks
								Hospitalization	40 (27-50)		89 (81-93)		
								Death	55 (21- 74)		98.5 (86.6-99.8)		
								Asymptomatic infection	58.0 (41.7-69.7)		69.7 (47.7-82.5)		
								Hospitalization	53.0 (25.7-70.3)		88.4 (74.9-94.7)		
								Deaths	55.6 (26.6-73.2)		97.0 (91.7-98.9)		
44	Azamgarhi et al (June 17, 2021)* [*Update to Azamgarhi et al below*]	UK-London	Retrospective cohort	2235 HCWs working at one hospital	Original and Alpha£	Excluded	BNT162b2	Documented infection	70.0 (6.0-91.0)	>14	—		
43#	Stowe et al (June 14, 2021)	UK	TND Case-control	Patients seeking emergency care services with subsequent hospitalization	Alpha specifically^	Included	BNT162b2	Hospitalization	83 (62-93)	21+ to <13 days post dose 2	95 (78-99)	14+	~20 weeks (but most much less)
							AZD1222		76 (61-85)		86 (53-96)		
					Delta specifically^		BNT162b2		94 (46-99)		96 (86-99)		
							AZD1222		71 (51-83)		92 (75-97)		
42#	Sheikh et al (June 14, 2021)	Scotland	TND	Scottish population	Alpha^	Unknown	BNT162b2	Documented infection	38 (29-45)	28+	92 (90–93)	14+	
						Unknown	AZD1222	Documented infection	37 (32-42)	28+	73 (66–78)	14+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
					Delta^	Unknown	BNT162b2	Documented infection	30 (17-41)	28+	79 (75–82)	14+	~20 weeks (but most much less)
						Unknown	AZD1222	Documented infection	18 (9-25)	28+	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	55 (40-66)	14+	98 (97-99)	14+	~14 weeks
								Hospitalization	—		99 (96-100)	14+	
								Death	—		98 (87-100)	14+	
							mRNA-1273	Documented infection	93 (74-98)	14+	—		
							AZD1222	Documented infection	95 (92-97)	21+	—		
40	Skowronski et al* (July 9, 2021) *[Update to June 9 preprint]*	Canada	TND	≥70-year olds living in community	Alpha specifically^	Included	BNT162b2 & mRNA-1273	Documented infection	67 (57-75)	21+	—		~6 weeks
					Gamma specifically^				61 (45- 72)	21+			
					Non-VOC specifically^				72 (58-81)	21+			
					Original, Alpha, Gamma and Non-VOC^		BNT162b2		64(57-71)	21+			
							mRNA-1273		71(56-81)	21+			
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 workers (HCWs), and 231,858 individuals	original & Alpha¶¶	Excluded	BNT162b2	Documented infection	7 (-1-15)	>14	82 (79-84)	>7	10 weeks
								COVID-Hospitalization	35 (18-49)	>14	93 (89-96)	>7	
								COVID-Mortality	7 (-15-25)	>14	94 (90-96)	>7	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
				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	80 (60-90)	≥14 days post dose 1 to 13 days post dose 2	93 (78-98)	≥14	13 weeks
							mRNA-1273	Documented infection	83 (40-95)	≥14 days post dose 1 to 13 days post dose 2	82 (20-96)	≥14	
37	Salo et al* (March 4, 2022) *[Update to July 10, 2021 preprint]*	Finland	Retrospective cohort	265,326 HCWs	Alpha††	Excluded	BNT162b2 & mRNA-1273	Documented infection	44.4 (30.4-55.6)	4 weeks	—	—	
								Documented infection	63 (56.3-68.7)	12 weeks (includes 2 dose recipients)	—	—	
36	Khan et al (May 31, 2021)	USA	Retrospective cohort	14,697 IBD patients in VA hospitals	Unknown	Included	BNT162b2 & mRNA-1273	Documented infection	-1 (-50-32)	14+ up to 7 days post dose 2	69 (44-83)	7+	
								Hospitalization/death	9 (-114-61)		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	21 (3-36%)	14+	65 (56-73)	14+	12 weeks
								Symptomatic infection	30 (10-45)		82 (73-88)		
								Hospitalization	65 (25-83)		94 (60-99)		
							AZD1222	Documented infection	44 (31-54)		—	—	n/a
								Symptomatic infection	50 (37-61)				
								Hospitalization	92 (46-99)				
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	59 (55-62)	14+	91 (88-93)	7+	15 weeks
								Hospitalization and Death	69 (59-77)		96 (82-99)	0+	
							mRNA-1273	Symptomatic infection	72 (63-80)		94 (86-97)	7+	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
								Hospitalization and Death	73 (42-87)		96 (74-100)	0+	
					Alpha specifically^		BNT162b2 & mRNA-1273	Symptomatic infection	61 (56-66)		90 (85-94)	7+	
								Hospitalization and Death	59 (39-73)		94 (59-99)	0+	
					Beta or Gamma specifically^		BNT162b2 & mRNA-1273	Symptomatic infection	43 (22-59)		88 (61-96)	7+	
							BNT162b2 & mRNA-1273	Hospitalization and Death	56(-9-82)		100	0+	
33	PHE (May 20, 2021)	UK	Test-negative case control	≥65 years	Alpha	Excluded	BNT162b2	Symptomatic infection	54 (50-58)	28+	90 (82-95)	≥14	
							AZD1222	Symptomatic infection	53 (49-57)	28+	89 (78-94)	≥14	
32#	Ranzani et al.* (Aug 20, 2021) *[update to Jul 21 preprint]*	Brazil	Test-negative case control	22,177 70+ year olds in Sao Paulo	Gamma^	Included	Coronavac	Symptomatic infection	12.5 (3.7-20.6)	≥14	46.8 (38.7-53.8)	≥14	~10.5 weeks
								Hospitalization	16.9 (5.7-26.8)		55.5 (46.5-62.9)		
								Death	31.2 (17.6-42.5)		61.2 (48.9-70.5)		
31	Ismail et al. (May 12, 2021)	UK	Screening method	13,907 ≥70	Alpha	Included	AZD1222	Hospitalization in 70-79	84 (74-89)	28+	—		
								Hospitalization I n 80+	73 (60-81)	28+	—		
							BNT162b2	Hospitalization in 70-79	81 (73-87)	28+	—		
								Hospitalization in 80+	81 (76-85)	28+	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	82 (74-87)	≥14 days post dose 1 to 6 days post dose 2	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	
								Over 70 years: Symptomatic infection	61 (51-69)	28-34 days post dose 1 including some with dose 2	—		
								Over 70 years: Symptomatic infection	60 (41-73)	28-34 days post dose 1 including	—		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
										some with dose 2			
28	Angel et al.* (May 6, 2021)	Israel	Retrospective cohort	6710 HCWs at a single tertiary care center in	Alpha¶	Excluded	BNT162b2	Symptomatic	89 (83-94)	>7 days post dose 1 to 7 days post dose 2	97 (94-99)	>7 days	
								Asymptomatic	36 (-51-69)		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	65.5 (58.2-71.5)	15-21 days	90 (86-92)	≥14	
								CC Alpha severe/fatal infection	72 (32-90)		100 (82-100)		
					Beta specifically^			CC Beta documented infection	46.5 (38.7-53.3)		75 (71-79)		
								CC Beta severe/fatal infection	56.5 (0-82.8)		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)		
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	84 (40-96)	14-21	95 (62-99)	≥7 days	
								Symptomatic infection	83 (15-97)		94 (51-99)		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
23	Gras-Valenti et al.*(Apr 29, 2021)	Spain	Case-control	268 HCWs	Original & Alpha¥¥	Included	BNT162b2	Documented infection	53 (1-77)	>12	—		
22	Tenforde et al.* (Apr 28, 2021)	USA	Test-negative case-control	Hospitalized adults ≥65 years	Original and Alpha¥	Unknown	BNT162b2 & mRNA-1273	Hospitalization	64 (28-82)	≥14 days post dose 1 to 14 days post dose 2	94 (49-99)	≥14 days	
21	Goldberg et al. (Apr 24, 2021)	Israel	Prospective cohort	5,600,000+ individuals ≥16 years	Original and Alpha^	Included	BNT162b2	Documented infection	58 (57-59)	>14 days post dose 1 to <7 days post dose 2	93 (93-93)	≥7 days	
								Hospitalization	69 (68-71)		94 (94-95)		
								Severe disease	66 (63-69)		94 (94-95)		
								Death	63 (58-67)		94 (93-95)		
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	66 (60-71)	≥21	80 (74-85)	≥0 days	
								Symptomatic disease	78 (72-83)		95 (91-98)		
							AZD1222	Documented infection	61 (54-68)		79 (65-88)		
								Symptomatic disease	71 (62-78)		92 (78-97)		
19	Vasileiou et al.* (Apr 23, 2021) *[Update to Feb 21 preprint]*	UK – Scotland	Prospective Cohort (Person-time)	Scotland population: 5.4 million	Original & Alpha£	Excluded	BNT162b2	Hospitalization	91 (85-94)	28-34	—		
							AZD1222	Hospitalization	88 (75-94)	28-34			
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	72 (58-86)	≥21	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	55 (40-66)	21-27	70 (55- 80)	35-41	
								Hospitalization	50 (19-69)	21-27	75 (52-87)	35-41	
								Emergency visit	58 (31–74)		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	42 (14-63)	≥14	86 (72-94)	≥7	4 weeks
15		UK			Alpha^	Included	BNT162b2	Documented infection	78 (73-82)	22-28	—		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	Glampson et al.* (Sep 17, 2021) *[Update to Jul 15 preprint]*		Retrospective cohort	2,183,939 adults ≥16 in Northwest London			AZD1222	Documented infection	74 (65-81)	22-28			
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	66.9 (28.7--84.6)	≥15	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	
12	Bouton et al. (Mar 30, 2021)	USA – MA	Prospective Cohort	10,950 healthcare workers in Boston	Original^	included	BNT162b2 & mRNA-1273	Documented infection	82 (68-90) >14 days post dose 1 including some with dose 2 starting day 0				
11	Thompson et al.* (Mar 29, 2021)	USA	Prospective cohort	3,950 healthcare workers in eight US sites	Original¥	Excluded	BNT162b2 & mRNA1273	Documented infection	80 (59-90)	≥14	90 (68-97)	≥14	
10	Shrotri et al.* (Jun 23, 2021)	UK	Prospective cohort	10,412 care home	Original and Alpha^	Stratified	BNT162b2	Documented infection	65 (29-83)	35-48	—		

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	[Update to Mar 26 preprint]			residents aged ≥65 years from 310 LTCFs in England			AZD1222	Documented infection	68 (34-85)	35-48			
9	Public Health England – March (Mar 17, 2021)	UK - England	Test Negative Case-Control	Adults in England over 70 years	Alpha^	Unknown	BNT162b2	Symptomatic infection	58 (49-65)	≥28	—		
							AZD1222	Symptomatic infection	58 (38-72)	≥35			
			Retrospective Cohort	Adults in England over 80 years		Included	BNT162b2	Hospitalization[1]	42 (32-51)	≥14	—		
								Death[1]	54 (41-64)	≥14			
							AZD1222	Hospitalization[1]	35 (4-56)	14-21			
8	Yelin et al. (Mar 17, 2021)	Israel – Maccabi System	Retrospective Cohort	1.79 million enrollees, adults <90 years	Alpha^	Excluded	BNT162b2	Documented infection	91 (89-93) ≥35 days post dose 1 most with dose 2				
								Symptomatic infection	99 (95-99) ≥35 days post dose 1 most with dose 2				
7	Britton et al.* (Mar 15, 2021)	USA – CT	Retrospective Cohort	463 residents of two skilled nursing facilities experiencing outbreaks	Original¥	Stratified	BNT162b2	Include Hx of COVID: Documented infection	63 (33-79) ≥14 days post dose 1 including some with dose 2 through day 7				
								Exclude Hx of COVID: Documented infection	60 (30-77) ≥14 days post dose 1 including some with dose 2 through day 7				
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	79 (63-88)	>10 days post dose 1, including some with dose 2	80 (56-91)	>0	
							BNT162b2	Asymptomatic infection	79 (62-89)	>10	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	21 (-11-44)	>14	64 (14-84)	>7	
								LTCF Staff: Documented Infection	17 (4-28)	>14	90 (82-95)	>7	

N4.	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	1st Dose VE % (95%CI)	Days post 1st dose±	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
4	Hyams et al.* (November 1, 2021) *[Update to Mar 3 preprint]*	UK – University of Bristol	Test Negative Case-Control	466 tests: ≥80 years hospitalized with respiratory symptoms	Alpha£	Included	BNT162b2	Hospitalization	79 (47-93)	>14	—		
							AZD1222	Hospitalization	80 (36-95)	>14			
3	Dagan et al.* (Feb. 24, 2021)	Israel – Clalit Health System	Retrospective Cohort	596,618 – matched on demographics, residence, clinical characteristics	original & Alpha^	Excluded	BNT162b2	Documented infection	46 (40-51)	14-21	92 (88-95)	>7	
								Symptomatic infection	57 (50-63)	14-21	94 (87-98)	>7	
								Hospitalization	74 (56-86)	14-21	87 (55-100)	>7	
								Severe disease	62 (39-80)	14-21	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	57 (48-63)	>28	88 (84-90)	7	
1	Amit et al.* (Feb 18, 2021)	Israel	Prospective Cohort	9,109 healthcare workers	original & Alpha¶	Excluded	BNT162b2	Documented infection Symptomatic infection	75 (72-84) ≥15 days post dose 1 including some with dose 2 through day 7				
									85 (71-92) ≥15 days post dose 1 including some with dose 2 through day 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
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14. Lopez Bernal J, Andrews N, Gower C, et al. Effectiveness of BNT162b2 mRNA vaccine and ChAdOx1 adenovirus vector vaccine on mortality following COVID-19. *medRxiv*. Published online 2021:2021.05.14.21257600 doi: 10.1101/2021.05.14.21257218
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2. Summary of Study Results for Post-Authorization COVID-19 Booster Dose Vaccine Effectiveness

#	Reference (date)	Country	Design	Population	Dominant Variants	History of COVID	Vaccine Product	Outcome Measure	Reference group	Booster Dose VE % (95%CI)	Days post Booster dose	Max Duration of follow up after fully vaccinated
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)		
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+	

#	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		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 (February 26,2022)	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	59.4 (54.9-63.5)	51	~21 weeks
										16 (12.3-19.5)	144+	
42	Monge et al (February 14, 2022)	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 mRNA-1273 booster			58.6 (55.5-61.6)		
							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	

#	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
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 dose >180 days	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	
										87.7 (80.5-92.3)	>30	
37	Chemaitelly et al (February 8, 2022)	Qatar	Test-negative case control	133,417 individuals	**Omicron specifically^**	Included	BNT162b2	Symptomatic infections	Unvaccinated	15.8 (0.9-28.4)	1 week	~15 weeks
										37.6 (28.8-45.4)	≥12 weeks	
								Severe, critical or fatal disease		90.6 (77.8-96.0)	1-6 weeks	
										90.8 (81.5-95.5)	≥7 weeks	
							mRNA-1273	Symptomatic infections		3.6 (-31- 29.1)	1 week	
										38.6 (19.4-53.1)	≥6 weeks	
								Severe, critical or fatal disease		80.8 (-51.9-97.6)	1-6 weeks	
										100	≥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	**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

#	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
				negative controls				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 (February 1, 2022)	Israel	Retrospective cohort	1,138,681 persons aged over 60 years	**Omicron^**	Excluded	BNT162b2 **(four doses)**	Documented infections	**Complete vaccination with three doses at least 4 months prior**	50 (50-53)	12+	2 weeks
										48(45-50)	3-7 days post dose 4	
								Severe illness		77 (59-87)	12+	
										75(55-87)	3-7 days post dose 4	
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	Complete vaccination with two doses of primary mRNA series at least 6 months prior	87.3(85-89.2)	14+	~20 weeks
								Severe		94(89.5-96.6)		
32	Lytras et al (January 29,2022)	Greece	Retrospective cohort	9100 COVID-19 intubations and 14755 COVID-19 deaths in Greece	Non-VOC, Alpha, Delta^	Included	BNT162b2	Intubation (15-79y)	Unvaccinated	98.2 (97.2–98.9	14+	~12 weeks
								Intubation (80+ y)		97.5 (95.5–98.6)		
								Death (15-79y)		98.3 (96.8–99.1)		
								Death (80+y)		98.4 (97.4–99.0)		
31	Willet et al (Janaury 26,2022)	Scotland	Test-negative case control	6166 Omicron cases and 4911 Delta cases	**Omicron specifically^**	Included	BNT162b2	Documented infection	Unvaccinated	43.2 (38.1-47.8)	14+	~11 weeks
							mRNA-1273			46.3 (41.30-51.03)		
					Delta specifically^		BNT162b2			85.9 (84.2-87.4)		
							mRNA-1273			86.5 (84.8-88.0)		
30	McConeghy et al (January 28,2022)	USA	Nested trial	200 Nursing homes	Delta††	Excluded	BNT162b2, mRNA-1273 primary series + BNT162b2 and mRNA-1273 booster	Documented infection	Complete vaccination with two doses of primary mRNA	50.4 (29.4-64.7)	≤42	~12 weeks
								Hospitalization		47.7 (-377.7-88.9)		

#	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
								Death	series at least 6 months prior	97.2 (88.1-100)		
								Combined death or hospitalization		82 (55.5-94)		
				127 VA Community living centers				Documented infection		58.2 (32.3-77.8)		
								Hospitalization		36.6 (-35.4-77.3)		
								Combined death or hospitalization		45.8 (-15.5-79.1)		
29	Tenforde et al* (January 28, 2022)	USA	Test-negative case control	2952 hospitalized adults (18+ y)	Delta^	Included	BNT162b2 or mRNA-1273	Hospitalization: Immunocompromised	Unvaccinated	88 (81-93)	7+	~16 weeks
								Hospitalization: non-immunocompromised		97 (95-99)		~10 weeks
28	Spensley et al (January 26, 2022)	UK	Prospective cohort	1121 end stage kidney disease patients receiving in-center haemo-dialysis patients	**Omicron specifically^**	Included	BNT162b2 primary + BNT162b2 booster	Documented infection	Unvaccinated	66 (36-81)	14+	~15 weeks
							AZD1222 + BNT162b2 booster			47 (2-70)		
27	Abu-Raddad et al (January 24,2021)	Qatar	Matched retrospective cohort	2,476,113 individuals in Qatar	**Omicron specifically^**	Excluded	BNT162b2	Documented infection	Complete vaccination with two doses of BNT162b2 at least 6-8 months prior	47.7 (46-49.3)	7+	~10 weeks
								Symptomatic infection		50.1 (47.3-52.8)		
										50.3 (47.5-53.0)	14+	
							mRNA-1273	Documented infection		54 (50.7-57.2)	7+	
								Symptomatic infection		50.8 (43.4-57.3)	7+	
										50.1 (41.4-57.6)	14+	
					Delta specifically^		BNT162b2	Symptomatic infection		86.1(67.3-94.1)	14+	
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)		

#	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
25	Tartof et al (January 18, 2022)	USA	Test-negative case control	3730 hospital admissions and ED admissions in Southern California	**Omicron specifically^**	Excluded	BNT162b2	ED admission	Unvaccinated	78 (73–82)	<3 mos.	~20 weeks
										48 (14–69)	≥ 3 mos.	
								Hospitalization		89 (83–92)	<3 mos.	
										90 (57–98)	≥ 3 mos.	
					Delta specifically^			ED admission		88 (85–91)	<3 mos.	
										81 (58–91)	≥ 3 mos.	
								Hospitalization		95(91-97)	<3 mos.	
										65 (16-85)	≥ 3 mos.	
24	Young-Xu et al (January 18,2021)	USA	Matched test-negative case control	14,868 veterans 18 or older as cases and 54,347 veterans as controls	**Omicron specifically^**	Excluded	Any mRNA vaccine	Documented infection	Unvaccinated	62 (59-65)	14+	~20 weeks
					Delta specifically^			Documented infection		77 (75-79)		
					Delta and Omicron^			Hospitalization		91 (85-94)		
								Death		96 (91-98)		
23	Jara et al (January 13,2022)	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 (January 11, 2022)	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	Spitzer et al* (January 10, 2022)	Israel	Prospective cohort	1928 healthcare workers at a tertiary	Delta^	Excluded	BNT162b2	Documented infection	Complete vaccination with two doses of BNT162b2 at	93 (80-98)	7+	~4 weeks
								Symptomatic infection		93 (75-98)		

#	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
				medical center in Tel Aviv				Asymptomatic infection	least 1 month prior	92 (52-99)		
20	Tseng et al (February 18, 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 (71-74)	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)	Canada	Test negative case control	16,087 Omicron-positive cases, 4,261	**Omicron specifically^**	Excluded	mRNA primary + BNT162b2 booster	Symptomatic disease	Unvaccinated	60 (55-65)	7+	~9 weeks
							mRNA primary + mRNA-1273 booster			65 (55-72)		

#	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 January 1 pre-print]			Delta-positive cases, and 114,087 test-negative controls			mRNA primary + BNT162b2 booster	Severe disease		95 (87-98)		
							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 (December 29,2021)	South Africa	Test-negative case control	69,092 HCWs	Omicron^	Excluded	Ad26.COV.2	Hospitalization	Unvaccinated	63 (31-81)	0-13	~13 weeks
										84 (67-92)	14-27	
										85 (54-95)	1-2 months	
16	Lustig et al (December 21, 2021)	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 days prior, for 60+ year olds	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
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 (December 5, 2021)	Israel	Retrospective cohort	5.7 million Israeli individuals	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	16-39: Documented infection	Receipt of 2 doses at least 5 months prior	91 (90.1-91,3)	12+	~8 weeks

#	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
								40-59: Documented infection		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	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
				members of the Maccabi HMO								
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)	Israel	Test-negative case control	306,710 Israeli adults ≥ 40 years	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses at	85 (83-86)	14-20	~7 weeks
										86 (85-87)	28-65	

#	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]		Matched case-control	with either 2 or 3 doses				Documented infection	least 5 months prior	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) *[Update to August 31 Preprint]*	Israel	Retrospective cohort	1,144,690	Delta^	Excluded	BNT162b2 primary series + BNT162b2 booster	Documented infection	Complete vaccination with two doses at least 5 months prior	92 (90- 93)	12+	~3 weeks
								Severe disease		94 (91-96)		

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

2.1 Booster studies that do not meet criteria

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. REACT-1 round 15 final report: Increased breakthrough SARS-CoV-2 infections among adults who had received two doses of vaccine, but booster doses and first doses in children are providing important protection. *MedRxiv*, Published online 2021 December 16. https://www.medrxiv.org/content/10.1101/2021.12.14.21267806v1.
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. *University of Edinburgh.* Published online 22 December 2021. https://www.research.ed.ac.uk/en/publications/severity-of-omicron-variant-of-concern-and-vaccine-effectiveness-.
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.

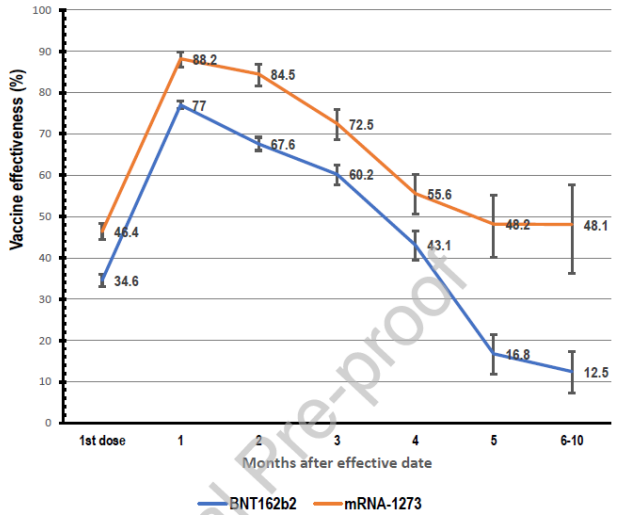
8. Lewnard J A, Hong V X, Patel M M, et al. Clinical outcomes among patients infected with Omicron (B.1.1.529) SARS-CoV-2 variant in southern California. medRxiv. Published online 2022 January 11. doi: https://doi.org/10.1101/2022.01.11.22269045.
9. McKeigue PM, Porter D, Hollick R, et al. Risk of severe 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.

