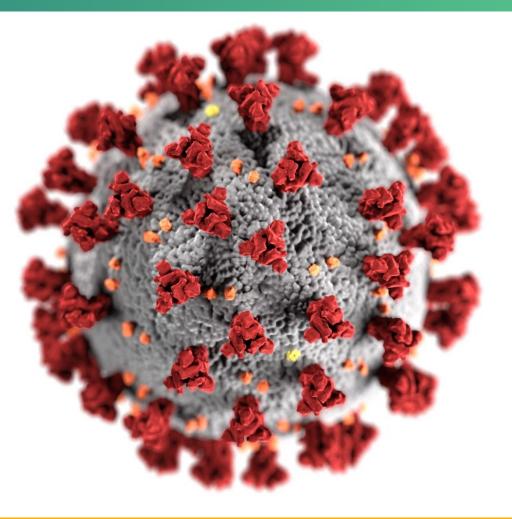
### **COVID-19 Vaccine Effectiveness during Omicron**

Ruth Link-Gelles, PhD, MPH LCDR, US Public Health Service Program Lead, COVID-19 Vaccine Effectiveness Epidemiology Task Force, CDC

ACIP April 20, 2022





cdc.gov/coronavirus

### Organization of presentation

- Evidence organized by outcome
  - Infection
  - Emergency department/urgent care (ED/UC)
  - Hospitalization

# Vaccine effectiveness (VE) data for infection with Omicron

### Increasing Community Access to Testing (ICATT) Partnership: VE analysis for <u>symptomatic infection</u>

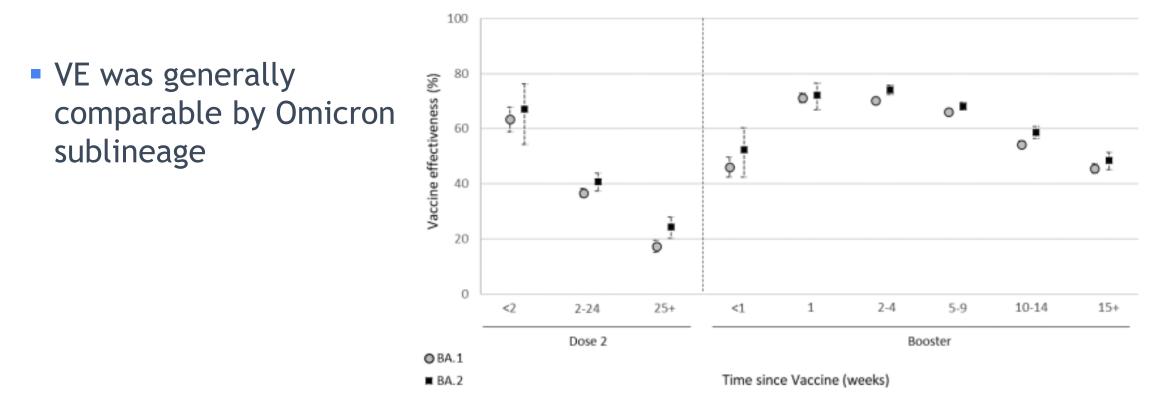
- Nationwide community-based drive-through COVID-19 testing via pharmacies
- Self-reported vaccine history at time of registration for COVID-19 testing; excluded those who did not report vaccination status
- Design: Test-negative, case-control analysis
- Population: Persons with ≥1 COVID-like symptom and nucleic acid amplification testing (NAAT)
- Adjusted for:
  - Calendar day, race, ethnicity, gender, site's HHS region, site census tract's social vulnerability index (SVI)
  - Prior infection excluded
- Period:
  - Tested December 26, 2021 March 23, 2022

## Increasing Community Access to Testing (ICATT) Partnership, booster VE against symptomatic infection in adults ≥18 years during Omicron, Dec 26, 2021-Mar 23, 2022

	Tests with vaccine regimen, no.	SARS-CoV-2 positive, (%)	Adjusted VE (95% CI)		
Unvaccinated	208,122	50	Ref.		
J&J + J&J					
0-1 months since booster	1,023	47	25 (15-34)	<b>⊢</b> •	
2-4 months since booster	2,513	42	30 (24-36)	<b>⊢</b>	
J&J + mRNA					
0-1 months since booster	3,607	31	60 (57-62)	<b>⊢⊕</b> i	
2-4 months since booster	9,787	30	55 (53-57)	H <b>@</b> H	
mRNA + mRNA + mRNA					
0-1 months since booster	78,242	27	68 (67-69)	•	
2-4 months since booster	207,276	27	63 (63-64)	•	
				0 20 40 60 80 VaccineEffectiveness (%)	100

#### Data from the UK: VE vs. symptomatic infection comparing Omicron sublineages (BA.1 vs BA.2) by time since booster

 Pfizer-BioNTech, Moderna, or ChAdOx1-S primary series, Pfizer-BioNTech or Moderna booster

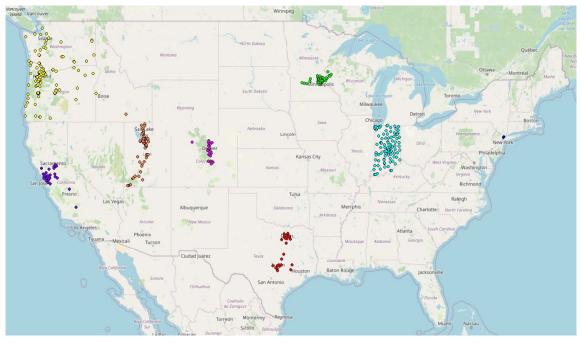


### **Overall summary of VE against infection**

- VE looks different for recipients of J&J vaccine; lower overall vs. regimens that include at least 1 mRNA
- Evidence of slight waning against infection for 3 mRNA doses by 2-4 months after the last dose
- Early VE data from the UK show similar VE for BA.1 and BA.2 sublineages of Omicron variant

Vaccine effectiveness data for <u>emergency</u> <u>department/urgent care (ED/UC)</u> due to Omicron in the US