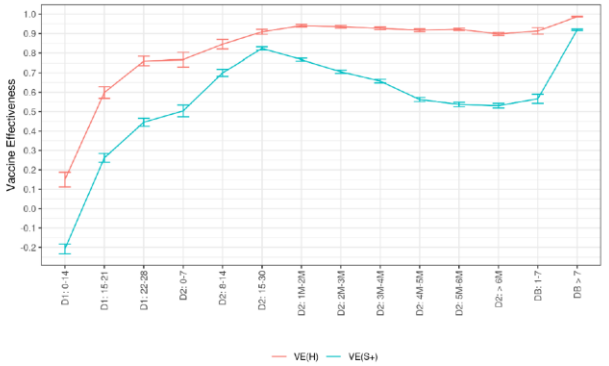
3. Duration of Protection Studies

These are studies that assess duration of protection criteria as outlined above along with those studies that do not meet aforementioned criteria that are relevant to evaluating duration of protection. Some of these studies are also in the above table but duplicated here for ease.

We would like to highlight

- It is currently challenging to disentangle any apparent reduction in VE over time due to waning immunity from reduction due to immune escape by the Delta variant.
- Countries have implemented different dose intervals and vaccination strategies that can make comparisons across studies challenging.
- Persons who are vaccinated early in a program are different than those who are vaccinated later. For example, many who were vaccinated early were those at highest risk, and this could confound the results. Some of the older individuals also might have some degree of immunosenescence.

#	Reference (date)	Country	Population	Dominant Variants	Vaccine product	Study Period	Descriptive Findings
116	Syed et al (March 2, 2022)	Qatar	12+	Alpha, Beta/Gamma, Delta	Comirnaty mRNA-1273	December 16, 2020-October 31, 2021	Cohort study linking adminsitrative databases. VEs are unadjusted 

115	Suarez Castillo et al (March 3, 2022)	France	50+ year olds	Alpha, Beta/Gamma, Delta	Comirnaty mRNA-1273 Ad26.COV2.S ChAdOx1	January 1-December 12, 2021	TND study/survival analysis by linking administrative databases. Figure 2 • Covid-19 vaccine effectiveness against symptomatic infections and hospitalizations among persons aged 50 years or over, according to the time elapsed since the injection of each vaccine dose, data collected from January 1st to December 12, 2021 
114	Klein et al (March 1, 2022)	USA	5-17 year olds	**Omicron** Delta	Comirnaty	April 2021-January 2022	TND study evaluating VE against emergency department/urgent care visits and hospitalizations.

Encounter type/Vaccination status	Total	SARS-CoV-2 test-positive, no. (%)	VE %* (95% CI)
ED or UC encounters during Delta or Omicron predominance, by age group			
5–11 yrs			
Unvaccinated (Ref)	8,599	2,652 (30.8)	—
2 doses (14–67 days earlier)	582	124 (21.3)	46 (24–61)
12–15 yrs			
Unvaccinated (Ref)	12,064	3,238 (26.8)	—
2 doses (14–149 days earlier)	4,547	254 (5.6)	83 (80–85)
2 doses (≥150 days earlier)	1,517	378 (24.9)	38 (28–48)
3 doses (≥7 days earlier)	10	3 (30)	NC
16–17 yrs			
Unvaccinated (Ref)	7,421	2,068 (27.9)	—
2 doses (14–149 days earlier)	2,692	193 (7.2)	76 (71–80)
2 doses (≥150 days earlier)	1,721	329 (19.1)	46 (36–54)
3 doses (≥7 days earlier)	64	13 (20.3)	86 (73–93)
ED or UC encounters, by age group and predominant variant			
5–11 yrs**			
Omicron predominant††			
Unvaccinated (Ref)	5,938	2,409 (40.6)	—
2 doses (14–67 days earlier)	486	118 (24.3)	51 (30–65)
12–15 yrs			
Delta predominant††			
Unvaccinated (Ref)	9,633	1,978 (20.5)	—
2 doses (14–149 days earlier)	4,060	80 (2.0)	92 (89–94)
2 doses (≥150 days earlier)	798	32 (4.0)	79 (68–86)
Omicron predominant††			
Unvaccinated (Ref)	2,336	1,254 (53.7)	—
2 doses (14–149 days earlier)	472	174 (36.9)	45 (30–57)
2 doses (≥150 days earlier)	719	346 (48.1)	−2 (−25–17)
3 doses (≥7 days earlier)	10	3 (30.0)	NC
16–17 yrs			
Delta predominant††			
Unvaccinated (Ref)	5,302	1,191 (22.5)	—
2 doses (14–149 days earlier)	2,340	78 (3.3)	85 (81–89)
2 doses (≥150 days earlier)	1,156	47 (4.1)	77 (67–84)
3 doses (≥7 days earlier)	2	0 (—)	NC
Omicron predominant††			
Unvaccinated (Ref)	1,363	771 (56.6)	—
2 doses (14–149 days earlier)	263	114 (43.4)	34 (8–53)
2 doses (≥150 days earlier)	565	282 (49.9)	−3 (−30–18)
3 doses (≥7 days earlier)	62	13 (21.0)	81 (59–91)
Hospitalizations during Delta or Omicron predominance, by age group			
5–11 yrs			
Unvaccinated (Ref)	262	59 (22.5)	—
2 doses (14–67 days earlier)	23	2 (8.7)	74 (−35–95)
12–15 yrs			
Unvaccinated (Ref)	496	149 (30)	—
2 doses (14–149 days earlier)	182	7 (3.8)	92 (79–97)
2 doses (≥150 days earlier)	63	13 (20.6)	73 (43–88)
16–17 yrs			
Unvaccinated (Ref)	437	136 (31.1)	—
2 doses (14–149 days earlier)	150	7 (4.7)	94 (87–97)
2 doses (≥150 days earlier)	82	14 (17.1)	88 (72–95)
3 doses (≥7 days earlier)	4	1 (25.0)	NC

113	Smid et al (February 25, 2022)	Czech Republic	General population of country	**Omicron** Delta	Comirnaty mRNA-1273 Ad26.COV2.S ChAdOx1	December 7, 2021-February 13, 2022	Cohort study created by linking administrative databases. (<2 months and >=2 months prior to onset)

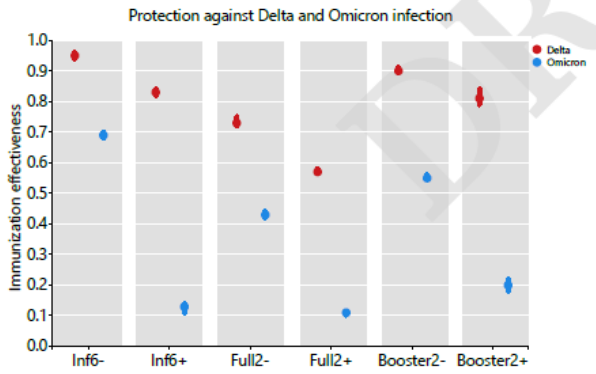


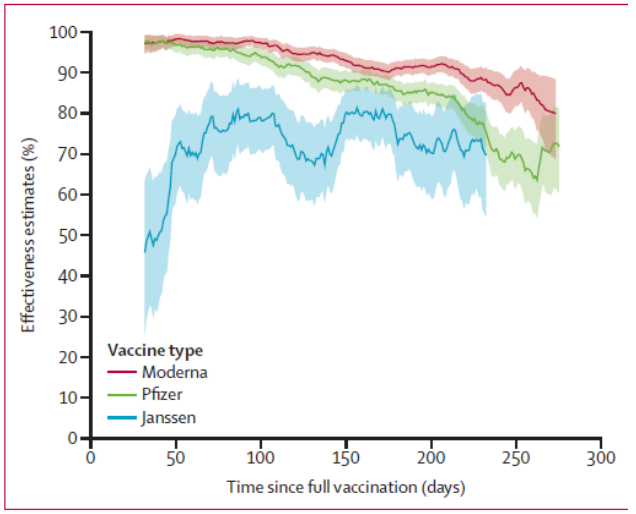
Fig. 2. Protection provided by vaccination or previous infection against infection by the Omicron and Delta variants of the SARS-CoV-2 virus. Inf6-, previous infection <6 months ago; Inf6+, previous infection >6 months ago; Full2-, complete vaccination <2 months ago; Full2+, complete vaccination >2 months ago; Booster2-, booster dose <2 months ago; Booster2+, booster dose >2 months ago. Shown are point estimates of protection with 95% CI.

Table 3. Vaccine effectiveness and protection provided by post-infection immunity *against hospitalization*, for the Omicron and Delta variants of the SARS-CoV-2 virus, 95% confidence intervals (CI) in parentheses.

Effect ag. *Hosp.*	Omicron	Delta
Full 2-	45% (29-57%)	75% (68-80%)
Full 2+	29% (21-37%)	79% (78-81%)
Booster 2-	87% (84-88%)	98% (97-98%)
Booster 2+	79% (75-83%)	97% (95-98%)

Table 6. Vaccine effectiveness and protection provided by post-infection immunity against hospitalization with a *need for oxygen therapy*, for the Omicron and Delta variants of the SARS-CoV-2 virus, 95% confidence intervals (CI) in parentheses.

Effect ag. O_2	Omicron	Delta
Full 2-	57% (32-72%)	82% (76-87%)
Full 2+	32% (20-43%)	82% (80-83%)
Booster 2-	90% (87-92%)	98% (98-98%)
Booster 2+	85% (80-88%)	97% (95-98%)

							Table 7. Vaccine effectiveness and protection provided by post-infection immunity against hospitalization with a need for *intensive care*, for the Omicron and Delta variants of the SARS-CoV-2 virus, 95% confidence intervals (CI) in parentheses. Effect ag. *ICU* / Omicron / Delta Full 2- / 58% (3-82%) / 84% (72-91%) Full 2+ / 37% (12-55%) / 86% (83-88%) Booster 2- / 83% (75-89%) / 98% (97-99%) Booster 2+ / 60% (37-74%) / 97% (92-99%)
112	Patalon et al (February 26, 2022)	Israel	16+ Maccabi insured patients	**Omicron**	Comirnaty	January 1-January 21, 2022	Matched TND study to evaluate relative VE against infection and hospitalization/death. All persons had received the primary series by August 1, 2021. Marginal effectiveness against infection of a booster dose given a month before the outcome period was at its peak at 59.4% (95% CI, 54.9%-63.5%). Effectiveness declined gradually with time from inoculation, reaching 16% (95% CI, 12.3%-19.5%) in those vaccinated 5 months prior to the outcome period compared to those not receiving the booster dose. As for the marginal effectiveness against severe disease, it seems that waning exists though to a much lesser degree, as effectiveness declines from 72.2% (95% CI, 37.8%-87.6%) 3 months after inoculation to 54.5% (95% CI, 13.4-76.1) five months after vaccination. However, numbers are small as also reflected by the confidence intervals.
111	Wright et al (February 25, 2022)	USA	18+ hospitalized	Pre Delta; Delta	Comirnaty mRNA-1273 Ad26.COV2.S	April 1-October 26, 2021	Case-control study of patients hospitalized in one large US network of hospitals.  *Figure 3:* Vaccine effectiveness against severe COVID-19 by time since vaccination and vaccine type

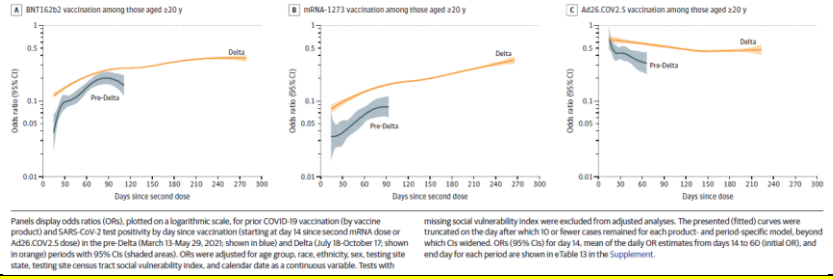
<table>
<tr><td>110</td><td>Liu et al (February 18, 2022)</td><td>Australia</td><td>Persons exposed in two outbreaks (1 at a night club, 1 at a medical school graduation event)</td><td>Omicron</td><td>Comirnaty
mRNA-1273
ChAdOx1</td><td>December 8, 2021-December 22, 2021</td><td>Unadjusted VE in two outbreaks by time since 2nd dose (combined for all vaccines)<table><tr><th>Timing</th><th>Night club outbreak</th><th>Graduation event outbreak</th></tr><tr><td><1 month</td><td>-33.3 (-141.4-26.3)</td><td>No cases</td></tr><tr><td>1-2 months</td><td>-18.1 (-85.7-24.8)</td><td>87.5 (64-95.7)</td></tr><tr><td>2-3 months</td><td>-5.9 (-67.5-33.1)</td><td>60 (38-74.2)</td></tr><tr><td>3+ months</td><td>-36.2 (-114.3-13.4)</td><td>32 (22-40.6)</td></tr></table></td></tr>
<tr><td>109</td><td>Wu et al (February 2022)</td><td>China</td><td>18+ year old contacts of cases</td><td>Delta</td><td>Coronavac
BBIBP-CorV</td><td>July 31, 2021-? (prior to November 17, 2021)</td><td>Study done in the context of an outbreak. The adjusted VE of full vaccination against symptomatic COVID-19 was 52.32% (25.73-69.39) for ≤3-month intervals and 49.95% (1.2-74.64) for 4–6-month intervals; against COVID-19 pneumonia, VEs were 60.31 (31.31-77.07) for ≤3-month and 67.08% (9.33-88.05) for 4–6-month intervals.</td></tr>
<tr><td>108</td><td>Britton et al (February 14, 2022)</td><td>USA</td><td>12+ year olds</td><td>Pre-Delta and Delta</td><td>Comirnaty
mRNA-1273
Ad26.COV2.S</td><td>March 13, April 15, or June 15 (based on age-based vaccine-eligibility October 17, 2021</td><td>TND study to evaluate VE against symptomatic disease based on data collected from pharmacies (note vaccination data based on recall and some portion of 2 dose recipients received 3 doses). In the paper, there is a stratification by age group.  </td></tr>
<tr><td>107</td><td>Ferdinands et al (February 11, 2022)</td><td>USA</td><td>18+ years</td><td>Delta, Omicron</td><td>Comirnaty
mRNA-1273</td><td>August 26, 2021-January 22, 2022</td><td>TND study at 8 VISION network sites evaluating VE against emergency room/urgent care visits nad hospitalizations.</td></tr>
</table>

							TABLE 2. mRNA COVID-19 vaccine effectiveness* against laboratory-confirmed COVID-19–associated† emergency department and urgent care encounters and hospitalizations among adults aged ≥18 years, by number and timing of vaccine doses§ — VISION Network, 10 states, August 2021–January 2022**
106	Fabiani et al (February 10, 2022)	Italy	16+ years	Alpha, Delta	Comirnaty mRNA-1273	December 27, 2020-November 7, 2021	Cohort study of people who received at least one dose of vaccine at some point before Sept 27. Used of day 0-<14 days post dose 1 as proxy for unvaccinated group. Provide stratification by age and risk group in paper.

Characteristic	Total	SARS-CoV-2 positive test result no. (%)	VE fully adjusted % (95% CI)*	Waning trend p value††
ED/UC encounters				
Overall				
Unvaccinated (Ref)	110,873	43,054 (39)	—	—
Any mRNA vaccine, 2 doses	105,193	16,487 (16)	72 (72–73)	<0.001
<2 mos	4,808	301 (6)	88 (87–90)	
2–3 mos	10,644	1,312 (12)	80 (78–81)	
4 mos	10,175	1,230 (12)	79 (77–80)	
≥5 mos	79,566	13,644 (17)	69 (68–70)	
Any mRNA vaccine, 3 doses	25,138	2,285 (9)	89 (89–90)	<0.001
<2 mos	15,614	920 (6)	92 (91–93)	
2–3 mos	8,759	1,120 (13)	86 (85–87)	
4 mos	736	227 (31)	75 (70–79)	
≥5 mos	29	18 (62)	50 (−7–77)	
Delta-predominant period				
Unvaccinated (Ref)	86,074	29,063 (34)	—	—
Any mRNA vaccine, 2 doses	85,371	8,136 (10)	80 (79–81)	<0.001
<2 mos	4,253	144 (3)	92 (91–94)	
2–3 mos	8,662	527 (6)	88 (86–89)	
4 mos	8,941	721 (8)	85 (83–86)	
≥5 mos	63,515	6,744 (11)	77 (76–78)	
Any mRNA vaccine, 3 doses	14,207	347 (2)	96 (95–96)	<0.001
<2 mos	10,621	210 (2)	97 (96–97)	
2–3 mos	3,542	134 (4)	93 (92–94)	
≥4 mos	44	3 (7)	89 (64–97)	
Omicron-predominant period				
Unvaccinated (Ref)	24,799	13,991 (56)	—	—
Any mRNA vaccine, 2 doses	19,822	8,351 (42)	41 (38–43)	<0.001
<2 mos	555	157 (28)	69 (62–75)	
2–3 mos	1,982	785 (40)	50 (45–55)	
4 mos	1,234	509 (41)	48 (41–54)	
≥5 mos	16,051	6,900 (43)	37 (34–40)	
Any mRNA vaccine, 3 doses	10,931	1,938 (18)	83 (82–84)	<0.001
<2 mos	4,993	710 (14)	87 (85–88)	
2–3 mos	5,217	986 (19)	81 (79–82)	
4 mos	692	224 (32)	66 (59–71)	
≥5 mos	29	18 (62)	31 (−50–68)	
Hospitalizations				
Overall				
Unvaccinated (Ref)	40,125	16,335 (41)	—	—
Any mRNA vaccine, 2 doses	42,326	4,294 (10)	82 (81–83)	<0.001
<2 mos	1,662	71 (4)	93 (91–94)	
2–3 mos	3,084	223 (7)	88 (86–90)	
4 mos	3,279	234 (7)	89 (87–90)	
≥5 mos	34,301	3,766 (11)	80 (79–81)	
Any mRNA vaccine, 3 doses	10,957	471 (4)	93 (92–94)	<0.001
<2 mos	7,332	221 (3)	95 (94–95)	
2–3 mos	3,413	211 (6)	91 (89–92)	
≥4 mos	212	39 (18)	81 (72–87)	
Delta-predominant period				
Unvaccinated (Ref)	36,214	14,445 (40)	—	—
Any mRNA vaccine, 2 doses	38,707	3,315 (9)	85 (84–85)	<0.001
<2 mos	1,574	49 (3)	94 (92–96)	
2–3 mos	2,790	154 (6)	91 (89–92)	
4 mos	3,129	192 (6)	90 (89–92)	
≥5 mos	31,214	2,920 (9)	82 (82–83)	
Any mRNA vaccine, 3 doses	8,124	195 (2)	95 (95–96)	<0.001
<2 mos	6,071	118 (2)	96 (95–97)	
2–3 mos	2,030	74 (4)	93 (91–95)	
≥4 mos	23	3 (13)	76 (14–93)	
Omicron-predominant period				
Unvaccinated (Ref)	3,911	1,890 (48)	—	—
Any mRNA vaccine, 2 doses	3,619	979 (27)	55 (50–60)	0.01
<2 mos	88	22 (25)	71 (51–83)	
2–3 mos	294	69 (23)	65 (53–74)	
4 mos	150	42 (28)	58 (38–71)	
≥5 mos	3,087	846 (27)	54 (48–59)	
Any mRNA vaccine, 3 doses	2,833	276 (10)	88 (86–90)	<0.001
<2 mos	1,261	103 (8)	91 (88–93)	
2–3 mos	1,383	137 (10)	88 (85–90)	
≥4 mos	189	36 (19)	78 (67–85)	

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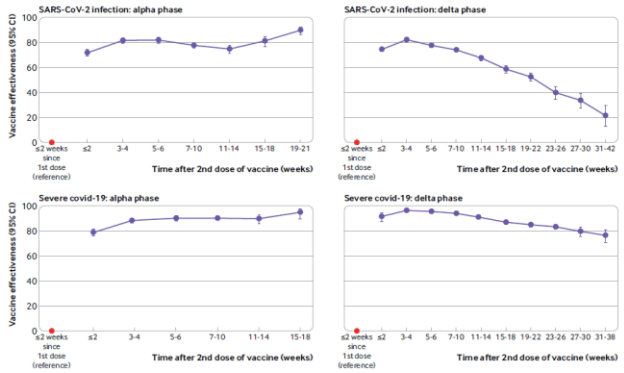
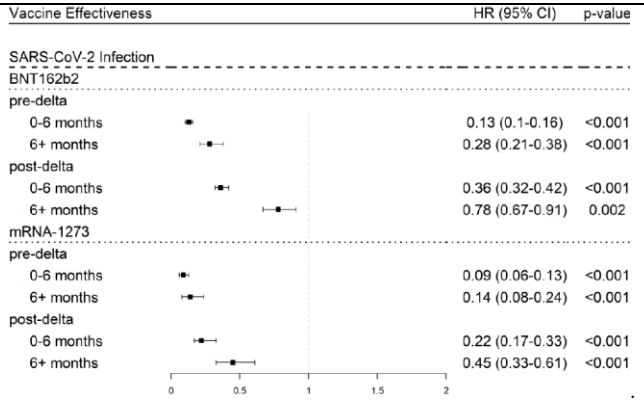
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td> 
</td></tr>
<tr><td>105</td><td>Butt et al (February 9, 2022)</td><td>USA</td><td>Veterans on chronic hemodialysis</td><td>Pre-Deltaà Delta</td><td>Comirnaty mRNA-1273</td><td>January 26-August 31, 2021</td><td>TND study linking adminsitrative databases. (Month=month since complete vaccination). VE against infection.
<table>
<tr><td></td><td>Test positive</td><td></td><td>Test negative</td><td></td><td></td></tr>
<tr><td>Month</td><td>Vaccinated (N)</td><td>Unvaccinated (N)</td><td>Vaccinated (N)</td><td>Unvaccinated (N)</td><td>VE (95% CI)</td></tr>
<tr><td>1</td><td>247</td><td>822</td><td>112</td><td>573</td><td>49.1 (38.2, 58.1)</td></tr>
<tr><td>2</td><td>245</td><td>822</td><td>107</td><td>573</td><td>40.4 (27.8, 50.9)</td></tr>
<tr><td>3</td><td>246</td><td>822</td><td>85</td><td>573</td><td>23.2 (7.3, 36.4)</td></tr>
<tr><td>4</td><td>246</td><td>822</td><td>70</td><td>573</td><td>45.3 (33.2, 55.2)</td></tr>
<tr><td>5</td><td>242</td><td>822</td><td>74</td><td>573</td><td>36.8 (23.0, 48.2)</td></tr>
<tr><td>6</td><td>216</td><td>822</td><td>69</td><td>573</td><td>34.1 (19.0, 46.4)</td></tr>
<tr><td>7</td><td>246</td><td>822</td><td>54</td><td>573</td><td>42.9 (29.5, 53.8)</td></tr>
<tr><td>8</td><td>49</td><td>822</td><td>4</td><td>573</td><td>87.6 (76.0, 93.6)</td></tr>
</table></td></tr>
<tr><td>104</td><td>Risk et al (February 7, 2022)</td><td>USA</td><td>18+</td><td>Pre-Deltaà Delta</td><td>Comirnaty mRNA-1273</td><td>April 1-October 20, 2021</td><td>Cohort study based on electronic medical records (note 33% of infections and 19% of hospitalizations not based on laboratory testing but based on diagnostic code, though reported sensitivity analysis showed no difference but did not provide the data).</td></tr>
</table>

							
103	Cerqueria-Silva et al (February 9, 2022)	Brazil	General population	Gamma, Delta	Coronavac followed by Comirnaty booster	January 18-November 11, 2021	TND study linking administrative databases **Table 3 | Effectiveness of CoronaVac vaccine against confirmed SARS-CoV-2 infection, by length of time (in days) since two-dose vaccination or BNT162b2 booster dose, stratified by age group** **Table 4 | Effectiveness of CoronaVac vaccine against COVID-19 hospitalization or death, by length of time (in days) since two-dose vaccination or BNT162b2 booster dose, stratified by age group**

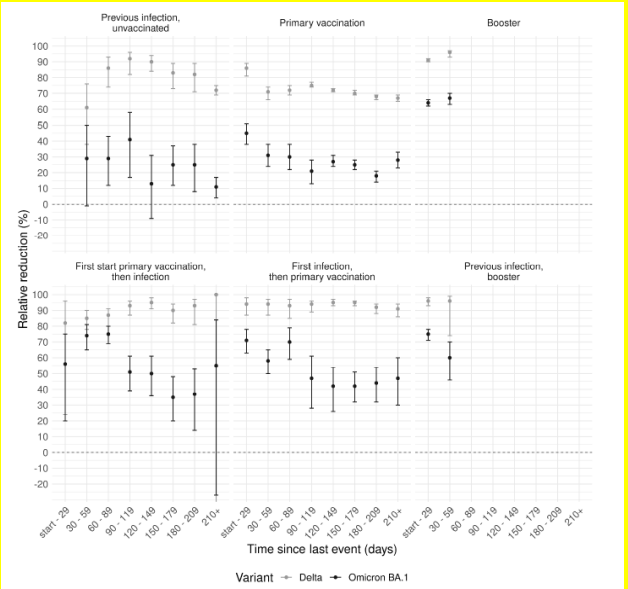
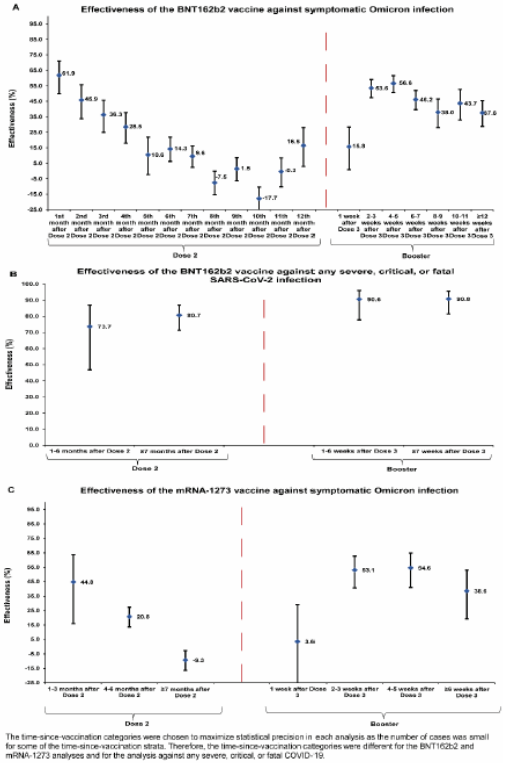
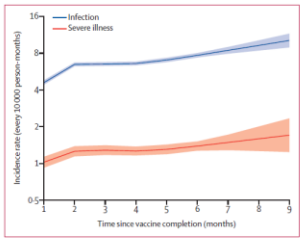
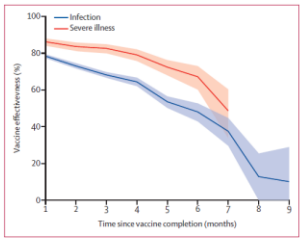
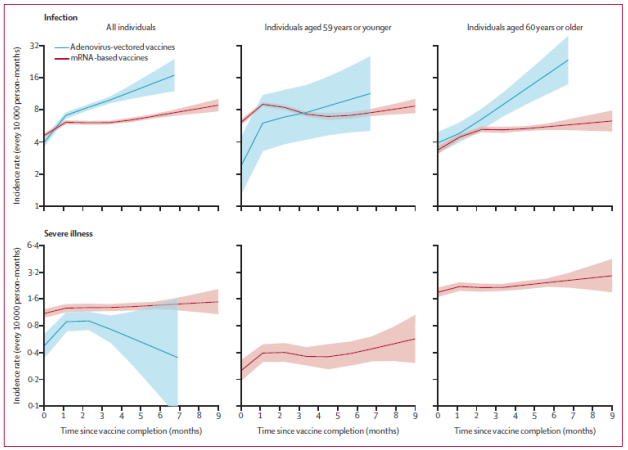
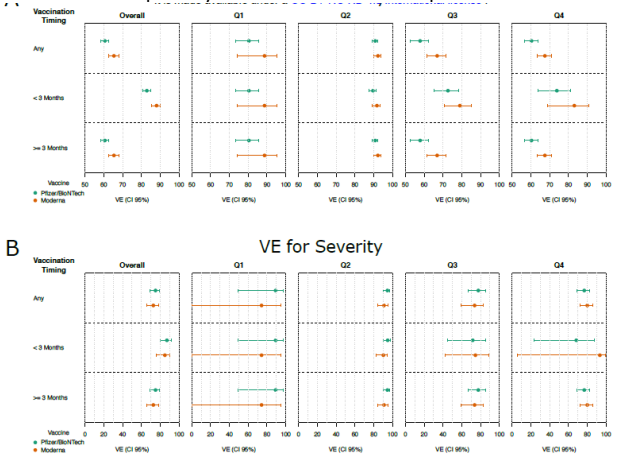
							Extended Data Table 4 | Vaccine effectiveness against death due to COVID-19 using RT-PCR, by length of time (in days) since two-dose vaccination or BNT162b2 booster dose Period post vaccine (days) | Overall | 18-59 | 60-79 | ≥80 Second dose 0-13 | 67.3% (65.6-68.9) | 86.4% (82.5-89.4) | 69.6% (67.6-71.6) | 56.0% (51.6-60.0) 14-30 | 82.7% (81.7-83.6) | 91.4% (88.7-93.5) | 84.5% (83.3-85.6) | 72.7% (69.8-75.4) 31-60 | 83.6% (82.8-84.3) | 91.9% (89.7-93.6) | 84.8% (83.8-85.7) | 70.0% (67.2-72.5) 61-90 | 81.4% (80.5-82.2) | 92.2% (89.8-94.0) | 82.5% (81.3-83.7) | 67.2% (64.2-69.9) 91-120 | 79.8% (78.7-80.8) | 95.0% (93.1-96.4) | 81.7% (80.3-83.0) | 63.5% (59.9-66.7) 121-150 | 78.3% (77.0-79.6) | 93.7% (90.9-95.7) | 82.0% (80.3-83.5) | 58.7% (54.3-62.7) 151-180 | 76.8% (75.1-78.4) | 92.1% (88.2-94.7) | 81.9% (79.7-83.8) | 53.9% (48.3-58.9) >180 | 74.8% (72.2-77.2) | 90.3% (85.5-93.5) | 81.5% (77.6-84.7) | 45.5% (37.1-52.8) Booster (BNT162b2) 0-6 | 80.3% (73.1-85.6) | 100% (*) | 81.4% (71.3-87.9) | 59.9% (39.3-73.5) 7-13 | 92.2% (87.4-95.2) | 100% (*) | 92.3% (83.8-96.3) | 80.7% (65.3-89.2) 14-30 | 98.3% (96.3-99.2) | 81.9% (-31.6-97.5) | 99.1% (93.6-99.9) | 95.4% (88.7-98.1) >30 | 97.1% (90.5-99.1) | 100% (*) | 94.3% (58.3-99.2) | 93.5% (73.2-98.4)
102	Andeweg et al (February 8, 2022)	Netherlands	General population	**Omicron** Delta	Comirnaty ChAdOx1 mRNA-1273 Ad26.COV2.S	November 22, 2021-January 19, 2022	TND study linking administrative databases evaluating VE/risk reduction from prior infection and/or vaccination.  Figure 1. Relative reduction in Delta and Omicron BA.1 infections atter previous infection, primary vaccination, booster vaccination, or combinations of previous infection and vaccination, compared with naïve status ((1-OR) * 100), by time since last event in persons aged 18 and older.
101	Chemaitelly et al (February 8, 2022)	Qatar	General population	**Omicron**	Comirnaty mRNA-1273	December 23, 2021-February 2, 2022	Matched TND study based on linking adminsitrative databases.

							Figure 1. Effectiveness of the BNT162b2 vaccine against A) symptomatic SARS-CoV-2 Omicron infection and B) severe, critical, or fatal COVID-19 due to Omicron infection. C) Effectiveness of the mRNA-1273 vaccine against symptomatic SARS-CoV-2 Omicron infection. Data are presented as effectiveness point estimates. Error bars indicate the corresponding 95% confidence intervals.  The time-since-vaccination categories were chosen to maximize statistical precision in each analysis as the number of cases was small for some of the time-since-vaccination strata. Therefore, the time-since-vaccination categories were different for the BNT162b2 and mRNA-1273 analyses and for the analysis against any severe, critical, or fatal COVID-19. **Sub-studies[*]** / **mRNA-1273** / **Cases[†] (Severe, critical, or fatal disease)[‡]** / **Controls[†] (PCR-negative)** / **Effectiveness in % (95% CI)[‡]** Vaccinated / Vaccinated Yes / No / Yes / No **Dose 1** Dose 1 and no Dose 2 — 0 — 103 — 2 — 280 — 100.0 (Omitted)[¶] **Dose 2** 1-6 months after Dose 2 and no Dose 3 — 3 — 105 — 35 — 265 — 76.9 (19.2 to 93.4) ≥7 months after Dose 2 and no Dose 3 — 23 — 117 — 139 — 257 — 64.0 (39.1 to 78.7) **Dose 3 (booster dose)** 1-6 weeks after Dose 3 — 1 — 103 — 19 — 270 — 80.8 (-51.9 to 97.6) ≥7 weeks after Dose 3 — 0 — 102 — 5 — 278 — 100.0 (Omitted)[¶]
100	Lauring et al (February 7, 2022)	USA	≥18 years	Delta (for the duration analysis	Comirnaty mRNA-1273	July 4-December 25, 2021 (for the Delta analysis)	TND case control study in 21 hospitals in the US (IVY Network). For Delta, VE against hospitalization 88% (95% CI: 86 to 90%) 14-150 days post 2nd dose; >150 days, VE was 81% (78 to 84%).

	(updated March 9, 2022)						
107	Kislaya et al (January 31, 2022)	Portugal	≥12 years	Deltaà **Omicron**	Comirnaty ChAdOx1 mRNA-1273 Ad26.COV2.S	December 6-21, 2021	Compared the odds of vaccination in Delta versus Omicron cases. (higher odds =lower VE of Omicron). Omicron : Delta aOR Complete primary vaccination <113 days 2.3(1.9 to 2.8) Complete primary vaccination 113-168 days 2.0 (1.7 to 2.4) Complete primary vaccination 169+ days 1.9(1.6 to 2.3)
106	Corrao et al (January 27, 2022)	Italy	≥12 years	AlphaàDelta	Comirnaty ChAdOx1 mRNA-1273 Ad26.COV2.S	January 17-October 20, 2021	Cohort study   Figure 1: Influence of time since complete vaccination on rates of SARS-CoV-2 infection and severe COVID-19 illness Estimates based on the cohort of 5 351 085 individuals who received complete vaccination from January to July, 2021. The figure reports the trends in age-period-cohort modelled incidence rates (and 95% CI bands) according to time since complete vaccination. Estimates are adjusted for the month of vaccine completion (cohort effect), and the month of outcome occurrence (period effect). Figure 2: Influence of time since complete vaccination on vaccine effectiveness against SARS-CoV-2 infection and severe COVID-19 illness Estimates based on the cohort of 9 140 390 potential candidates who were to receive the vaccine as of Dec 27, 2020. Cox proportional hazard models were fitted for estimating hazard ratio and 95% CI. Vaccine effectiveness was directly calculated as 1 -hazard ratio.  Figure 3: Influence of time since complete vaccination on rates of SARS-CoV-2 infection (top boxes) and severe COVID-19 illness (bottom boxes) in the entire cohort and according to age and vaccine type Estimates based on the cohort of 5 351 085 individuals who received complete vaccination from January to July, 2021. The figure reports the trends in age-period-cohort modelled incidence rates (and 95% CI bands) according to time since complete vaccination. Estimates are adjusted for the month of vaccine completion (cohort effect), and the month of outcome occurrence (period effect).

105	Roberts et al (January 31, 2022)	USA	Adults	Multiple	Comirnaty mRNA-1273 (for duration)	January 1-December 31, 2021	TND study evaluating VE against infection (top) and hospitaliation/death (bottom). Note that this is a combination of primary and booster dose VE in quarter 4. 
104	Belayachi et al (January 27, 2022)	Morocco	≥18 year olds	Unknownàdelta	BBIBP-CorV	February 1-October 1, 20221	TND linking adminsitrative databases to evaluate VE against severe disease. As a function of time after vaccination of second dose vaccination, vaccine effectiveness among persons who had received the second dose 1–30 days earlier was 88% (95% CI, 84-91), 87% (95% CI: 83-90) among those who had received it 31–90 days earlier, 75% (95% CI: 67-80) among those who had received it 91–120 days earlier, 61% (95% CI: 54-67) among those who had received it 121–150 days earlier, 64% (95% CI: 59-69) among those who had received it ≥150 days earlier. Note they attempted to stratify by age (>/< 60 years) showing a trend towards a lower VE gainst severe/critical disease in those over 60 but confidence intervals were overlapping.
103	Lytras et al (January 29, 2022)	Greece	≥15 year olds	Alphaà Delta	Comirnaty ChAdOx1 mRNA-1273 Ad26.COV2.S	January-December 2021	Cohort study linking administrative databases evaluating VE against intubation and death. VE provided for 6 months

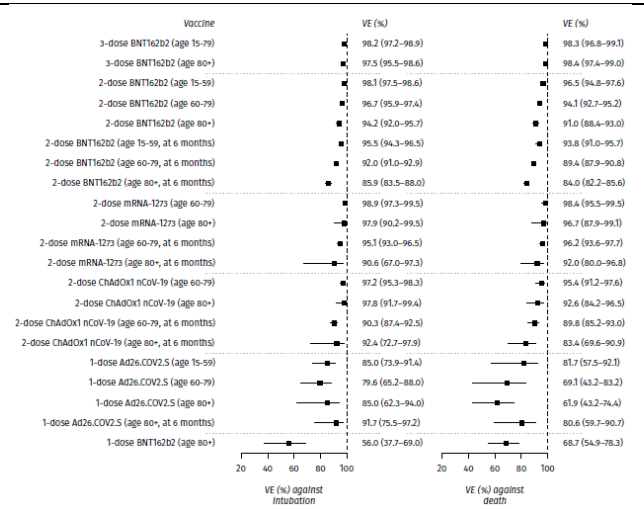
							
102	Goldhaber-Fiebert et al (January 23, 2022)	USA	Prison population and staff	Delta	Comirnaty mRNA-1273	June 1-November 5, 2021	Matched TND among cases evaluating duration of protection against infection of early vs late fully (primary series) vaccinated persons. Among staff, odds of infection increased 25% (Odds Ratio [OR], 1.25; 95% Confidence Interval [CI], 1.13 – 1.40) in each 28-day period post-vaccination; among residents, the odds increased by 21% (OR, 1.21; 95%CI 1.08 – 1.36) (Figure 1). Compared with individuals within 60 days of being fully vaccinated, odds of infection were over fourfold greater ≥181 days since full vaccination for staff (OR, 4.36; 95%CI 1.92 – 9.89) and nearly threefold greater for residents (OR, 2.89; 95%CI 1.40 – 5.98)
101	Bedston et al (January 20, 2022)	Wales	Healthcare Workers	AlphaàDelta	Comirnaty	December 7, 2020-September 30, 2021	Cohort study. 2 weeks after dose 2, VE against infection was 67% (aHR 0.33, 95 %CI 0.24–0.44). This increased in weeks 2–5 to 86% (aHR 0.14, 95 %CI 0.09–0.21), and decreased to 77% over weeks 6–13. After this, vaccine effectiveness decreased from 60% to 53% between weeks 14–25, and from week 26 vaccine effective was 45% (aHR 0.55, 95 %CI 0.49–0.61).
100	Accorsi et al (January 21, 2022)	USA	≥18 year olds	Deltaà **Omicron**	Comirnaty mRNA-1273	December 10-January 1, 2022	TND study in ICATT (free testing sites throughout US) against symptomatic disease. Note OR can be converted to VE by the formulate VE=1-OR

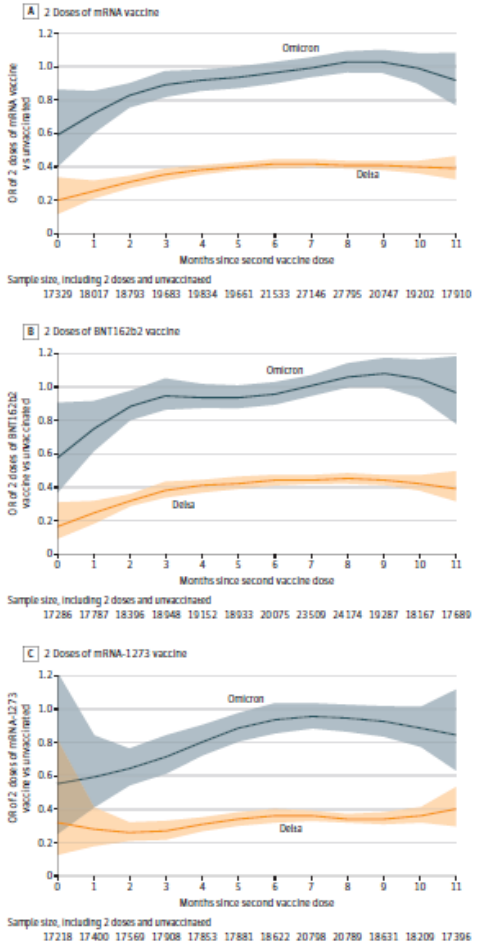
							Figure 2. Odds Ratios for the Association of 2 Doses of mRNA Vaccine by Months Since Second Dose and Symptomatic SARS-CoV-2 Infection Caused by the Omicron or Delta Variants Among Adults 18 Years or Older Tested in the Increasing Community Access to Testing Platform, December 10, 2021, to January 1, 2022 
99	Thompson et al (January 21, 2022)	USA	≥18 year olds	Deltaà **Omicron**	Comirnaty mRNA-1273	August 26, 2021-January 5, 2022	TND study in VISION network calculating VE against emergency department/urgent care visits and and hospitalizaiton among persons with symptoms consistent with COVID-19

							TABLE 2. mRNA COVID-19 vaccine effectiveness* against laboratory-confirmed COVID-19–associated† emergency department and urgent care encounters and hospitalizations among adults aged ≥18 years, by number and timing of vaccine doses§ and vaccine product received — VISION Network, 10 states, August 2021–January 2022¶ Encounter/Predominant variant period/Vaccination status | Total | SARS-CoV-2 positive test result, no. (%) | VE, %* (95% CI) **ED or UC encounters** **Delta predominant** Unvaccinated (Ref) | 98,087 | 36,542 (37.2) | — **Any mRNA vaccine** 2 doses (14–179 days earlier) | 39,629 | 3,269 (8.2) | 86 (85–87) 2 doses (≥180 days earlier) | 52,506 | 6,893 (13.1) | 76 (75–77) 3 doses | 14,523 | 469 (3.2) | 94 (93–94) **Omicron predominant** Unvaccinated (Ref) | 6,996 | 3,398 (48.6) | — **Any mRNA vaccine** 2 doses (14–179 days earlier) | 1,746 | 591 (33.9) | 52 (46–58) 2 doses (≥180 days earlier) | 5,409 | 2,037 (37.7) | 38 (32–43) 3 doses | 3,876 | 520 (13.4) | 82 (79–84) **Hospitalizations** **Delta predominant** Unvaccinated (Ref) | 37,400 | 14,272 (38.2) | — **Any mRNA vaccine** 2 doses (14–179 days earlier) | 14,645 | 895 (6.1) | 90 (89–90) 2 doses (≥180 days earlier) | 26,190 | 2,563 (9.8) | 81 (80–82) 3 doses | 8,092 | 209 (2.6) | 94 (93–95) **Omicron predominant** Unvaccinated (Ref) | 460 | 174 (37.8) | — **Any mRNA vaccine** 2 doses (14–179 days earlier) | 115 | 14 (12.2) | 81 (65–90) 2 doses (≥180 days earlier) | 488 | 86 (17.6) | 57 (39–70) 3 doses | 514 | 24 (4.7) | 90 (80–94)
98	Tartof et al (January 19, 2022)	USA	≥18 year olds enrolled in Kaiser insurance	Deltaà **Omicron**	Comirnaty	December 1, 2021-January 11, 2022	TND study of persons admitted to the emergency room or hospital with symptoms consistent with COVID-19. | | Delta VE (95% CI) (n=1509) | | Omicron VE (95% CI) (n=1543) | | | | ED only (n=1100) | Hospitalization (n=409) | ED only (n=1193) | Hospitalization (n=350) | | Primary Series | | | | | | 7 days -< 3 months post dose 2 | 80 (69-87) | 88 (71-95) | 60 (43-72) | 70 (41-84) | | 3-5 months | 71 (61-79) | 77 (62-88) | 38 (21-51) | 67 (44-80) | | ≥6 months post dose 2 | 63 (57-69) | 74 (65-80) | 41 (32-50) | 68 (56-76) | | Booster series | | | | | | 14 days-< 3 months post dose 3 | 88 (85-91) | 95 (91-97) | 78 (73-82) | 89 (83-92) | | ≥3 months post dose 3 | 81 (58-91) | 65 (16-85) | 48 (14-69) | 90 (57-98) |
97	Amodio et al (January 19, 2022)	Italy	≥18 year olds	AlphaàDelta	Comirnaty mRNA-1273	January 1-September 30, 2021	Cohort study of 3.9 millions adults in Sicily conducted from administrative databases. Decreasing trends for vaccine effectiveness, measured as monthly percentage changes, were statistically significant for all the three evaluated outcomes (-4·76% per month, p<0·001 against SARS-CoV-2 infection; -2·27% per month, p=0·029 against severe COVID-19; 2·26% per month, p=0·028 against COVID-19 intubation/death, respectively).

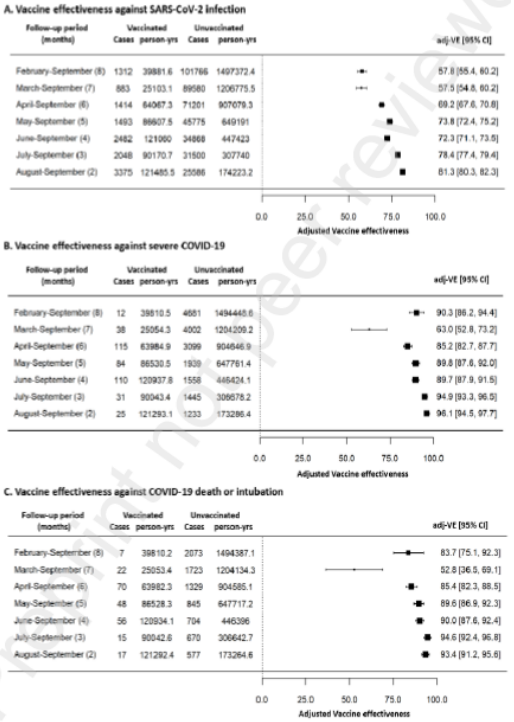
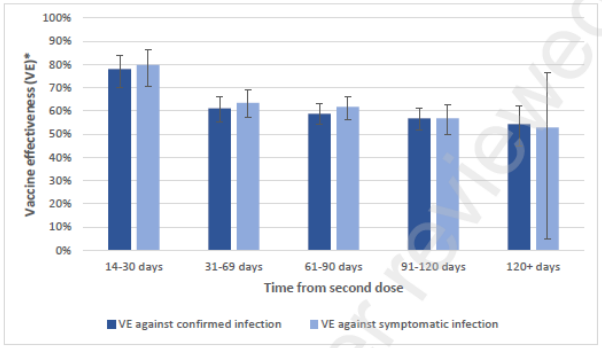
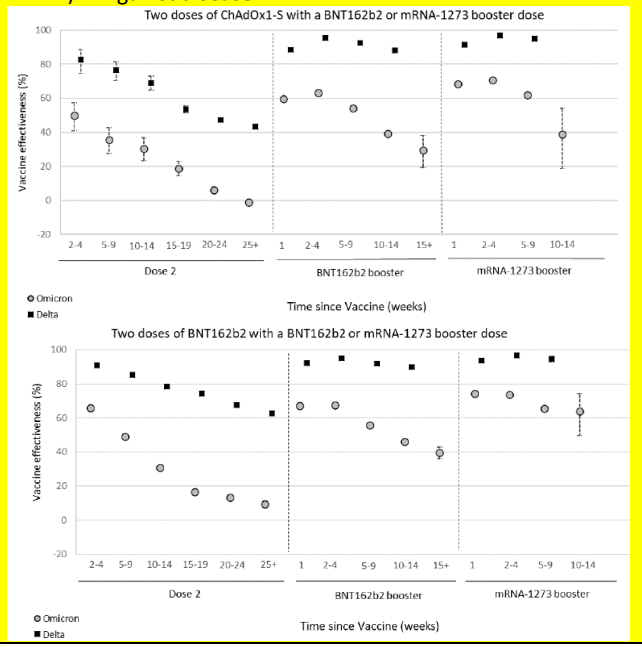
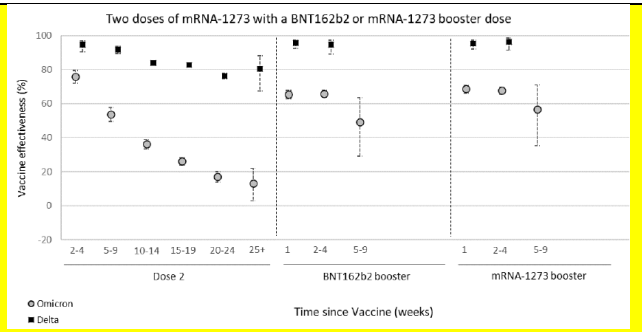
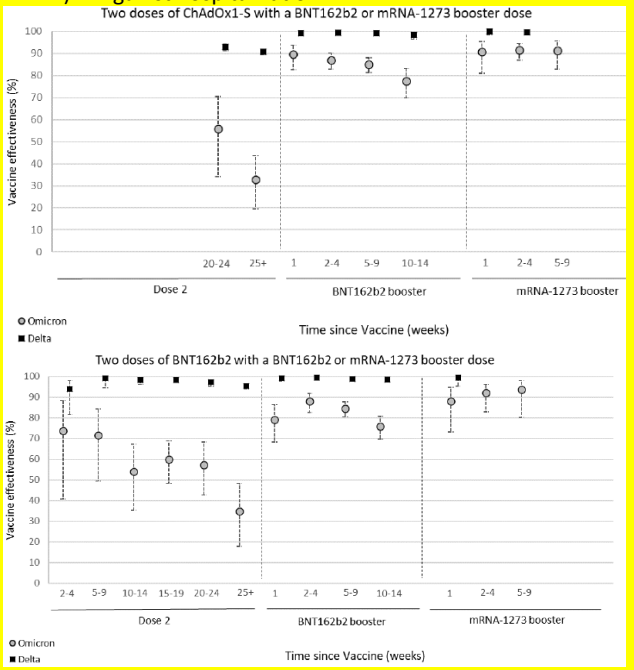
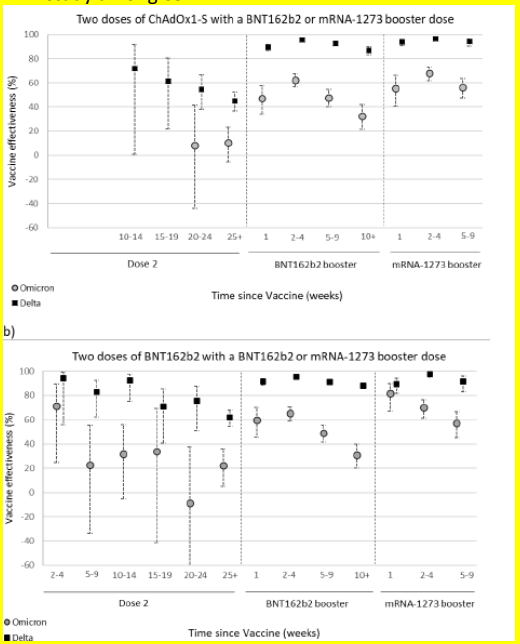
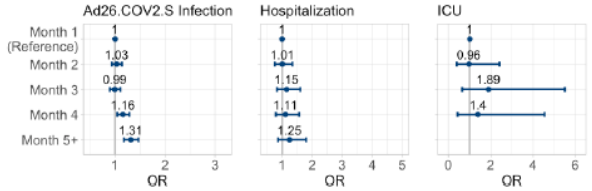
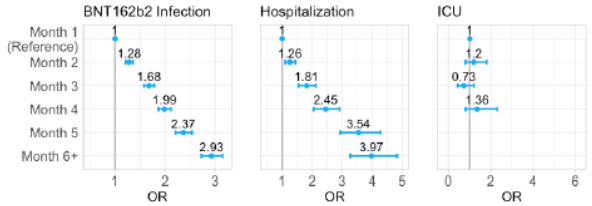
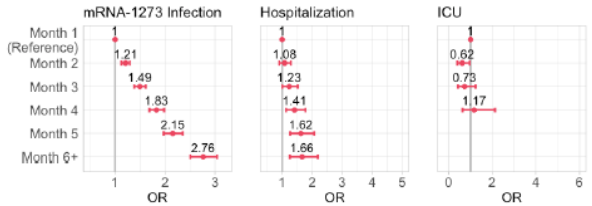
							Figure 4: Vaccine effectiveness estimates after adjustment for age and sex according to the different assessed outcomes and follow-up periods. 
96	Suah et al (January 16, 2022)	Malaysia	General population	Delta	Comirnaty CoronaVac	September 1-30, 2021	Compared early (April-June) vs late (July-August) vaccinated persons (comparing to unvaccinated based on census data). For BNT162b2, crude vaccine effectiveness against COVID-19 infections declined from 90.8% (95% CI 89.4, 92.0) in the late group to 79.1% (95% CI 75.8, 81.9) in the late group. Vaccine effectiveness for BNT162b2 against ICU admission and deaths were comparable between the two different periods. For CoronaVac, crude vaccine effectiveness waned against COVID-19 infections from 74.4% in the late group (95% CI 209 70.4, 77.8) to 30.0% (95% CI 18.4, 39.9) in the early group. It also declined significantly against ICU admission, dropping from 56.1% (95% CI 51.4, 60.2) to 29.9% (95% CI 13.9, 43.0) (adjusted). For deaths, however, CoronaVac's effectiveness did not wane after three to five months of full vaccination. Waning more prominent in 60+.
95	Chiew et al (January 8, 2022)	Singapore	12-18 year olds	Delta	Comirnaty	June 1-November 20, 2021	Cohort study evaluating VE against infection and disease.

							Figure 1. Vaccine effectiveness over time from completion of second dose.  **Vaccine effectiveness is adjusted for age group, gender, ethnicity, housing type, time from second vaccination dose (in months) and date of notification using Poisson regression. Reference group is unvaccinated.*
94	UKHSA (January 28, 2022, Update of #94/#83 Dec 31st analysis) (Note Andrews et al published March 2 with data through mid-January in case you're interested in the methods).	UK	General population	Delta, **Omicron**	Comirnaty ChAdOx1 mRNA-1273	November 27-January 21, 2022	TND case control 1) Against disease 

							 2) Against hospitalization 
93	Tseng et al (February 18, 2022)	USA	18+ year olds enrolled in Kaiser insurance	Delta, **Omicron**	mRNA-1273	December 6-23, 2021	TND case control study done by linking administrative databases.

	[update from January 21 preprint]						<table><tr><th></th><th>Delta VE (95% CI)</th><th>Omicron VE (95% CI)</th></tr><tr><td>VE against infection</td><td></td><td></td></tr><tr><td>2 dose (14+)</td><td>60.7 (56.5-64.5)</td><td>0 (0-3.1)</td></tr><tr><td>14-90 days</td><td>82.8 (69.6-90.3)</td><td>30.4 (5-49)</td></tr><tr><td>91-180 days</td><td>63.6 (51.8-72.5)</td><td>15.2 (0-30.7)</td></tr><tr><td>181-270 days</td><td>61.4 (56.8-65.5)</td><td>0 (0-1.2)</td></tr><tr><td>>270 days</td><td>52.9 (43.7-60.5)</td><td>0 (0-1.7)</td></tr><tr><td>3 dose</td><td>95.2 (93.4-96.4)</td><td>62.5 (56.2-67.9)</td></tr><tr><td>3rd dose on or after 10/21</td><td>95.7 (94.2-96.9)</td><td>63.6 (57.4-68.9)</td></tr><tr><td>3rd dose prior to 10/21</td><td>90.7 (81.4-95.3)</td><td>39.1 (3.8-61.5)</td></tr><tr><td>3 dose (immunocompetent)</td><td>95.7 (94.2-96.8)</td><td>63.6 (57.4-68.9)</td></tr><tr><td>3rd dose on or after 10/21</td><td>95.9 (94.4-97.0)</td><td>64.1 (57.9-69.4)</td></tr><tr><td>3rd dose prior to 10/21</td><td>93.1 (83.9-97)</td><td>49.0 (12.6-70.2)</td></tr></table>
92	UKHSA (January 7, 2022)	UK	65+ year olds	Delta, **Omicron**	Comirnaty mRNA-1273 ChAdOx1	November 27-December 31, 2021	TND study among 65+. 
91	Grgič Vitek et al (January 6, 2022)	Slovenia	18+ year olds	Delta	Comirnaty mRNA-1273	October 2021	Cohort study using administrative databases specifically evaluated VE against SARI hospitalization. Note results are unadjusted.

							<table><tr><th rowspan="2">Age group (years)</th><th>Ful</th><th colspan="2">Vaccine effectiveness</th></tr><tr><th></th><th>%</th><th>95% CI</th></tr><tr><td colspan="4">Vaccinated ≤ 3 months ago</td></tr><tr><td>18–49</td><td></td><td>97</td><td>90–99</td></tr><tr><td>50–64</td><td></td><td>94</td><td>91–97</td></tr><tr><td>≥ 65</td><td></td><td>93</td><td>88–96</td></tr><tr><td colspan="4">Vaccinated 4–5 months ago</td></tr><tr><td>18–49</td><td></td><td>NA</td><td>NA</td></tr><tr><td>50–64</td><td></td><td>90</td><td>79–95</td></tr><tr><td>≥ 65</td><td></td><td>85</td><td>81–88</td></tr><tr><td colspan="4">Vaccinated ≥ 6 months ago</td></tr><tr><td>18–49</td><td></td><td>23</td><td>0–69</td></tr><tr><td>50–64</td><td></td><td>89</td><td>56–97</td></tr><tr><td>≥ 65</td><td></td><td>43</td><td>30–54</td></tr></table>
90	Zheutlin et al (January 6, 2022)	USA	18+ year olds who had been fully vaccinated	Alpha, Delta, nonVOC	Comirnaty mRNA-1273 Ad26.COV2.S	January 1-September 7, 2021	Matched case control using an administrative dataset among vaccinated persons, comparing the odds of infection, hospitalization, and ICU admission at 28 day intervals post dose 2 relative to the 1st month after full vaccination. Note outcomes defined by COVID-19 ICD10 codes or SARS-CoV-2 PCR testing. **Figure 2.** Odds ratios (OR) and 95% CI assessing durability of baseline vaccine protection against COVID-19 breakthrough infections, hospitalizations, and ICU admissions. **a) Ad26.COV2.S**  **b) BNT162b2**  **c) mRNA-1273** 

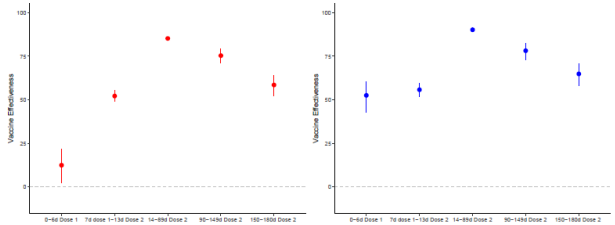
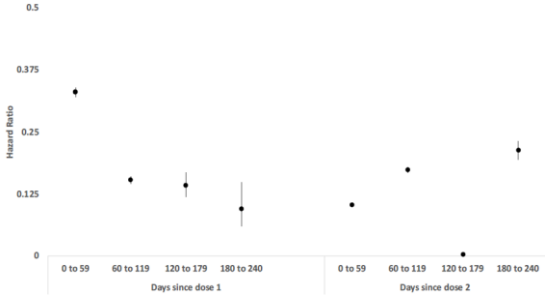
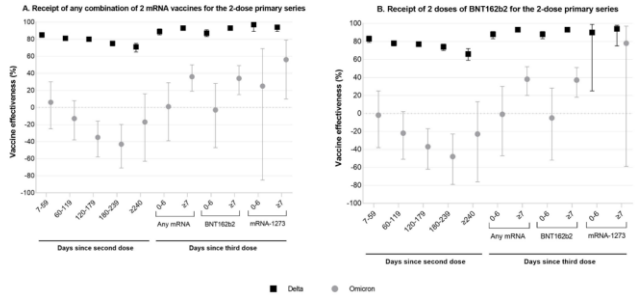
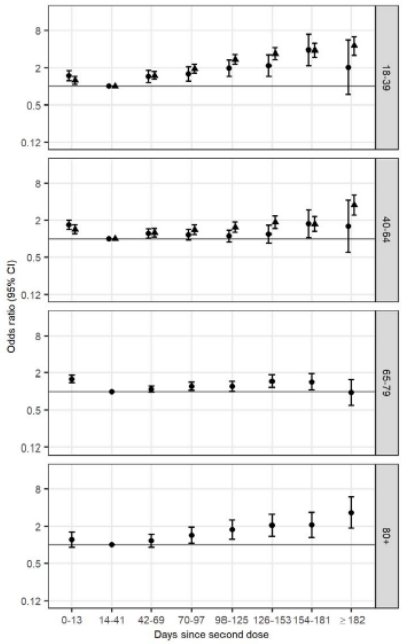
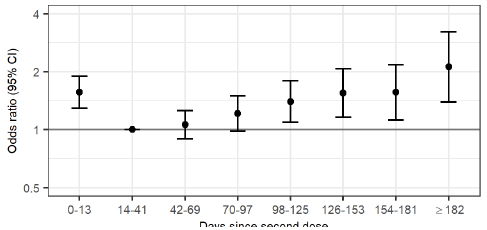
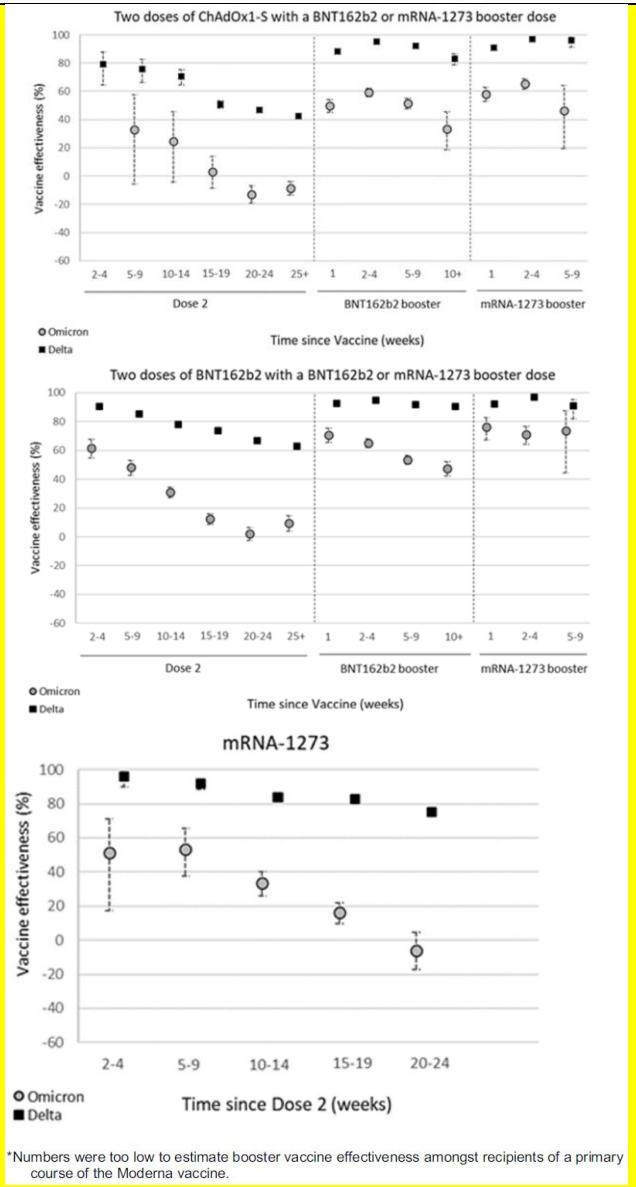
89	Lyngse et al (January 6, 2022)	Denmark	General population	Delta	Comirnaty ChAdOx1 mRNA-1273	June 21-October 26, 2021	HH transmission study. The VE against susceptibility and VE against transmission decreased from 71% (95%CI: 69-72) and 57% (95%CI: 53-61), respectively, to 32% (95%CI: 16-45) and 29% (95%CI: 14-41), respectively, between time points corresponding to 0-1 months and 7-8 months after vaccination
88	Prunas et al (January 5, 2022)	Israel	12-16 year olds enrolled in Maccabi health services	Delta	Comirnaty	June 15-December 8, 2021	Matched case control evaluating association between time since vaccination and infection (red) and disease (blue). 
87	Fisman et al (January 5, 2022)	Canada	5+ year olds	Alpha, Beta, Gamma, Delta, nonVOCs	Comirnaty ChAdOx1 mRNA-1273 (homologous and heterologous)	December 2020-October 2021	Case-Cohort study looking at VE against infection combined across the different platforms over time since vaccination as well as evaluated impact of dosing intervals. 
86	Buchan et al (January 28, 2022) [updated from January 1, 2022 version]	Canada	18+ year olds	Delta, **Omicron**	Comirnaty ChAdOx1 mRNA-1273 (vaccinated persons had at least 1 dose of an mrna vaccine)	December 6-December 26, 2021	TND study linking administrative databases.

							Figure S1. Vaccine effectiveness against infection by Omicron or Delta among adults aged ≥18 years by vaccine schedule and time since latest dose  Vaccine effectiveness for mRNA-1273 0-6 days after the third dose was estimated as 100% based on zero vaccinated test-positive cases and was therefore not presented in panel B.
85	Cerqueria-Silva et al (December 27, 2021)	Brazil	18+ year olds with prior infection 90+ days prior to testing in study period	Gamma, Delta	Coronavac, Comirnaty ChAdOx1 Ad26.COV2.S	January 18, 2021, - November 11, 2021.	Matched TND study linking adminsitrative databases. VE against symptomatic disease on top; severe disease on bottom. **14-90 days** / **>90 days** / **p-value** **BNT162b2** 64.2% (54.2-72.0) / 100% (*) / 0.277 **ChAdOx1** 55.5% (50.5-60.1) / 56.8% (46.6-65.1) / 0.544 **CoronaVac** 40.5% (36.4-44.3) / 38.0% (33.1-42.5) / 0.760 **Ad26.COV2.S** 46.1% (32.7-56.7) / 30.6% (-12.4-57.1) / 0.420 **Table A4. Vaccine effectiveness ≥14 days after series comp** Vaccine waning (time after series completion) 14-90 days / >90 days / p-value **BNT162b2** 88.8% (50.0-97.5) / 100% (*) / 0.765 **ChAdOx1** 86.6% (77.6-92.0) / 95.1% (84.8-98.4) / 0.007 **CoronaVac** 86.6% (79.8-90.3) / 74.4% (63.3-82.2) / 0.012 **Ad26.COV2.S** 60.2% (-10.8-85.7) / 41.0% (-240.9-89.9) / 0.978
84	Hitchings et al (December 24, 2021)	Brazil	18+ year olds living in Sao Paulo	Gamma, Delta	Coronavac	January 17- September 30, 2021	TND based on linking adminsitrative databases among persons with 2 doses of coronavac (ref period day 14-41 post dose 2). OR for symptomatic disease.

							 OR against hospitalization or death 

83	UK HSA (December 24, 2021) (update of Andrews et al publication)	UK	General population	Delta, **Omicron**	Comirnaty ChAdOx1 mRNA-1273	November 27-December 17, 2021	 *Numbers were too low to estimate booster vaccine effectiveness amongst recipients of a primary course of the Moderna vaccine.

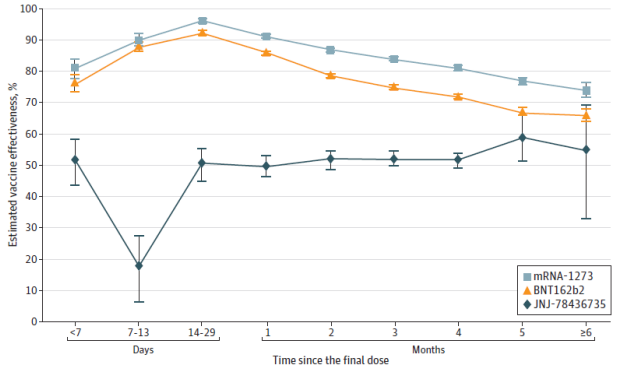
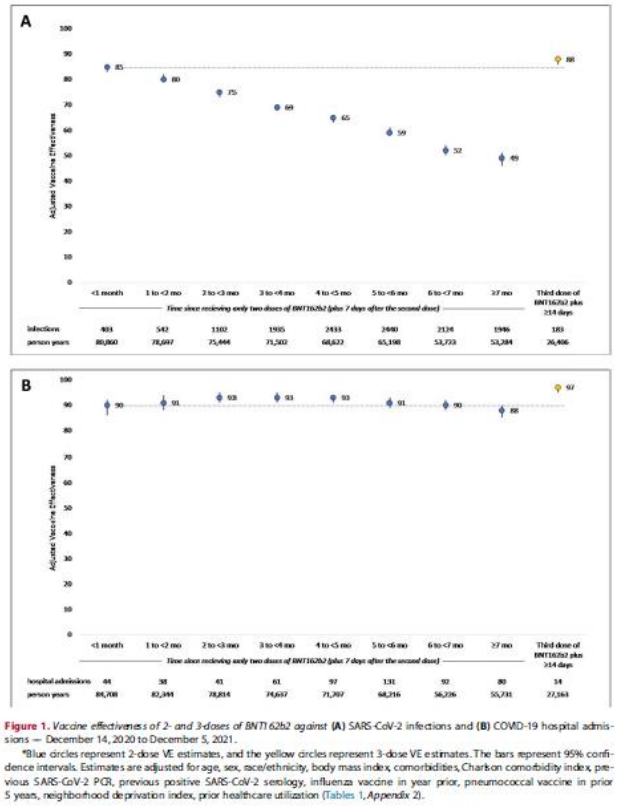
82	Tabak et al (December 22, 2021)	USA	18+ year olds	NonVOC, Alpha, Delta	Comirnaty mRNA-1273 Ad26.COV2.S	May 1-August 7, 2021	TND study on patients presenting to CVS with symptoms for testing. (final dose in primary series) Figure 2. Multivariable Adjusted Estimated Vaccine Effectiveness Against SARS-CoV-2 Infection and 95% CIs 
81	Kissling et al (December 22, 2021)	8 European countries	30+ years	Delta	Comirnaty mRNA-1273 ChAdOx1 Ad26.COV2.S	July-August 2021	TND study in primary care sites evaluating VE against symptomatic disease

							Table 3: Effectiveness of complete COVID-19 vaccination among participants in the primary care and community I-MOVE-COVID-19 and ECDC VE study, by time since vaccination and vaccine product, Europe, July–August 2021
80	Tartof et al (December 21, 2021) (updated February 14, 2022)	USA	3 million Kaiser Permanente members, 18+ years	Non-VOC, Alpha, Delta,	Comirnaty	December 14, 2020-December 5, 2021	Cohort study looking at booster dose VE and duration of protection of 2 doses. Manuscript has stratification by age group and immunocompromised status, with similar patterns as seen below though immunocompromised has a trend towards more waning against hospitalization but not significant.

Analysis by time since vaccination			
Brand, age group and time since vaccination	Cases / controls	Crude VE (95% CI)[a]	Adjusted VE (95% CI)[b]
Comirnaty, age 30–59 years[c]			
Unvaccinated	1045/1684		
Vaccinated 14–29 days	123/1287	87 (84–89)	87 (83–89)
Vaccinated 30–59 days	261/1584	75 (71–79)	76 (72–81)
Vaccinated 60–89 days	60/335	70 (59–78)	72 (61–80)
Vaccinated ≥90 days	151/647	66 (58–72)	65 (56–71)
Comirnaty, age 60+ years[c]			
Unvaccinated	74/161		
Vaccinated 14–29 days	2/30	-	-
Vaccinated 30–59 days	32/425	67 (42–81)	65 (37–80)
Vaccinated 60–89 days	146/951	65 (49–76)	66 (48–78)
Vaccinated ≥90 days	192/1159	66 (51–76)	64 (44–77)
Vaxzevria, age 30–59 years[d]			
Unvaccinated	990/1655		
Vaccinated 14–29 days	21/107	71 (52–83)	72 (52–83)
Vaccinated 30–59 days	79/320	67 (56–75)	67 (57–75)
Vaccinated 60–89 days	42/162	64 (47–76)	65 (48–76)
Vaccinated ≥90 days	9/50	-	-
Spikevax, age 30–59 years[e]			
Unvaccinated	1033/1672		
Vaccinated 14–29 days	2/180	98 (92–100)	98 (93–100)
Vaccinated 30–59 days	19/285	91 (85–94)	91 (85–95)
Vaccinated 60–89 days	6/98	89 (75–96)	90 (76–96)
Vaccinated ≥90 days	11/33	-	-
Janssen, age 30–59 years[f]			
Unvaccinated	919/1578		
Vaccinated 14–29 days	19/61	-	-
Vaccinated 30–59 days	123/338	46 (32–57)	50 (36–62)
Vaccinated 60–89 days	70/205	45 (26–60)	52 (33–66)
Vaccinated ≥90 days	5/17	-	-

							
79	Katikireddi et al (December 20, 2021)	Scotland and Brazil	≥18 year old general population	Scotland: Delta Brazil: Gamma/Delta	ChAdOx1	Scotland: May 19-October 25, 2021 Brazil: January 18-October 25, 2021	Scotland: administrative database linkage study Brazil: evaluated VE by comparing fully vaccinated persons at day 0-13 and persons 14+ days post dose 2.

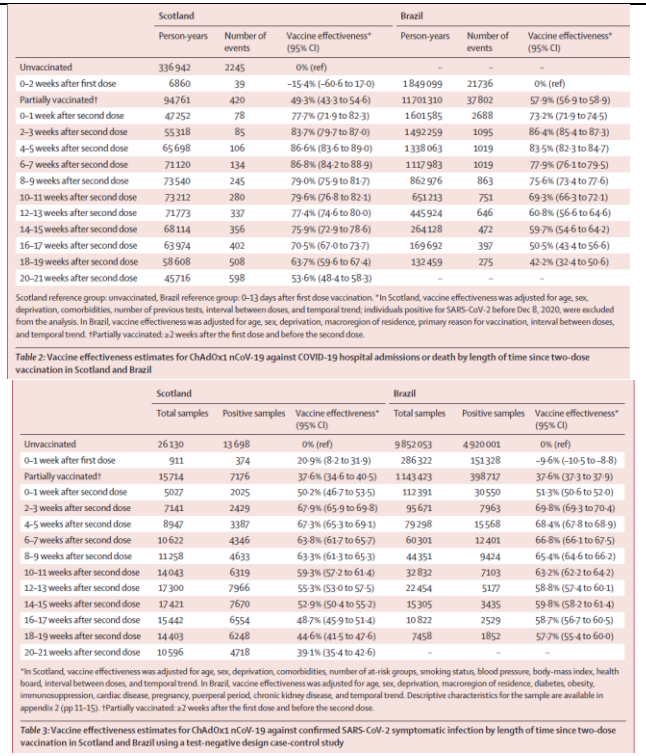
							
78	Abu-Raddad et al (December 16, 2021 *Updated January 26,2022)*	Qatar	General population	AlphaàBetaàDelta	mRNA-1273	January 1 and December 5, 2021	TND study linking adminsitrative databases.

Table 2: Vaccine effectiveness estimates for ChAdOx1 nCoV-19 against COVID-19 hospital admissions or death by length of time since two-dose vaccination in Scotland and Brazil

	Scotland			Brazil		
	Person-years	Number of events	Vaccine effectiveness* (95% CI)	Person-years	Number of events	Vaccine effectiveness* (95% CI)
Unvaccinated	336 942	2245	0% (ref)	..	..	..
0–2 weeks after first dose	6860	39	−15·4% (−60·6 to 17·0)	1 849 099	21 736	0% (ref)
Partially vaccinated†	94 761	420	49·3% (43·3 to 54·6)	11 701 310	37 802	57·9% (56·9 to 58·9)
0–1 week after second dose	47 252	78	77·7% (71·9 to 82·3)	1 601 585	2688	73·2% (71·9 to 74·5)
2–3 weeks after second dose	55 318	85	83·7% (79·7 to 87·0)	1 492 259	1095	86·4% (85·4 to 87·3)
4–5 weeks after second dose	65 698	106	86·6% (83·6 to 89·0)	1 338 063	1019	83·5% (82·3 to 84·7)
6–7 weeks after second dose	71 120	134	86·8% (84·2 to 88·9)	1 117 983	1019	77·9% (76·1 to 79·5)
8–9 weeks after second dose	73 540	245	79·0% (75·9 to 81·7)	862 976	863	75·6% (73·4 to 77·6)
10–11 weeks after second dose	73 212	280	79·6% (76·8 to 82·1)	651 213	751	69·3% (66·3 to 72·1)
12–13 weeks after second dose	71 773	337	77·4% (74·6 to 80·0)	445 924	646	60·8% (56·6 to 64·6)
14–15 weeks after second dose	68 114	356	75·9% (72·9 to 78·6)	264 128	472	59·7% (54·6 to 64·2)
16–17 weeks after second dose	63 974	402	70·5% (67·0 to 73·7)	169 692	397	50·5% (43·4 to 56·6)
18–19 weeks after second dose	58 608	508	63·7% (59·6 to 67·4)	132 459	275	42·2% (32·4 to 50·6)
20–21 weeks after second dose	45 716	598	53·6% (48·4 to 58·3)	..	..	..

Scotland reference group: unvaccinated, Brazil reference group: 0–13 days after first dose vaccination. *In Scotland, vaccine effectiveness was adjusted for age, sex, deprivation, comorbidities, number of previous tests, interval between doses, and temporal trend; individuals positive for SARS-CoV-2 before Dec 8, 2020, were excluded from the analysis. In Brazil, vaccine effectiveness was adjusted for age, sex, deprivation, macroregion of residence, primary reason for vaccination, interval between doses, and temporal trend. †Partially vaccinated: ≥2 weeks after the first dose and before the second dose.

Table 3: Vaccine effectiveness estimates for ChAdOx1 nCoV-19 against confirmed SARS-CoV-2 symptomatic infection by length of time since two-dose vaccination in Scotland and Brazil using a test-negative design case-control study

	Scotland			Brazil		
	Total samples	Positive samples	Vaccine effectiveness* (95% CI)	Total samples	Positive samples	Vaccine effectiveness* (95% CI)
Unvaccinated	26 130	13 698	0% (ref)	9 852 053	4 920 001	0% (ref)
0–1 week after first dose	911	374	20·9% (8·2 to 31·9)	286 322	151 328	−9·6% (−10·5 to −8·8)
Partially vaccinated†	15 714	7176	37·6% (34·6 to 40·5)	1 143 423	398 717	37·6% (37·3 to 37·9)
0–1 week after second dose	5027	2025	50·2% (46·7 to 53·5)	112 391	30 550	51·3% (50·6 to 52·0)
2–3 weeks after second dose	7141	2429	67·9% (65·9 to 69·8)	95 671	7963	69·8% (69·3 to 70·4)
4–5 weeks after second dose	8947	3387	67·3% (65·3 to 69·1)	79 298	15 568	68·4% (67·8 to 68·9)
6–7 weeks after second dose	10 622	4346	63·8% (61·7 to 65·7)	60 301	12 401	66·8% (66·1 to 67·5)
8–9 weeks after second dose	11 258	4633	63·3% (61·3 to 65·3)	44 351	9424	65·4% (64·6 to 66·2)
10–11 weeks after second dose	14 043	6319	59·3% (57·2 to 61·4)	32 832	7103	63·2% (62·2 to 64·2)
12–13 weeks after second dose	17 300	7966	55·3% (53·0 to 57·5)	22 454	5177	58·8% (57·4 to 60·1)
14–15 weeks after second dose	17 421	7670	52·9% (50·4 to 55·2)	15 305	3435	59·8% (58·2 to 61·4)
16–17 weeks after second dose	15 442	6554	48·7% (45·9 to 51·4)	10 822	2529	58·7% (56·7 to 60·5)
18–19 weeks after second dose	14 403	6248	44·6% (41·5 to 47·6)	7458	1852	57·7% (55·4 to 60·0)
20–21 weeks after second dose	10 596	4718	39·1% (35·4 to 42·6)	..	..	..

*In Scotland, vaccine effectiveness was adjusted for age, sex, deprivation, comorbidities, number of at-risk groups, smoking status, blood pressure, body-mass index, health board, interval between doses, and temporal trend. In Brazil, vaccine effectiveness was adjusted for age, sex, deprivation, macroregion of residence, diabetes, obesity, immunosuppression, cardiac disease, pregnancy, puerperal period, chronic kidney disease, and temporal trend. Descriptive characteristics for the sample are available in appendix 2 (pp 11–15). †Partially vaccinated: ≥2 weeks after the first dose and before the second dose.

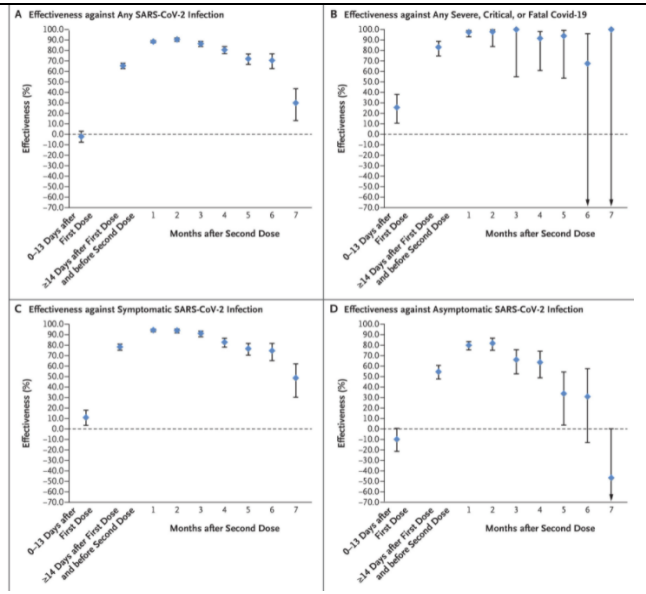
							
77	Young-Xu et al (December 15, 2021)	USA	Male 65+ year old veterans in VA system	NonVOC, Alpha, Delta	Comirnaty mRNA-1273	January-September 2021	Matched case control study

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Table. Change in Estimated Messenger RNA Vaccine Effectiveness Against Laboratory-Confirmed SARS-CoV-2 Infections, January to September 2021
<table>
<tr><th></th><th colspan="3">Adjusted vaccine effectiveness by month from full vaccination, % (95% CI)[a]</th></tr>
<tr><th>Month</th><th>Pre-Delta (January to April)</th><th>Rising Delta (May to June)</th><th>High Delta (July to September)</th></tr>
<tr><td>1</td><td>94.5 (90.7-96.7)</td><td>92.1 (87.2-95.1)</td><td>62.0 (45.6-73.5)</td></tr>
<tr><td>2</td><td>88.5 (86.1-90.5)</td><td>90.6 (87.8-92.7)</td><td>60.9 (51.5-68.4)</td></tr>
<tr><td>3</td><td>87.9 (85.9-89.5)</td><td>87.3 (80.8-91.7)</td><td>57.8 (52.5-62.5)</td></tr>
<tr><td>4</td><td>NA</td><td>86.6 (83.0-89.5)</td><td>38.3 (33.5-42.7)</td></tr>
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<tr><td>7</td><td>NA</td><td>NA</td><td>23.4 (17.3-29.0)</td></tr>
<tr><td>8</td><td>NA</td><td>NA</td><td>24.8 (18.8-30.4)</td></tr>
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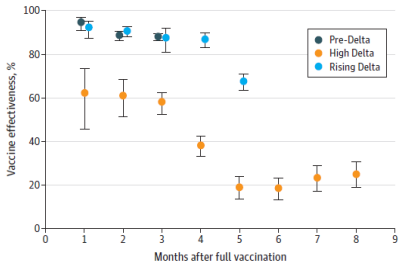
Figure. Estimated Messenger RNA Vaccine Effectiveness Against SARS-CoV-2 Infection by Delta Variant Period, January to September 2021


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<td>76</td>
<td>Machado et al (December 14, 2021)</td>
<td>Portugal</td>
<td>Non-institutionalized 65-<110 year olds</td>
<td>Alpha, Delta</td>
<td>Comirnaty mRNA-1273 ChAdOx1</td>
<td>February 2 (80+) or March 30 (65-79) - August 2021</td>
<td>
Cohort study linking administrative databases.
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<tr><th>timing post dose 2</th><th colspan="2">disease</th><th colspan="2">hospitalization</th><th colspan="2">deaths</th></tr>
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<tr><td>42-69 days</td><td>68 (64-71)</td><td>64 (53-72)</td><td>97 (94-98)</td><td>81 (66-90)</td><td>97 (92-98)</td><td>88 (78-94)</td></tr>
<tr><td>70+ days</td><td></td><td></td><td>93 (86-96)</td><td></td><td>93 (87-96)</td><td></td></tr>
<tr><td>70-97 days</td><td>59 (53-64)</td><td>53 (43-62)</td><td></td><td>74 (60-84)</td><td></td><td>86 (78-91)</td></tr>
<tr><td>98+ days</td><td>39 (29-48)</td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>42-69</td><td>33 (23-42)</td></tr>
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<td>USA</td>
<td>≥18 year olds Kaiser Permanente insured patients</td>
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<td>Cohort study</td>
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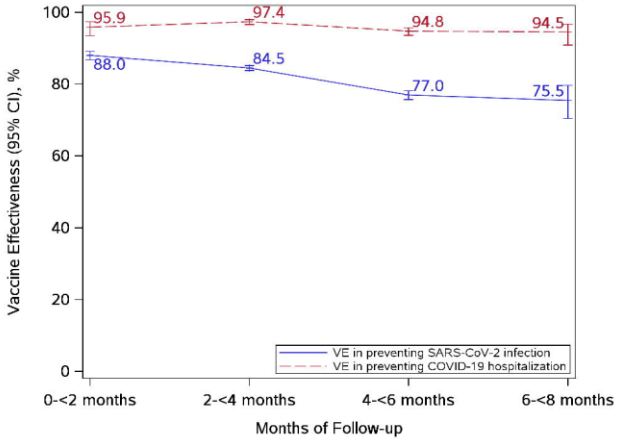
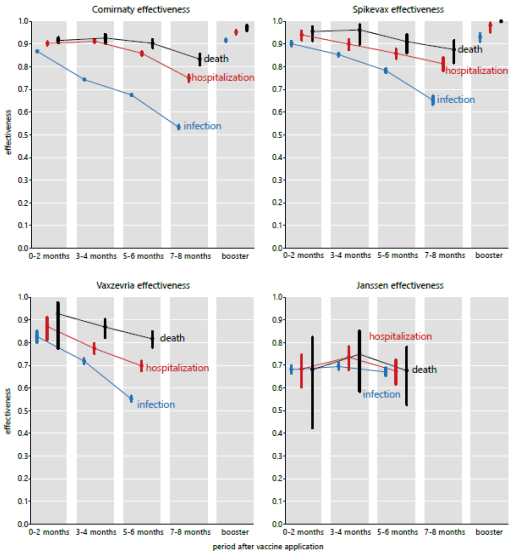
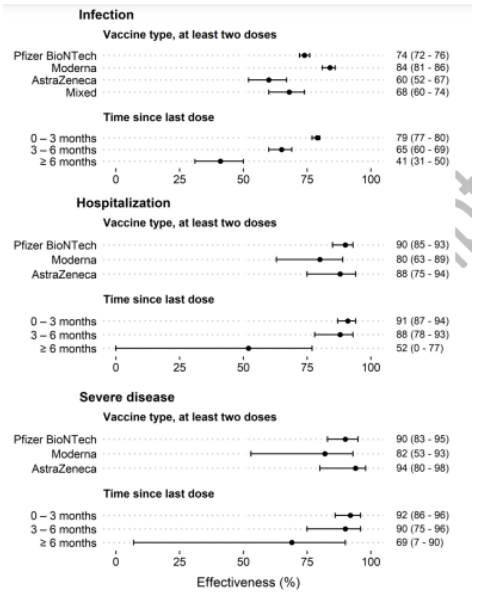
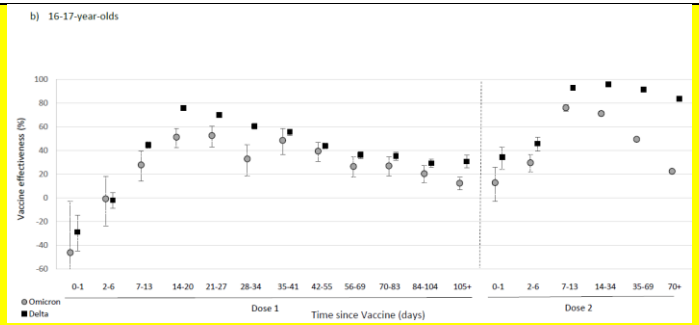
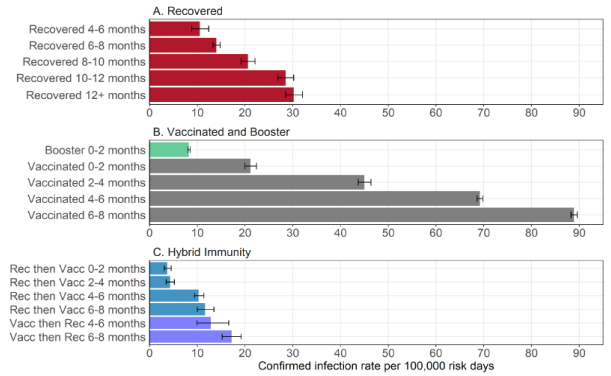
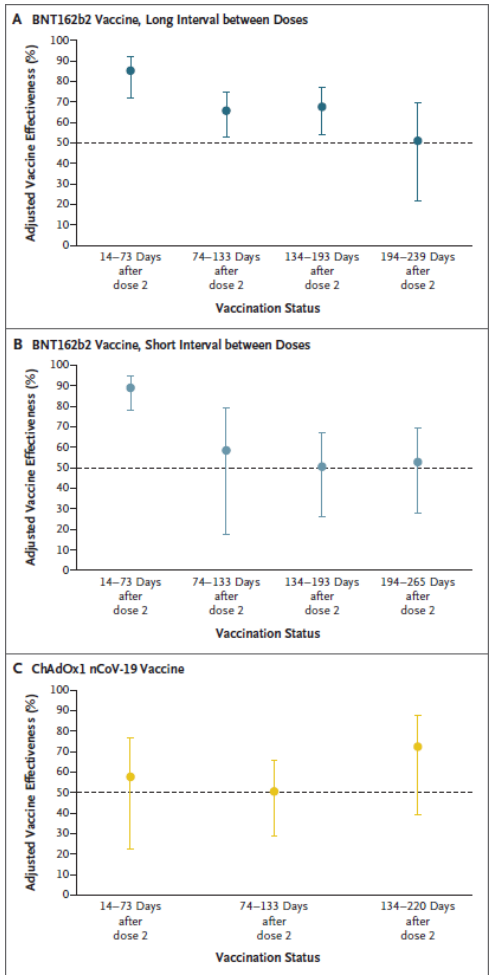
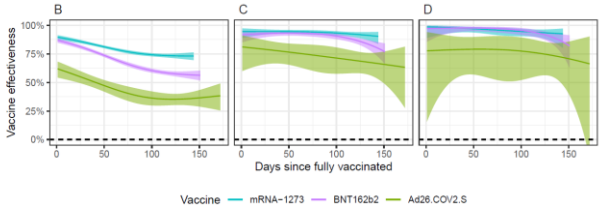
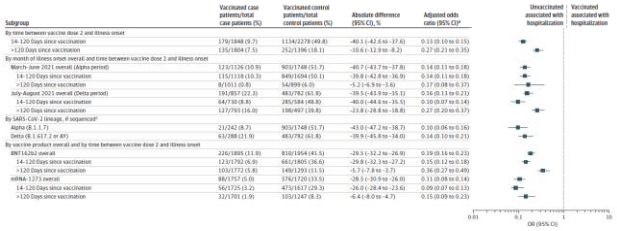
							
73	Berec et al (December 12, 2021)	Czech Republic	General population	Alpha, Delta	Comirnaty mRNA-1273 ChAdOx1 Ad26.COV2.S	December 27, 2020-November 21, 2021	Cohort study of population of Czech Republic using adminsitrative databases, evaluating duraiton of protection of primary and ve of boosted mRNA.  Fig. 2. Vaccine-acquired immunity against infection with respect to the delay from the full vaccine application, including the effect of a booster vaccine dose.

							Table 1. Estimated increase of breakthrough infection hazard ratios (HRs) in times of the SARS-CoV-2 delta variant dominance for age groups having started vaccination in the same month. Vaccine | March (age 70-80y) HR 95% CI | April (age 55-69y) HR 95% CI | May (age 35-54y) HR 95% CI Comirnaty 1.28 1.09-1.52 1.04 0.95-1.14 1.33 1.27-1.40 Spikevax 0.82 0.41-1.67 1.56 1.08-2.25 1.59 1.29-1.98 Vaxzevria 1.64 1.05-2.57 1.12 0.74-1.70 1.24 0.82-1.86 Janssen 2.70 0.37-19.63 0.40 0.20-0.78 0.91 0.34-2.43
72	Bjork et al (December 9, 2021) (Updated March 2, 2022)	Sweden	General population	Alpha, Delta	Comirnaty mRNA-1273 ChAdOx1	March 8-November 7, 2021	Case-control study based on surveillance data, matching on age/sex and no adjustment for other confounders. 
71	Kshirsagar et al (December 9, 2021)	USA	Fully vaccinated persons	NonVOCs, Alpha, Delta	Comirnaty mRNA-1273 Ad26.COV2.S	March 10-October 14, 2021	Cohort study of fully vaccinated persons evaluating risk of reinfection by vaccination. There was an increase in the rate of hospitalization starting ~110-125 days after full vaccination for all three vaccines depending on age group, with a steeper increase for Janssen.
70	Powell et al (February 18, 2022) [Update to December 11, 2021 preprint]	UK	General population with a focus on adolescents	Delta, **Omicron**	Comirnaty	Week 32 (~Aug 15) (16-17yo) and Week 37 (12-15 yo)	TND study among adolescents against symptomatic disease

							
69	Bajema et al (December 9, 2021)	USA	Veterans	nonVOCs, Alpha, Delta	Comirnaty mRNA-1273	February 1–September 30, 2021	TND among 1,896 U.S. veterans. Adjusted VE against hospitalization 14–119 days following 2nd dose of Moderna vaccine dose was 89.6% (95% CI = 80.1%–94.5%) and after the 2nd Pfizer-BioNTech dose was 86.0% (95% CI = 77.6%–91.3%); at ≥120 days VE was 86.1% (95% CI = 77.7%–91.3%) for Moderna and 75.1% (95% CI = 64.6%–82.4%) for Pfizer-BioNTech.
67	Goldberg et al (December 5, 2021)	Israel	General population	Delta	Comirnaty	August 1-September 31, 2021	Analysis of surveillance data comparing the following groups: Recovered: Previously infected individuals 90 or more days after confirmed infection who had never been vaccinated; Recovered then Vaccinated: Previously infected individuals who later were 7 or more days after receiving a single vaccine dose; Vaccinated then Recovered: Individuals who had been vaccinated with one or two doses and were later infected; Vaccinated: Individuals seven days or more after receiving the second dose, and who had not been infected before the start of the study period; Booster: Individuals who received a third (booster) dose 12 or more days previously and had not been infected before the start of the study period.  *Figure 3: Estimated covariate-adjusted rates of confirmed infections per 100,000 at-risk days obtained from the Poisson regression analysis for the study period August 1, 2021, to September 30, 2021, stratified by sub-cohorts. Confidence intervals are not adjusted for multiplicity.*

64	Hall et al* (February 16, 2022) *[Update to (December 1, 2021 preprint]*	UK	18+ year HCWs	AlphaàDelta	Comirnaty AZD2222	December 7, 2020-September 21, 2021	Cohort study of HCWs looking a VE against infection over time in those with and without prior infection. Pfizer long interval is doses separated by ≥6 weeks; short interval by <6 weeks 
2	Israel et al (November 25, 2021)	Israel	18+ years	Delta	Comirnaty	May 15-September 17, 2021	Test-negative design case control using administrative database of Leumit Health Services among 2-dose vaccine recipients. Compared with the initial 90 days after the vaccine, they found an increased risk of infection with time elapsed since vaccination.

	(updated with results from publication, see ref 2 below)						**Table 4 | Adjusted odds ratios for risk of SARS-CoV-2 in matched cohort** Time since second vaccine (days): — Adjusted odds ratio (95% CI) — P value 21-89 — Reference — — 90-119 — 2.37 (1.67 to 3.36) — <0.001 120-149 — 2.66 (1.94 to 3.66) — <0.001 150-179 — 2.82 (2.07 to 3.84) — <0.001 ≥180 — 2.82 (2.07 to 3.85) — <0.001 Age (continuous in years) — 1.01 (1.00 to 1.01) — 0.008 Male sex — 1.05 (0.99 to 1.11) — 0.08 Socioeconomic status (continuous 1-20) — 0.97 (0.96 to 0.98) — <0.001 Based on a conditional regression model fitted in a cohort matched for week of testing, age category (<18-39, 40-59, ≥60 years), and demographic group.
63	Irizarry et al (November 19, 2021)	USA (Puerto Rico)	12+ years	Predelta and delta	Comirnaty mRNA-1273 Ad26.COV2.S	December 15, 2020-October 15, 2021	Analysis of surveillance data linked to immunization registry data. VE against B) Infection c) Hospitalizations D) death by time since 2 weeks post complete series completion. Shading represents 99% CI. 
61	Andrews et al (November 15, 2021)	UK	50+	Delta	Comirnaty AZD2222	September 13-November 1, 2021	TND booster dose study that also calculated the VE of a 2nd dose >140 days after receipt of the 2nd dose. VE against symptomatic diseaes for two doses of ChAdOx1-S and BNT162b2 ≥20 weeks after being given were 44.1% (41.9 to 46.1) and 62.5% (61.0 to 63.9), respectively.
59	Tenforde et al (November 4, 2021)	USA	Hospitalized patients	Mix, alpha, and delta	Comirnaty mRNA-1273	March 11-August 15, 2021	Case-control study among hospitalized patients. When the mRNA-1273 and BNT162b2 vaccines were compared, estimated vaccine effectiveness was similar within 120 days of vaccination. In contrast, beyond 120 days, the results corresponded to an estimated effectiveness of 85% for the mRNA-1273 and 64% for the BNT162b2 vaccine to prevent COVID-19 hospitalizations. 
58	Poukka et al (November 4, 2021)	Finland	16-69 year old HCWs	Mix and delta	Comirnaty mRNA-1273 AZD2222 heterologous	December 27,2020-August 26 (infection) October 26 (hospitalization), 2021	HCW cohort study based on registries. No difference seen between delta and pre-delta periods. VE against infection

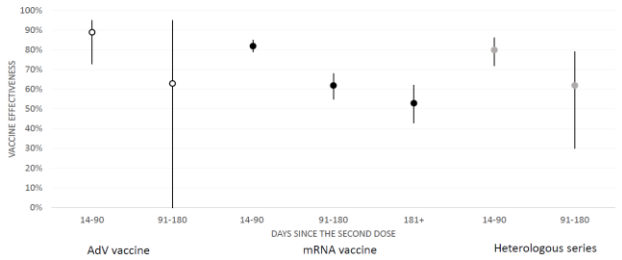
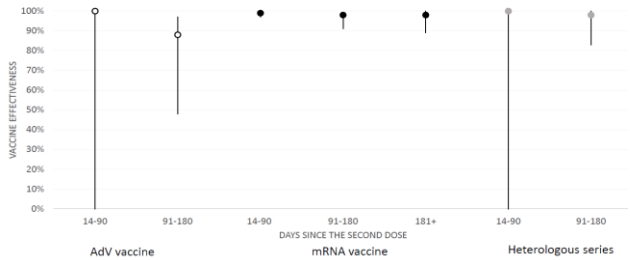
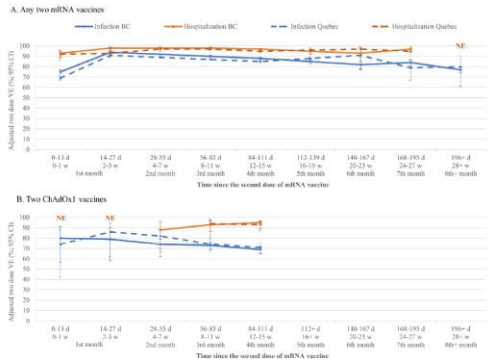
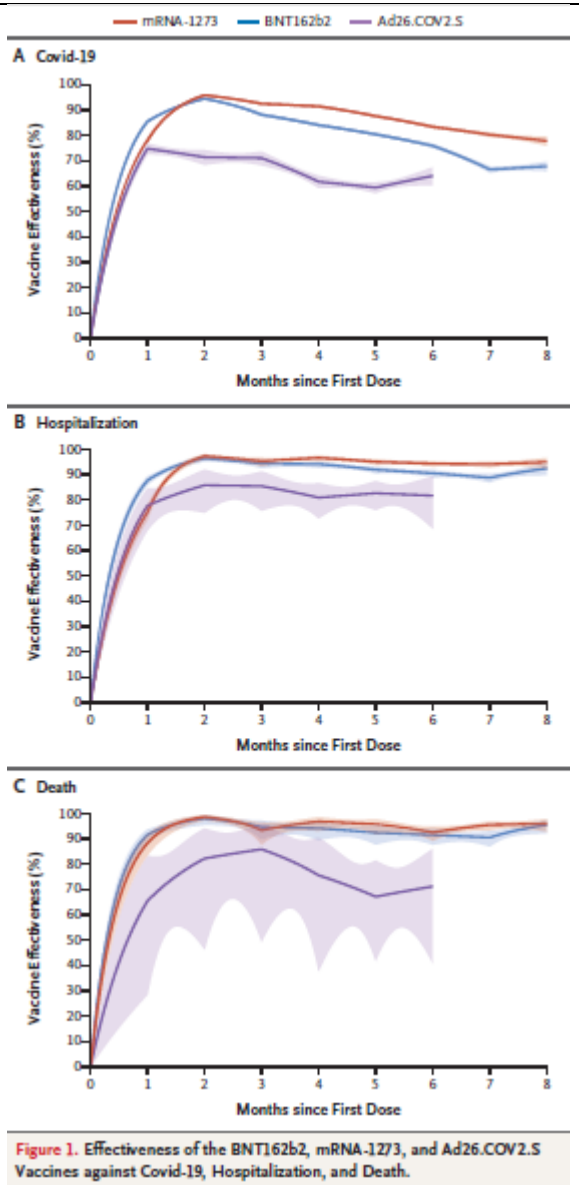
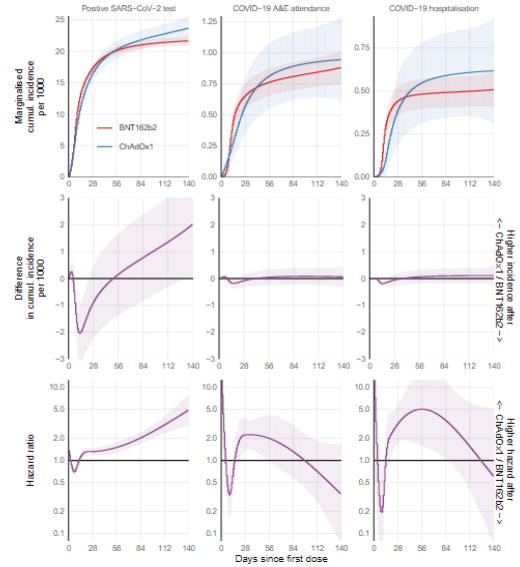
							 VE against hospitalization 
56	Skowronski et al (October 26, 2021)	Canada	General population	Alpha, Gamma, Delta	AZD1222 Comirnaty mRNA-1273 And heterologous schedules of the above	May 30-Oct 2, 2021	TND study in BC and Quebec. In both provinces, two-dose mRNA VE ≥95% against hospitalization was maintained through the seventh month post-vaccination. Two-dose mRNA VE against any infections peaked above 90% at 2–3 weeks post-vaccination, but remained about 80% or more through the eighth month. Given greater sample size, findings are most robust for BNT162b2 with similar pattern for mRNA-1273 and mixed mRNA or ChAdOx1/mRNA recipients, recognizing limited follow-up beyond the fourth or fifth month. For homologous two-dose ChAdOx1 recipients, VE ≥70% was also maintained for at least the fourth month post-vaccination. There was no indication of greater decline in two-dose protection against Delta. Among adults ≥70-years-old, mRNA VE was ≥80% against infection and ≥90% against hospitalization to at least the fifth month.

							Figure 3. Adjusted two-dose vaccine effectiveness against infection and hospitalization, by time since vaccination, mRNA and ChAdOx1 vaccines, ≥18-year-olds, British Columbia and Quebec, Canada 
55	Lin et al (October 26, 2021) *[updated with final publication on January 12, 2022}*	USA	General population	multiple	Comirnaty mRNA-1273 Ad26.COV2.S	December 13, 2020-Sept 8, 2021	Administrative database cohort study in North Carolina. For Pfizer two-dose,VE peaks at 94.5% (95% CI, 94.1 to 94.9) at 2 months (post the first dose). VE starts to decline after 2 months and drops to 66.6% (95% CI, 65.2 to 67.8) at 7 months. For Moderna two-dose,VE peaks at 95.9% (95% CI, 95.5 to 96.2) at 2 months. Effectiveness started to decline after 2 months and was maintained at 80.3% (95% CI, 79.3 to 81.2) at 7 months. For the Janssen one-dose regimen, vaccine effectiveness ramps to a peak level of 74.8% (95% CI, 72.5 to 76.9) at 1 month. Effectiveness started to decline after 1 month and decreased to 59.4% (95% CI, 57.2 to 61.5) at 5 months.

							 Figure 1. Effectiveness of the BNT162b2, mRNA-1273, and Ad26.COV2.S Vaccines against Covid-19, Hospitalization, and Death.

54	Nordstrom et al (October 25, 2021) *[Updated February 4, 2022}*	Sweden	General population	Alpha, Delta,	AZD1222 Comirnaty mRNA-1273 And AZD1222à mRNA-1273	January 12-October 4, 2021	National cohort study based on database linkage. Vaccine effectiveness of BNT162b2 against infection waned progressively from 92% (95% CI, 92-93, P<0·001) at day 15-30 to 47% (95% CI, 39-55, P<0·001) at day 121-180, and from day 211 and onwards no effectiveness could be detected (23%; 95% CI, -2-41, P=0·07). The effectiveness waned slightly slower for mRNA-1273, being estimated to 59% (95% CI, 18-79) from day 181 and onwards. In contrast, effectiveness of ChAdOx1 nCoV-19 was generally lower and waned faster, with no effectiveness detected from day 121 and onwards (-19%, 95% CI, -97-28), whereas effectiveness from heterologous ChAdOx1 nCoV-19 / mRNA was maintained from 121 days and onwards (66%; 95% CI, 41-80). Overall, vaccine effectiveness was lower and waned faster among men and older individuals. For the outcome severe Covid-19, effectiveness waned from 89% (95% CI, 82-93, P<0·001) at day 15-30 to 42% (95% CI, -35-75, P=0·21) from day 181 and onwards, with sensitivity analyses showing notable waning among men, older frail individuals, and individuals with comorbidities.
52	Hulme et al (October 18, 2021)	UK	HCW	Alpha, delta	Comirnaty AZD1222	January 4-June 13	Comparative VE Cohort study of HCWs based on linking databases who were vaccinated with AZD1222 or Comirnaty between January 4-February 28, 2021 who were followed for 20 weeks. **Figure 2: Comparative effectiveness** For each outcome based on the fully adjusted model, the marginal cumulative incidence for ChAdOx1 and BNT162b2, their difference, and the hazard ratio are shown. Models that assumed piecewise-constant hazards gave similar effect estimates (supplementary Figure S2). The models with less extensive confounder adjustment gave very similar estimates (supplementary Figure S1) suggesting that recipients of each vaccine were similar after accounting for differences in vaccine allocation over space and time (as did all models). 
51	Robles-Fontan et al	USA (Puerto Rico)	General population	Multiple, with delta time frame analysis	Comirnaty mRNA-1273 Ad26.COV2.S	December 15,2020-October 15, 2021	Cohort study of Puerto Rican population.

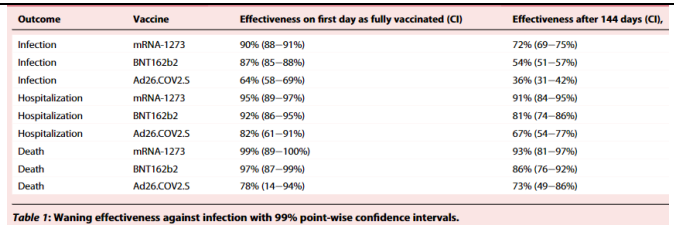
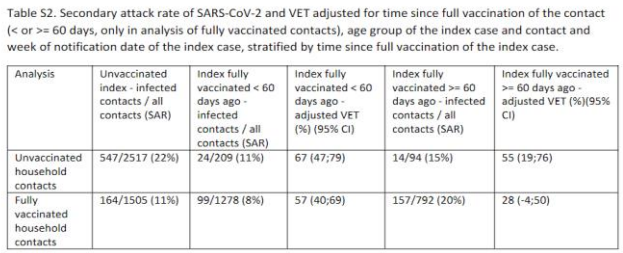
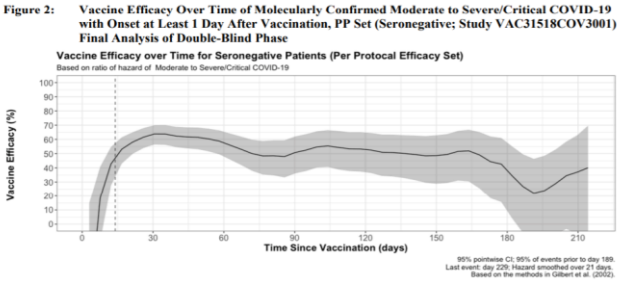
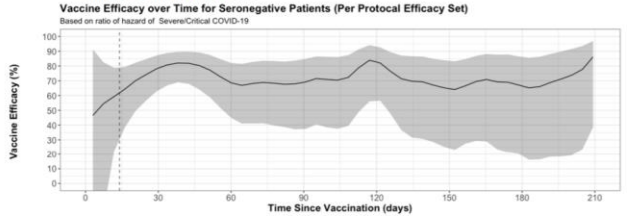
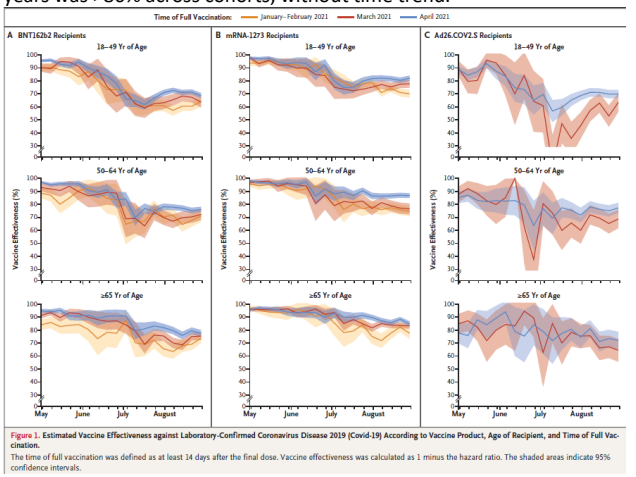
	(October 18, 2021) (updated March 2, 2022)						 **Outcome** / **Vaccine** / **Effectiveness on first day as fully vaccinated (CI)** / **Effectiveness after 144 days (CI),** Infection / mRNA-1273 / 90% (88–91%) / 72% (69–75%) Infection / BNT162b2 / 87% (85–88%) / 54% (51–57%) Infection / Ad26.COV2.S / 64% (58–69%) / 36% (31–42%) Hospitalization / mRNA-1273 / 95% (89–97%) / 91% (84–95%) Hospitalization / BNT162b2 / 92% (86–95%) / 81% (74–86%) Hospitalization / Ad26.COV2.S / 82% (61–91%) / 67% (54–77%) Death / mRNA-1273 / 99% (89–100%) / 93% (81–97%) Death / BNT162b2 / 97% (87–99%) / 86% (76–92%) Death / Ad26.COV2.S / 78% (14–94%) / 73% (49–86%) ***Table 1*: Waning effectiveness against infection with 99% point-wise confidence intervals.**
50	De Gier et al (October 14, 2021)	Netherlands	General population	Delta	Comirnaty mRNA-1273 Ad26.COV2.S AZD1222	August 9-September 24, 2021	Study of unvaccinated and vaccinated index cases and their contacts to evaluate transmission. They did not have sufficent sample size but evaluated if VE against transmission differed by time since vaccination of the index case  Table S2. Secondary attack rate of SARS-CoV-2 and VET adjusted for time since full vaccination of the contact (< or >= 60 days, only in analysis of fully vaccinated contacts), age group of the index case and contact and week of notification date of the index case, stratified by time since full vaccination of the index case. Analysis / Unvaccinated index - infected contacts / all contacts (SAR) / Index fully vaccinated < 60 days ago - infected contacts / all contacts (SAR) / Index fully vaccinated < 60 days ago - adjusted VET (%) (95% CI) / Index fully vaccinated >= 60 days ago - infected contacts / all contacts (SAR) / Index fully vaccinated >= 60 days ago - adjusted VET (%)(95% CI) Unvaccinated household contacts / 547/2517 (22%) / 24/209 (11%) / 67 (47;79) / 14/94 (15%) / 55 (19;76) Fully vaccinated household contacts / 164/1505 (11%) / 99/1278 (8%) / 57 (40;69) / 157/792 (20%) / 28 (-4;50)
49	Janssen Briefing document for US FDA (October 14, 2021)	multiple	General population	Multiple	Ad26.COV2.S	September 21, 2020-July 9, 2021	Final results from RCT  **Figure 2: Vaccine Efficacy Over Time of Molecularly Confirmed Moderate to Severe/Critical COVID-19 with Onset at Least 1 Day After Vaccination, PP Set (Seronegative; Study VAC31518COV3001) Final Analysis of Double-Blind Phase** **Vaccine Efficacy over Time for Seronegative Patients (Per Protocol Efficacy Set)** Based on ratio of hazard of Moderate to Severe/Critical COVID-19 Vaccine Efficacy (%) 100 90 80 70 60 50 40 30 20 10 0 0 30 60 90 120 150 180 210 Time Since Vaccination (days) 95% pointwise CI; 95% of events prior to day 189. Last event: day 229; Hazard smoothed over 21 days. Based on the methods in Gilbert et al. (2002).

							Table 3: Vaccine Efficacy of Molecularly Confirmed Moderate to Severe/Critical COVID-19 with Onset at Least 1 Day After Vaccination; Per Protocol Set Final Analysis of Double-Blind Phase Study (VAC31518COV3001) Ad26 5e10 vp: #Cases (N) PY (19577); Placebo: #Cases (N) PY (19608); VE% (95% CI) Analysis set: PP Moderate to severe/critical[a] Day 2 to Day 14: 82 (19577) 748.66; 88 (19608) 749.83; 6.7% (-27.54; 31.77) Day 15 to Day 28: 51 (19400) 1483.44; 184 (19398) 1480.09; 72.3% (62.10; 80.13) Day 29 to Day 56: 119 (19113) 2877.42; 306 (18924) 2837.44; 61.7% (52.46; 69.23) Day 57 to end DB Phase: 314 (17586) 6460.98; 573 (17090) 6158.91; 47.8% (39.95; 54.62) Day 57 to Day 112: 157 (17586) 5040.02; 308 (17090) 4860.10; 50.8% (40.24; 59.70) Day 113 to end DB Phase: 157 (11379) 4900.35; 265 (10572) 4529.34; 45.2% (33.04; 55.34) **Figure 4: Vaccine Efficacy Over Time of Molecularly Confirmed Severe/Critical COVID-19 with Onset at Least 1 Day After Vaccination, PP Set (Seronegative; Study VAC31518COV3001) Final Analysis of Double-Blind Phase** 
48	Rosenberg et al (October 9, 2021) *Updated with final publication on December 1, 2021*	USA	General adult population of New York	Delta for part of study period	Comirnaty mRNA-1273 Ad26.COV2.S	May 1-September 3, 2021	Cohort study based on adminsitrative datbases. Estimated VE for cases declined contemporaneously across age, products, and time-cohorts. VE for hospitalization for adults 18-64 years was >86% across cohorts, without time trend.  Figure 1. Estimated Vaccine Effectiveness against Laboratory-Confirmed Coronavirus Disease 2019 (Covid-19) According to Vaccine Product, Age of Recipient, and Time of Full Vaccination. The time of full vaccination was defined as at least 14 days after the final dose. Vaccine effectiveness was calculated as 1 minus the hazard ratio. The shaded areas indicate 95% confidence intervals.
47	Liu et al	USA	General population of NYC	Alpha, Delta, others	Comirnaty mRNA-1273	January 18-September 21, 2021	Hospital database cohort study. They found that there was an increased incidence rate with the increased time from vaccination, especially 120 days after vaccination.

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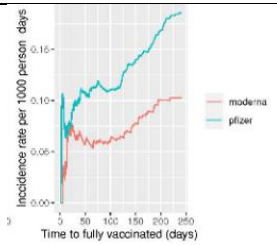

<table>
<tr><th></th><th colspan="3">Pfizer/BNT162b2</th><th colspan="3">Moderna/mRNA-1273</th></tr>
<tr><th>Time to fully vaccination</th><th>Total person-days at risk[3]</th><th>Incidence</th><th>Incident rate / 1000 person-days</th><th>Total person-days at risk</th><th>Incidence</th><th>Incident rate / 1000 person-days</th></tr>
<tr><td>210-240 days</td><td>3074</td><td>6</td><td>1.952</td><td>443</td><td>1</td><td>2.257</td></tr>
<tr><td>180-210 days</td><td>16811</td><td>24</td><td>1.428</td><td>5543</td><td>5</td><td>0.902</td></tr>
<tr><td>150-180 days</td><td>34847</td><td>16</td><td>0.459</td><td>16525</td><td>6</td><td>0.363</td></tr>
<tr><td>120-150 days</td><td>66486</td><td>27</td><td>0.406</td><td>32243</td><td>7</td><td>0.217</td></tr>
<tr><td>90-120 days</td><td>105697</td><td>15</td><td>0.142</td><td>52162</td><td>5</td><td>0.096</td></tr>
<tr><td>60-90 days</td><td>150864</td><td>16</td><td>0.106</td><td>74806</td><td>5</td><td>0.067</td></tr>
<tr><td>30-60 days</td><td>203392</td><td>26</td><td>0.128</td><td>100706</td><td>5</td><td>0.050</td></tr>
<tr><td>0-30 days</td><td>259596</td><td>26</td><td>0.100</td><td>126977</td><td>8</td><td>0.063</td></tr>
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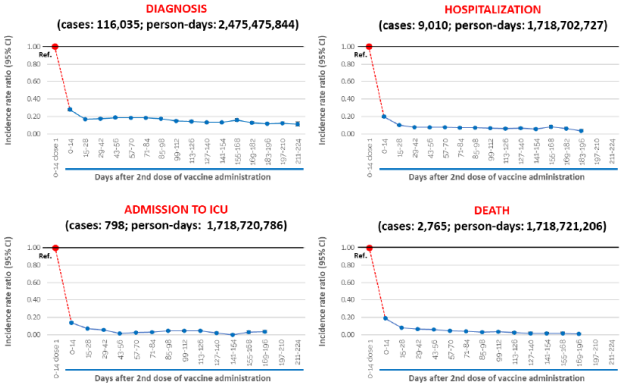
<tr>
<td>46</td>
<td>Italian Instituo Superiore di Sanita (September 30, 2021)</td>
<td>Italy</td>
<td>≥16 year old general population who received at least 1 dose of mRNA vaccine</td>
<td>Alpha, Delta</td>
<td>Comirnaty mRNA-1273</td>
<td>December 27, 2020-August 29, 2021</td>
<td>Compared different time points post vaccination dose 2 to day 0-14 post dose 1. They did not observe a reduction of the protective effect of vaccination, against symptomatic or asymptomatic COVID-19 diagnosis, after about seven months since the 2nd dose (VE 89%), nor against diagnosis with subsequent hospitalization (VE 96%), admission to ICU (VE 96%), or death (VE 99%) after about 6 months. Persons >80+, nursing home residents, persons with comorbidities or immunocompromised did see a decline in VE against infection though confidence intervals are wide for the latter.


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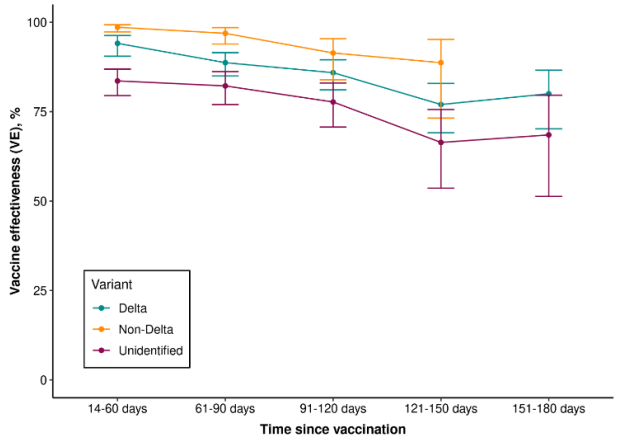
<td>Martinez Bas et al</td>
<td>Spain</td>
<td>≥18 year old general population</td>
<td>Alpha, Delta</td>
<td>Comirnaty mRNA-1273</td>
<td>April 1-August 31, 2021</td>
<td>Cohort study of contacts of cases.</td>
</tr>
</table>

<table>
<tr><td></td><td>(September 30, 2021)</td><td></td><td></td><td></td><td>AZD1222
Ad26.COV2.S</td><td></td><td><table>
<tr><td></td><td colspan="2">Adjust VE (95% CI)</td></tr>
<tr><td></td><td><90 days since last dose</td><td>≥90 days since last dose</td></tr>
<tr><td>unvaccinated</td><td>REF</td><td>REF</td></tr>
<tr><td>1 dose of Janssen</td><td>52 (44-59)</td><td>28 (-8-53)</td></tr>
<tr><td>1 dose of Spikevax</td><td>65 (56-73)</td><td>NA</td></tr>
<tr><td>2 doses of Spikevax</td><td>85(80-88)</td><td>67 (50-78)</td></tr>
<tr><td>1 dose of Comirnaty</td><td>57 (51-61)</td><td>NA</td></tr>
<tr><td>2 doses of Comirnaty</td><td>70 (67-73)</td><td>63 (58-68)</td></tr>
<tr><td>1 dose of Vaxzervia</td><td>40 (31-47)</td><td>52 (37-64)</td></tr>
<tr><td>2 doses of Vaxzervia</td><td>54 (47-60)</td><td>NA</td></tr>
<tr><td>1 dose of Vaxzervia+1 dose of Comirnaty</td><td>85 (69-93)</td><td>NA</td></tr>
</table></td></tr>
<tr><td>44</td><td>Bruxvoort et al (October 1, 2021)</td><td>USA</td><td>General population</td><td>Delta, Alpha+others</td><td>mRNA-1273</td><td>March 1-July 27, 2021</td><td>TND study among persons insured by Kaiser Permante Southern California.
 
</td></tr>
<tr><td>43</td><td>Payne et al (July 21, 2021)</td><td>UK</td><td>HCWs</td><td>Alpha</td><td>Comirnaty</td><td>December 7, 2020-March 12, 2021</td><td>Cohort study of HCWs</td></tr>
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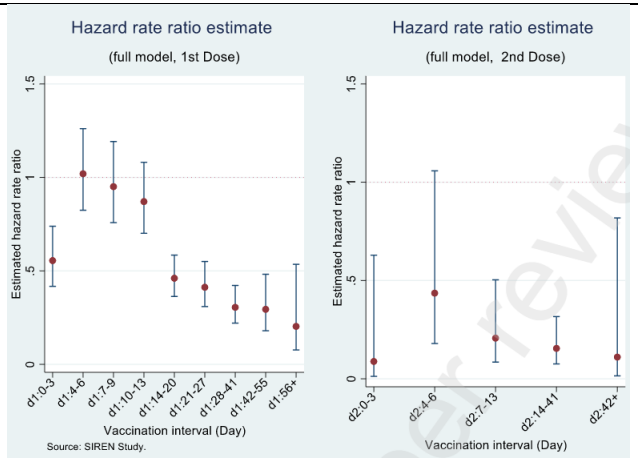
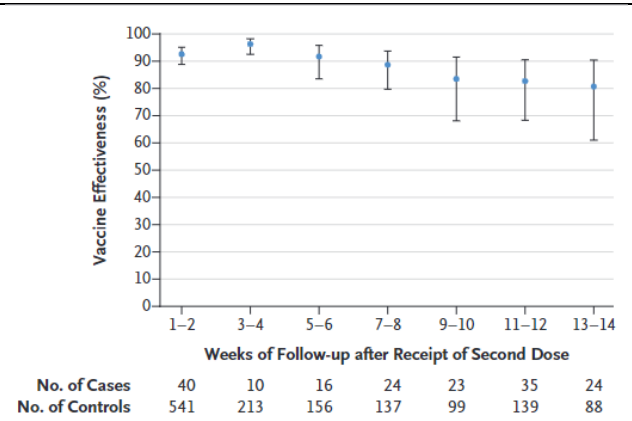
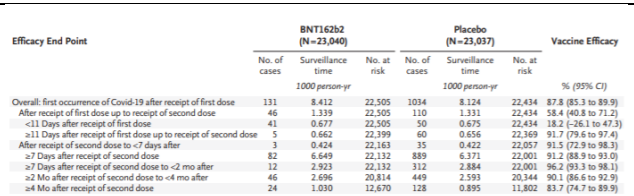
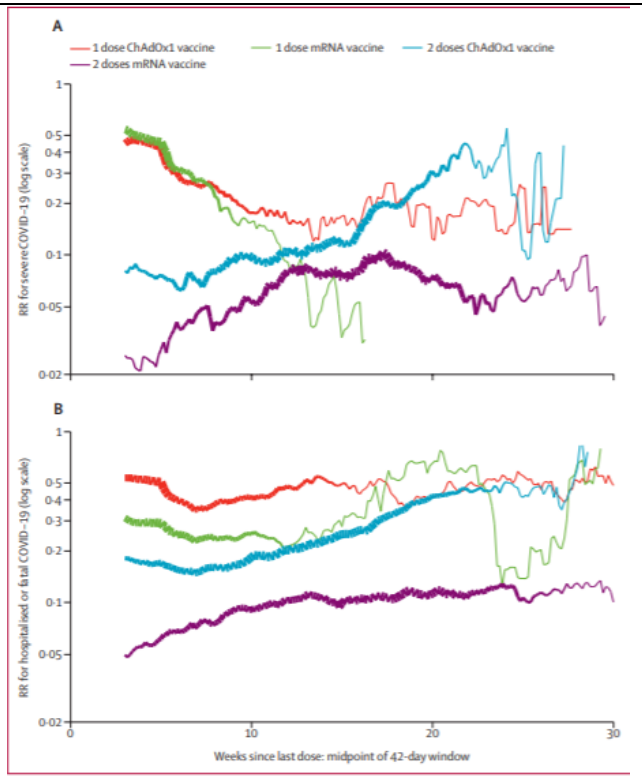
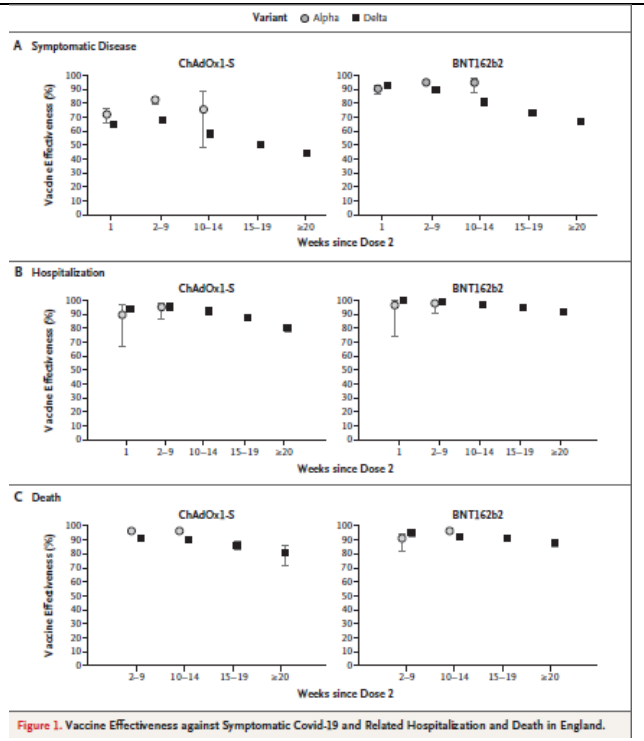
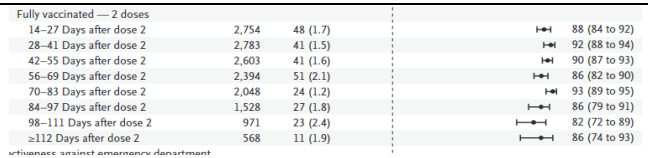
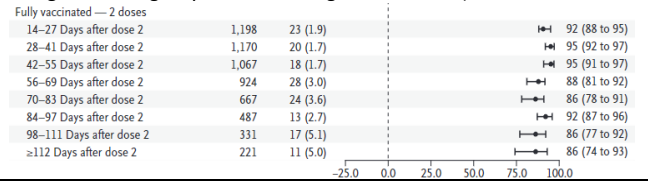
							
41	Eyre et al* (January 5, 2022) *[Update to September 29, 2021 preprint]*	UK	contacts of symptomatic and asymptomatic SARS-CoV-2-infected index cases	Alpha/Delta	Comirnaty AZD1222	January 1-July 31, 2021	Transmission study. Independently of contact vaccination status, for each doubling of weeks since 14 days after second vaccinationin index cases, the odds of a contact testing PCR-positive increased 1.13-fold (95%CI 1.09-1.17) for ChAdOx1 and 1.20-fold (1.10-1.31) for BNT162b2 with no evidence of a difference between vaccines (p=0.19). Higher probabilities of PCR-positive results in contacts 14 days after second vaccination for Delta vs. Alpha meant that by 12 weeks post second ChAdOx1 dose there was no evidence that onward Delta transmission rates differed between those not vaccinated and those having received two ChAdOx1dosesand the impact of BNT162b2had also attenuatedsubstantially
40	Nunes et al (September 23, 2021)	Portugal	Cohort of 80-109 year olds	Multiple	Comirnaty mRNA-1273	February 2-August 13, 2021	Cohort study done by linking adminsitrative records. VE against hospitalization in persons ≥ 98 days post dose 2 was 89% (71–96) compared to 14-41 days post dose 2 was 81% (64–91). VE against COVID-19-related deaths in persons ≥ 98 days post dose 2 was 74% (60–83) compared to 14-41 days post dose 2 was 86% (68–93). Neither were statisically different. Outcome by vaccine status / Person-years / Events (n) / Rate / Rate ratio / 95% CI / Confounder-adjusted HR / 95% CI / VE / 95% CI Hospitalisation 14 to 41 days: 32,505 / 10 / 0.31 / 0.03 / 0.01–0.05 / 0.18 / 0.09–0.36 / 82 / 64–91 42 to 69 days: 32,059 / 11 / 0.34 / 0.03 / 0.02–0.05 / 0.19 / 0.09–0.39 / 81 / 61–91 70 to 97 days: 31,161 / 16 / 0.51 / 0.04 / 0.03–0.07 / 0.22 / 0.12–0.43 / 78 / 57–88 ≥98 days: 33,321 / 6 / 0.18 / 0.02 / 0.01–0.03 / 0.11 / 0.04–0.29 / 89 / 71–96 Death 14–41 days: 32,506 / 7 / 0.22 / 0.02 / 0.01–0.05 / 0.14 / 0.07–0.32 / 86 / 68–93 42–69 days: 32,062 / 13 / 0.41 / 0.05 / 0.03–0.08 / 0.16 / 0.09–0.30 / 84 / 70–91 70–97 days: 31,164 / 20 / 0.64 / 0.07 / 0.05–0.11 / 0.13 / 0.08–0.23 / 87 / 77–92 ≥98 days: 33,326 / 51 / 1.53 / 0.17 / 0.13–0.22 / 0.26 / 0.17–0.40 / 74 / 60–83
37	Pilishvili et al (September 22, 2021)	USA	HCW	Multiple	Comirnaty mRNA-1273	December 28-May 19, 2021	TND case control among HCWs evaluated VE every 2 weeks for 14 weeks.

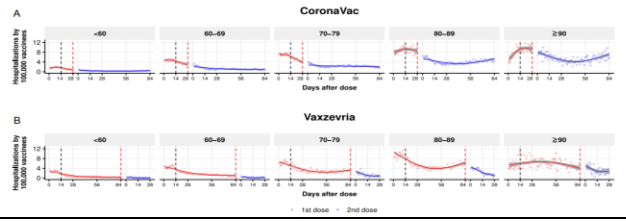
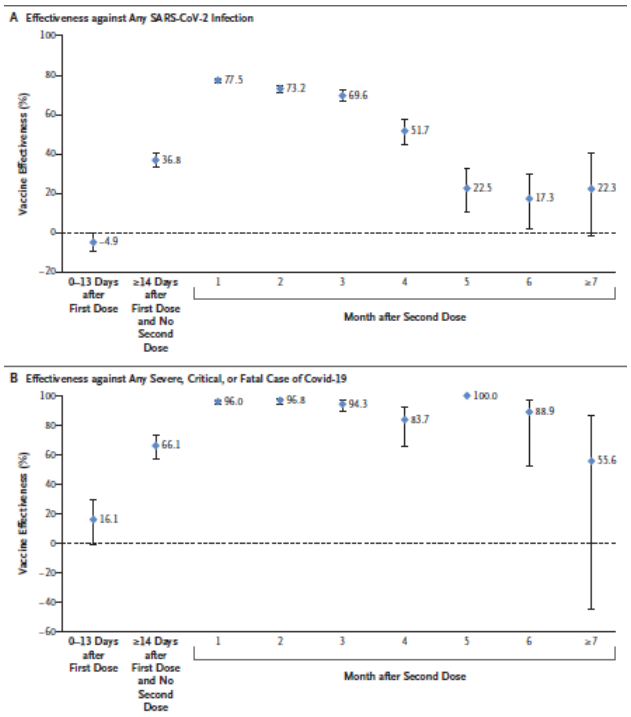
							
36	El Sahly et al (September 22, 2021)	USA	RCT participants	Multiple	mRNA-1273	July 27, 2020-March 26, 2021	Findings from the double blinded placebo controlled RCT. VE against disease was similar at 2 weeks-<2 months (91.8%), 2 months-<4 months (94%), and ≥4 months (92.4%) post dose 2
35	Baden et al (September 22, 2021)	USA	≥18-year-old RCT participants	Delta	mRNA-1273	July 1-August 27, 2021	RCT participants were followed after unblinding. Initial vaccine recipients (mRNA-1273e) were vaccinated between 7/27/20-12/16/20 while those vaccinated after unblinding (mRNA-1273p) were vaccianted between 12/29/20-4/30/21. Median follow-up times from the first dose were 13 months in the mRNA-1273e (including double-blind and open-label phases) and 7.9 months in the mRNA-1273p (only open-label phase) groups. While there was a significant difference in disease incidence rates between the groups, there was no difference in severe disease incidence rates though numbers are small. mRNA-1273e N=14746 / mRNA-1273p* N=11431 / mRNA-1273p vs mRNA-1273e Covid-19 Cases†: Cases n; Person-yr; Rate/1000 Person-yr; Cases n; Person-yr; Rate/1000 Person-yr; Reduction of observed incidence rate % (95% CI) All cases: 162; 2102; 77.1; 88; 1796; 49.0; 36.4 (17.1-51.5) ≥18-<65 yr: 136; 1558; 87.3; 68; 1289; 52.8; 39.6 (18.6-55.5) ≥65 yr: 26; 544; 47.8; 20; 507; 39.5; 17.4 (-53.9-56.3) Severe: 13; 2102; 6.2; 6; 1796; 3.3; 46.0 (-52.4-83.2) ≥18-<65 yr: 7; 1558; 4.5; 4; 1289; 3.1; 30.9 (-171.7- 85.2) ≥65 yr: 6; 544; 11.0; 2; 507; 3.9; 64.2 (-100.2-96.5)
34	Hagan et al (September 21, 2021)	USA	Incarcerated persons	Delta	Comirnaty mRNA-1273 Ad26.COV2.S	July 11-August 14, 2021	Outbreak investigation in a prison found that the attack rate among fully vaccinated persons was significantly higher in those vaccinated 4-6 months ago (89%) compared to those vaccinated 2 weeks-2 months ago (61%). This was combined for 3 vaccines used in the population.
33	Thomas et al (September 15, 2021)	Multiple	≥12-year-old RCT participants	Multiple	Comirnaty	July 27, 2020-March 13, 2021	Findings from the double blinded placebo controlled RCT. VE against disease was 96.2% (93.3-98.1) at 7 days-<2 months, 90.1% (86.6-92.9) at 2 months-<4 months, and 83.7% (74.7-89.9) at ≥4 months post dose 2.

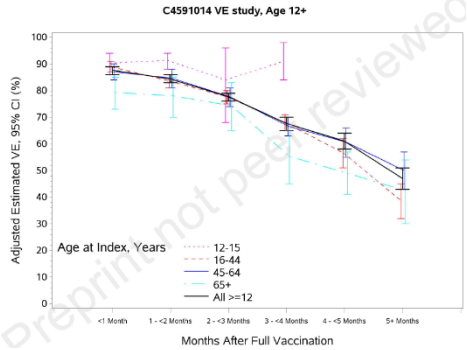
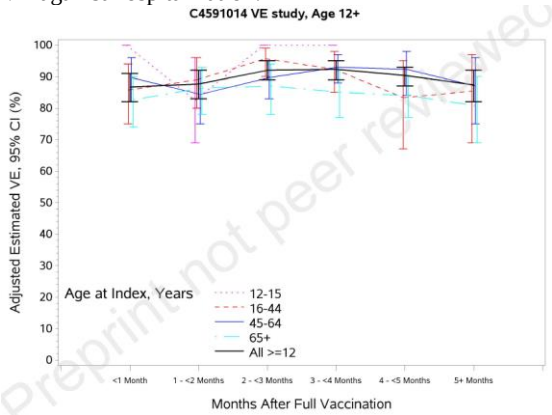
							
32	Pfizer (September 17, 2021)	Multiple	≥16-year-old RCT participants	Delta	Comirnaty	July 1-August 31, 2021	RCT participants were evaluated for duration of protection against symptomatic disease, with the original placebo recipients receiving the vaccine after unblinding. The mean time from Dose 2 of Comirnaty to 01 July 2021 was approximately 5 months for the crossover group and 10 months for the original group. There was a 26.3% (7.4%- 41.4%) relative vaccine efficacy for the group vaccinated later (crossover group) compared to the group vaccinated earlier (original group), with a difference in incidence rates of -18.6 per 1000 person-years of follow-up.
31	de Gier et al (September 17, 2021)	Netherlands	Hospitalized patients	Delta (just for duration of protection)	Comirnaty mRNA-1273 Ad26.COV2.S AZD1222	July 4-August 29, 2021 (just for duration of protection)	Incidence rate ratios were calculated based on national coverage and vaccination status of hospitalized cases. All 4 vaccines were combined in calculating the VE by time since vacciantion, and VE was only calculated during the delta dominant period when 99% of sequenced isolates were delta. No drop in VE against hospitalization nor in VE against ICU admission was seen between those vaccinated up to 20 weeks since full vacciantion among 15-49, 50-69, ≥70 year olds.
30	Self et al (September 17, 2021)	USA	≥18 years who were hospitalized at 21 U.S. hospitals across 18 states	Alpha, Delta, Non-VOC	Comirnaty mRNA-1273 Ad26.COV2.S	March 11–August 15, 2021	This case-control study found that the for mRNA-1273 vaccine, there was no difference in VE against hospitalization among those were 14-120 days post full vaccination and those who were >120 days post full vaccination. For Comirnaty, VE against hopsitalization was 91% (88-93) for those 14-120 days post full vaccination while it was 77% (67-84) for those >120 das post full vaccination. Ad26.COV2.S did not have enough data to stratify by more than 28 days post full vaccination.
29	Polinski et al (September 12, 2021)	USA	≥18 years of age	Alpha/Delta	Ad26.COV2.S	March 1, 2021-July 31, 2021	Retrospective cohort study used insurance claims data linked to health data sources to evaluate VE of Ad26.COV2.S against COVID-19 diagnosis and hospitalization among vaccinated individuals and matched unvaccinated individuals (matched on age, sex, comorbid-risk, calendar date, location and other risk factors for COVID-19 severity). VE was stable over time up to 152 days after vaccination.
28	McKeigue et al (September 15, 2021) (updated February 25, 2022)	Scotland	Population of Scotland	Alpha/Delta	Comirnaty mRNA-1273 AZD1222	December 1, 2020-September 8, 2021	Matched case-control study (REACT-SCOT) assessed rate ratios over time comparing rate of severe COVID-19 and the rate of hospitalization or death among thoswe full vaccinated with Comirnaty, mRNA-1273, and AZD1222 to unvaccinated persons.

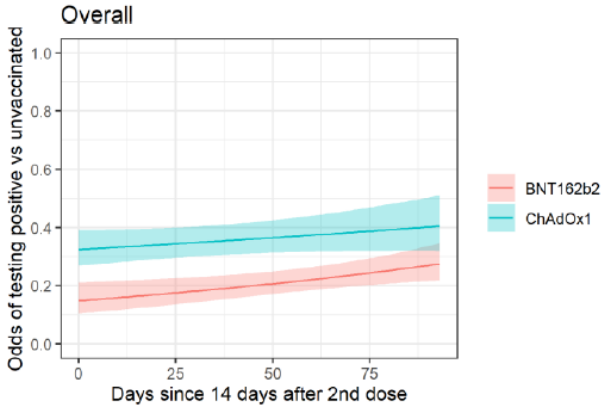
							 ***Figure 2:* Association between vaccine efficacy and time since last vaccine dose** (A) Severe COVID-19. RRs in conditional logistic regression model, adjusted for covariates. (B) Hospitalised or fatal COVID-19 cases. RRs in the 42-day time window centred on 20 weeks from the most recent vaccine dose are presented. The efficacy of vaccination is 1 minus the RR. For each effect, line thickness is proportional to precision (inverse variance) of estimate, scaled to the same maximum thickness for each effect. RR=rate ratio.
27	Bajema et al (September 10, 2021)	USA	Veterans ≥ 18 years	Alpha/Delta	BNT162b2 & mRNA-1273	February 1, 2021-August 6, 2021	Test-negative case-control study of adults hospitalized at 5 Veterans Affairs with COVID-like illness. No difference was found in VE against hospitalization <90 days vs. ≥ 90 days post second dose of BNT162b2 or mRNA-1273: 86.1% (76.5-91.8%) vs. 87.2 (78.2-92.5%).
26	Andrews et al With updated data through August 20th here (September 14, 2021)	UK	Symptomatic cases and test-negative controls 16 years and older	Alpha/Delta	Comirnaty mRNA-1273 AZD1222	December 8, 2020-September 3, 2021	This test-negative case-control study assessed VE of 2 doses of Comirnaty, mRNA-1273, and AZD1222 against symptomatic disease, hospitalization, and death over time separately for Alpha and Delta variants. VE against symptomatic disease peaked in early weeks post 2nd dose and then declined for Comirnaty and mRNA-1273 for both Alpha and Delta. Waning was greater for Delta than Alpha. Only limited waning against hospitalization and death was observed.

	Updated with final publication on January 12, 2022						 Figure 1. Vaccine Effectiveness against Symptomatic Covid-19 and Related Hospitalization and Death in England. Waning was also greater for those 65+ years compared to 40-64 year-olds and in those in a clinical risk group and clinically extremely vulnerable group. Data for mRNA-1273 was only available thorugh 10-14 weeks post 2nd dose for symptomatic disease and shows high VE (85.6%) at 10-14 weeks.
25	Dagan et al (September 9, 2021)	Israel	Pregnant women	Alpha/Delta	Comirnaty	December 20, 2020-June 3, 2021	Cohort study of pregnant women that showed no drop in VE through 56 days post dose 2
24	Thompson et al (September 9, 2021)	USA	≥50 years of age	Multiple including alpha/delta	Comirnaty mRNA-1273 Ad26.COV2.S	January 1-June 22, 2021	Test negative case control study that found that VE against hospitalization remained >80% through at least 112 days post the dose 2 for Comirnaty and mRNA-1273. For Ad26.COV2.S, VE stayed high at time point ≥56 days after vaccination. VE against ER/urgent care visit is >80% through at least 112 days post dose 2 for Comirnaty and mRNA-1273. For Ad26.COV2.S, VE stayed high at time point ≥56 days after vaccination. VE against hospitalization (for all 3 vaccines combined)

							 VE against emergency room visits/urgent care visits (for all 3 vaccines combined) 
23	Puranik et al (September 7, 2021)	USA	Persons ≥14 days post dose 2 ("full vaccination") who received first dose after January 1	Multiple including alpha/delta	Comirnaty	January 1-August 8, 2021	Test negative case control study to assess duration of protection against symptomatic disease. Adjusted OR start showing waning at day 60 after full vaccination. Covariate / Level/Category / Symptomatic Infection [N = 974 positive events] Time Relative to Full vaccination: Day 0: 1 (Reference); Day 30: 2.19 (0.89, 5.36); Day 60: 3.65 (1.78, 7.46); Day 90: 5.58 (2.72, 11.46); Day 120: 7.25 (3.47, 15.18); Day 150: 10.33 (5.03, 21.24)
22	Kertes et al (September 7, 2021)	Israel	Fully vaccinated population	Delta	Comirnaty	June 9-July 18, 2021	Study of Maccabi HMO clients who were 7 days post dose 2 by June 9 and had no history of prior infection. Found that those vaccinated in January-February had odds of infection of 1.61 (1.45-1.79) compared to those vaccinated in March-May of testing positive for SARS-CoV-2.
19	Keehner et al (September 1, 2021)	USA	~19,000 employees of University of California San Diego Health	Delta	BNT162b2 mRNA-1273	July -August 26, 2021	Cohort study of HCWs showed that among symptomatic cases occurring in July, HCW vaccinated in January or February had an attack rate of 6.7 per 1000 persons (95% CI, 5.9 to 7.8), whereas the attack rate was 3.7 per 1000 persons (95% CI, 2.5 to 5.7) among those who completed vaccination during the period from March through May. Among unvaccinated persons, the July attack rate was 16.4 per 1000 persons (95% CI, 11.8 to 22.9).
18	Nunes et al (August 29, 2021)	Portugal	1.5 million ≥65 year olds (duration of protection on only those 80+)	Alphaàdelta	BNT162b2 mRNA-1273	?February-August 13, 2021	Cohort study using electronic databases. For those 80+, VE against hospitalization was 82 (64-91) at day 14-41 and 89% (71-96) at day 98+. For COVID related mortality, it was 86% (68-93) at day 14-41 and 74 (60-83) at day 98+. Noted limitations are that data delays could mean that outcomes such as hospitalization/mortality have not been recorded for more recent cases. Additionally, only 6% of the 80+ cohort remained unvaccinated during the study period, making these unvaccinated individuals probably quite different from the vaccinated.
17	Cerqueria-Silva et al (August 27, 2021)	Brazil	75.9 million vaccinated in Brazil	Gamma	CoronaVac AZD1222	January 18-July 24, 2021	This was a retrospective cohort study that calculated VE, as well as evaluated the daily hospitalization incidence per 100,000 vaccinees. For CoronaVac, there was low hospitalization incidence up to 84 days in vaccinees up to 79 years old. 80-89 and ≥90 age groups lowest incidence 28 days post dose 2 but then increased but were still lower than 1 dose recipients

							
16	Chemaitelly et al* (October 6, 2021) *[Update to Aug 27 preprint]*	Qatar		AlphaàBetaàDelta	BNT162b2	January 1-August 15, 2021	Test-negative case-control study evaluating VE by time since vaccination stratified by age, VOC, and outcome. They see a drop in VE against infection over time since vaccination with no difference by those older/younger than 60. VE against severe disease is preserved (until sample size is insufficient). 
13	Tartof et al* (October 16, 2021)	USA	3.4 million Kaiser Permanante Southern California members ≥12 years	Delta for latter months of study	BNT162b2	December 14, 2020-August 8, 2021	Retrospective cohort study. VE against infection for the fully vaccinated decreased with increasing time since vaccination, declining from 88% (86–89) during the first month after full vaccination to 47% (43–51) after ≥5 months. Individuals ≥65 years of age had lower overall effectiveness against infections but declined at a similar rate (VE at <1 month after being fully vaccinated: 80% [73–85];

	[Update to Aug 23 preprint]						VE at ≥5 months: 43% [30–54]). Among fully vaccinated persons of all ages, protection against COVID-19-related hospitalization did not wane over time, with overall adjusted VE estimates of 87% (82–91) at < 1 month after being fully vaccinated, and 88% (82–92) at ≥5 months after full vaccination. At <1 month, VE against Delta: 93% [85–97] and VE against other variants: 97% [95–99]). At ≥4 months, VE against Delta infections: 53% [39–65] and VE against other variants: 67% [45–80]. VE against infection:  VE against hospitalization: 
12	Goldberg et al (August 24, 2021)	Israel	4.8 million fully vaccinated persons; >16 and ≥40 (depending on analysis) +unvaccinated in israel	Delta	BNT162b2	July 11-July 31 2021	The study compared the rate of breakthrough infection in July, when Delta was the dominant strain, between individuals who received 2 doses of the vaccine earlier this year to individuals who received two doses of the vaccine more recently, while adjusting for confounders. Rates of infection decline the more recently one was vaccinated; with severe disease, this is seen in those ≥60 years. A second analysis was done among the general population cohort of vaccinated and

							unvaccinated to calculate VE by age group and month of vaccination. **OUTCOME = Positive SARS-CoV-2 PCR test** Age | JanB | FebA | FebB | MarA | MarB | Apr | May 16-39 | 50% [45, 55] | 47% [42, 52] | 58% [55, 62] | 62% [59, 64] | 68% [65, 70] | 74% [71, 77] | 73% [67, 78] 40-59 | 58% [54, 62] | 61% [58, 65] | 63% [59, 66] | 67% [63, 70] | 74% [70, 77] | 78% [73, 82] | 80% [71, 86] 60+ | 57% [52, 62] | 63% [57, 67] | 65% [57, 71] | 73% [66, 78] | 72% [64, 77] | 73% [63, 81] | 75% [58, 85] **OUTCOME = Severe COVID-19** Age | Jan | Feb | Mar 40-59 | 94% [87, 97] | 98% [95, 99] | 98% [94, 99] 60+ | 86% [82, 90] | 88% [84, 91] | 91% [85, 95]
10	Pouwels et al* (October 14, 2021) [*Update to Aug 18 preprint]*	UK	General adult population	Alpha, Delta	BNT162b2 AZD1222	December 1, 2020-August 1, 2020	COVID-19 infection survey is a household longitudinal survey with testing. During the delta dominant period, in those 18 to 64 years, VE of BNT162b2 against new PCR-positives reduced by 22% (95% CI 6% to 41%) for every 30 days from second vaccination. Reductions were numerically smaller for ChAdOx1 (change -7% per 30 days, 95% CI -18% to +2%) but there was no formal evidence of heterogeneity (p=0.14). 
9	Tenforde et al (August 18, 2021)	USA	Hospitalized patients	Alpha > Delta	BNT162b2 mRNA-1273	March 11-July 14, 2021	Test-negative design case control study of hospitalized patients. VE against COVID-19– associated hospitalization was 86% (95% CI = 82%–90%) 2–12 weeks and 84% (95% CI = 77%–90%) 13–24 weeks from receipt of the 2nd dose, with no significant change between these periods (p = 0.854). There was no difference in VE by timing since vaccine among those ≥/< 65 years, immunocompromised versus not and among those with ≥/< 3 chronic conditions.

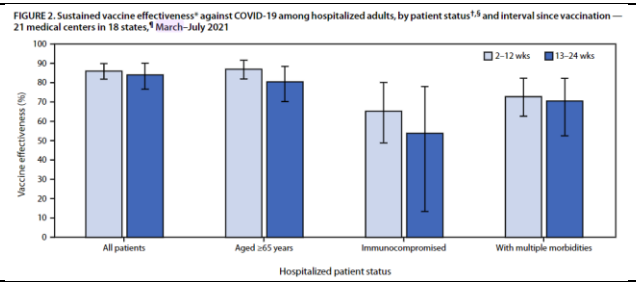
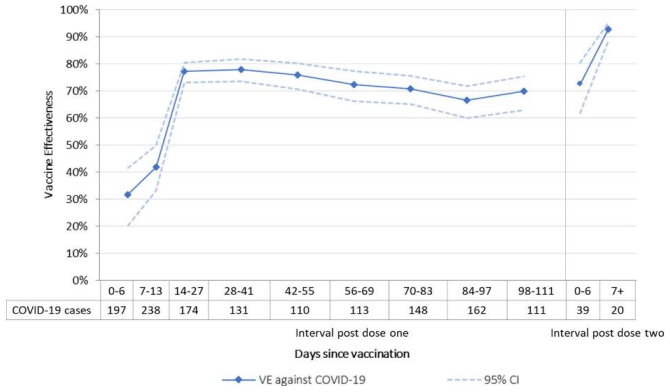
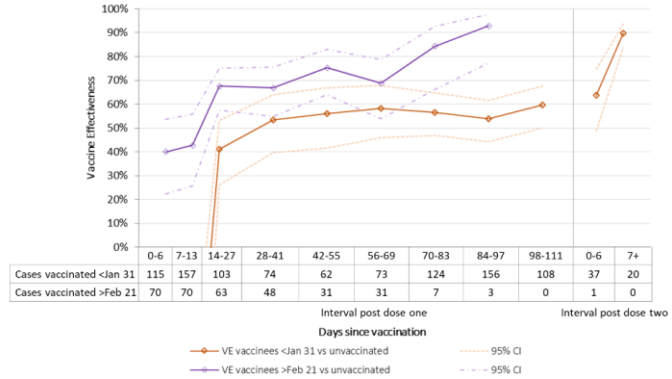
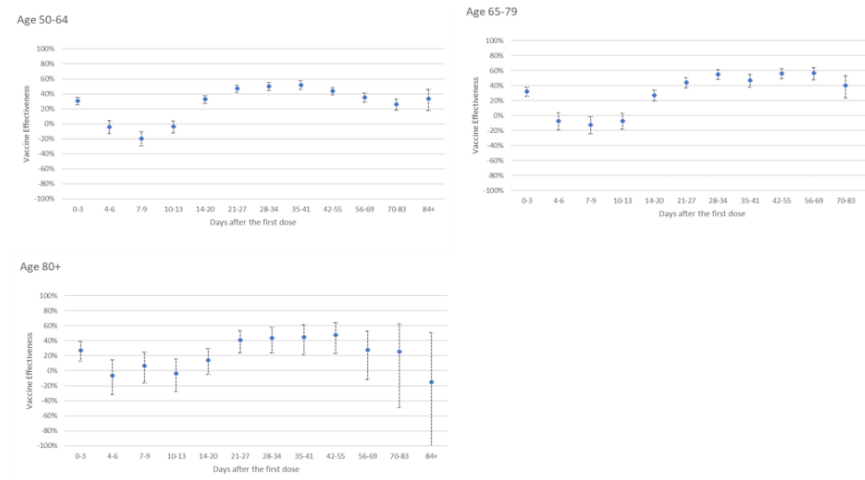
							
8	Yassi et al (July 16, 2021)	Canada	HCWs in Vancouver	Alpha/Gamma	BNT162b2 mRNA-1273	December 15-May 13, 2021	Retrospective cohort study of HCWs linking administrative databases. At 16 weeks (day 112) post dose 1 and 2 they don't see a decline in VE. Note that day 0-13 post dose 1 is included in the unvaccinated comparison group.
7	Chemaitelly et al (August 9, 2021)	Qatar	Immunosuppressed kidney transplant patients	Alpha/Beta	BNT162b2 mRNA-1273	February 1-July 21, 2021	Retrospective cohort study finding VE against infection was 73.9% (95% CI: 33.0-89.9%) at day 56+ post dose 2; VE against severe/critical/fatal disease was 83.8% (95% CI: 31.3-96.2) at day 56+ post dose 2.
6	Carazo et al (July 22, 2021)	Canada	HCWs in Quebec	Alpha	BNT162b2 mRNA-1273	January 17-June 5, 2021	This is a test-negative case control linking surveillance and vaccination data from administrative databases for HCWs. Across 16 weeks, no decline in single-dose VE against infection was observed with appropriate stratification based upon prioritized vaccination determined by higher versus lower likelihood of direct patient contact. Figure 2. Vaccine effectiveness against COVID-19 by interval since vaccination 

							Figure 3. Vaccine effectiveness against COVID-19 in healthcare workers vaccinated before January 31st 2021 (highest contacts with patients) and those vaccinated after February 20th 2021 (fewer contacts with patients) by interval since vaccination 
5	Amirthalingam et al (July 28, 2021)	UK	50+ year old population	Alpha/Delta	BNT162b2 AZD1222	January 4-June 18, 2021	This is a test-negative case control study linking surveillance and vaccination data from administrative databases. In summary, VE against disease potentially declines post dose 1 at day 70+ for AZD1222 and at day 56+ for BNT162b2 but there are wide/overlapping confidence intervals making conclusions challenging. Higher two-dose VE was observed with > 6-week intervals between BNT162b2 doses compared to the authorized 3-week schedule, including ≥ 80-year-olds. (This paper also includes information on GMTs at different time points post vaccination.) (a) AZ Vaccine 

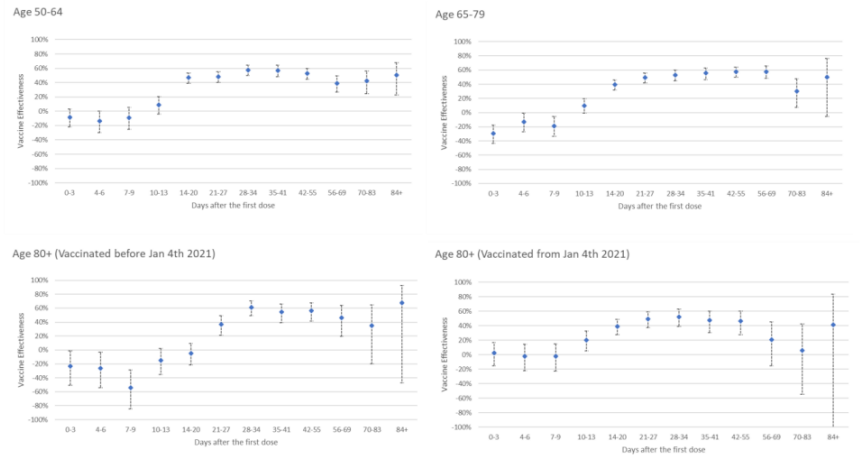
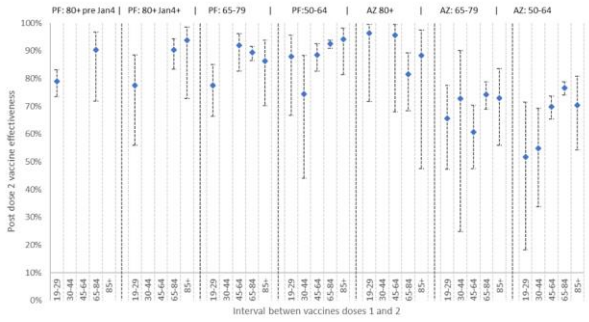
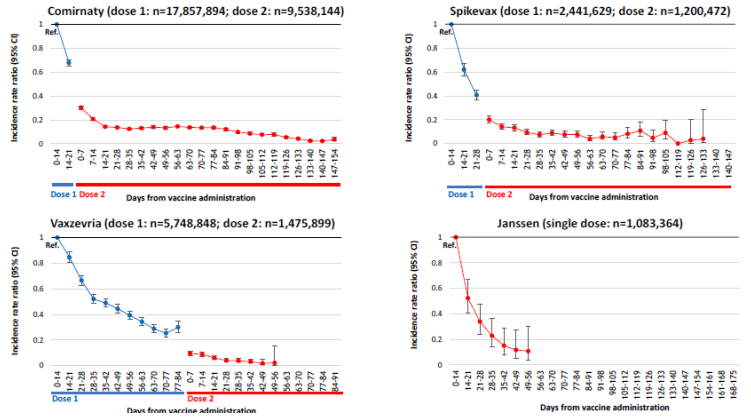
							(b) Pfizer  **Figure 4: Two dose vaccine effectiveness by age group, vaccine type and interval between doses** 
3	Italian Instituo Superiore di Sanita (July 30, 2021)	Italy	Italian general adult population with at least 1 dose of vaccine	Alpha	BNT162b2 AZD1222 mRNA-1273 Ad26.COV2.S	December 27, 2020-July 14, 2021	This study linked Italy's national vaccination registry with their surveillance data. For each of the outcomes evaluated, a multivariable negative binomial model was used to estimate the incidence rate ratio at different time intervals post dose 1 and 2, compared to the time period of 0-14 days after the first dose. VE is preserved against infection post complete vaccination for BNT162b2 at day 147-154, for mRNA-1273 at day 126-133, for AZD1222 at day 49-56, and for Ad26.COV2.S at day 49-56. VE against hospitalization, ICU admission, and mortality also do not change significantly over time.

							Figure 16. Adjusted estimates of the Incidence Rate Ratio of diagnosis at different time intervals from the administration of the first and second dose compared to the reference period (0-14 days from the first dose) by vaccine brand 
2	Israel et al (August 5, 2021)	Israel	All fully vaccinated persons enrolled in Leumit Health Services	Delta	BNT162b2	May 15-July 26, 2021	There was a significantly higher rate of positive results among patients who received their second vaccine dose at least 146 days before the RT-PCR test compared to patients who have received their vaccine less than 146 days before: adjusted odds ratio for infection was 2.76 (95% CI 1.62-3.08) for ≥ 60-year-old patients; 2.22 (95% CI 1.62-3.08) for patients 40-59-years; and 1.67 (95% CI 1.21-2.29) for 18-39-year-old patients.
1	Mizrahi et al (July 31, 2021)	Israel	16+ year olds enrolled at Maccabi Health Services	Delta	BNT162b2	June 1-July 27, 2021	The study compared the rate of breakthrough infection during June and July, when Delta was the dominant strain, between individuals who received 2 doses of the vaccine earlier this year to individuals who received two doses of the vaccine more recently, while adjusting for confounders. The authors report that persons vaccinated between January and February 2021 had a 53% (95% CI: 40-68%) increased risk of breakthrough infection in June and July compared to individuals vaccinated between March and April 2021. There was no difference by age groups 16-39, 40-59, ≥60 years. No unvaccinated persons were included in the study; thus, vaccine effectiveness was not evaluated.

Other data of interest:

- https://www.gov.il/BlobFolder/reports/vpb-12082021/he/files_publications_corona_vpb-12082021-01.pdf
- Salo et al HH transmission study in Finland, showing VE 10 weeks after 1 dose of an mRNA vaccine but is a mix of 1 and 2 dose recipients.
- Pfizer's press announcement of 4 month efficacy in adolescents https://www.pfizer.com/news/press-release/press-release-detail/follow-data-phase-3-trial-pfizer-biontech-covid-19-vaccine

Note as of January 7, 2022 version, only true duration of protection analyses are included. Please look at the update from December 30, 2021 if you wish to see full list of previously included studies with other data such as Kaplan-Meier curves. Missing reference numbers in table above indicate studies that have been removed.

4. 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	1st Dose VE % (95%CI)	Days post 1st dose	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	-1 (-58-36) 1 (-0.64-49)	0+ up t o<7 days post dose 2	-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	26 (-11– 54) -7 (-60-29) 9 (-16– 49) 14 (-11-52)	21+	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	38 (-69-78)	0+, including within 14 days of dose 2	27 (-40-62)	15+	~16.5 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	1st Dose VE % (95%CI)	Days post 1st dose	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
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
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	38 (-2-62)	14+	63 (46-75)	14+ (or 28+ after a single dose of Ad26.COV2.S)	~32 weeks
								Transmission to fully vaccinated household contacts	46 (22-63)		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	12 (9-15)	0+ up to 13 days post dose 2	68 (52-79)	14+	~20.5 weeks
							AZD1222		10 (6-14)		52 (22-70)		~8 weeks
					Delta^ specifically		BNT162b2		17 (14-19)		50 (35-61)		~29 weeks
							AZD1222		5 (1-9)		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	Alpha^	Unknown	AZD1222	Transmission to any household contacts (adjusted for contact	15 (4-26)	14+‡	58 (−12-84)	7+	~15 weeks
							BNT162b2		26 (12-37)		70 (61-77)		
							mRNA-1273		51 (8-74)		88 (50-97)		

#	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	1st Dose VE % (95%CI)	Days post 1st dose	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
				and other close contacts (all ages)			Ad26.COV2.S	vaccination status)	77 (6-94)		—		
4	Layan, Gilboa et al* (March 03, 2022) *[Published version of July 16,2021 preprint]*	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
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	-15.9 (-27.9 to -5)	10+, including <10 days post dose 2	23 (-11.3-46.7)	10-90	~11 weeks
											6.9 (-124.8-61.4)	90+	~26.5 weeks
								Transmission	56.8 (52.2-60.9)		91.8 (88.1-94.3)	10-90	~11 weeks
											61.1 (5.2-84.1)	90+	~26.5 weeks
					Delta^			Infectiousness given Infection	38.3 (-24.2-69.3)		-27.9 (-248.9-53.1)	10-90	~11 weeks
											-27.9 (-53.7 to -6.5)	90+	~26.5 weeks
								Transmission	82.8 (64.8-91.6)		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	48(38-57)	>21 days after dose 1, including some with dose 2	—		
							BNT162b2		46(38-53				
1	Salo et al* (March 4, 2022)	Finland	Retrospective cohort	265,326 HCW and their	Alpha††	Excluded	BNT162b2 & mRNA-1273	Documented infection in HCW's	16.7 (-11.9-38)	4 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	1st Dose VE % (95%CI)	Days post 1st dose	2nd Dose VE % (95% CI)	Days post 2nd dose	Max Duration of follow up after fully vaccinated
	[Update to July 10, 2021 preprint]			298,100 unvaccinated spouses and children (3-18 years)				unvaccinated spouses					
								Documented infection in HCW's unvaccinated spouses	23 (6.2-36.9)	12 weeks (combo of 1+2 dose recipients)	—	—	
								Documented infection in unvaccinated children of HCWs	-16.3 (-65.8-18.4)	2-5 weeks	—	—	
								Documented infection in unvaccinated children of HCWs	6.8 (-18.5-26.7)	12 weeks (includes 2 dose recipients)	—	—	

§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

5. 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

6. 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 COVID-19 vaccine efficacy and effectiveness against SARS-CoV-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

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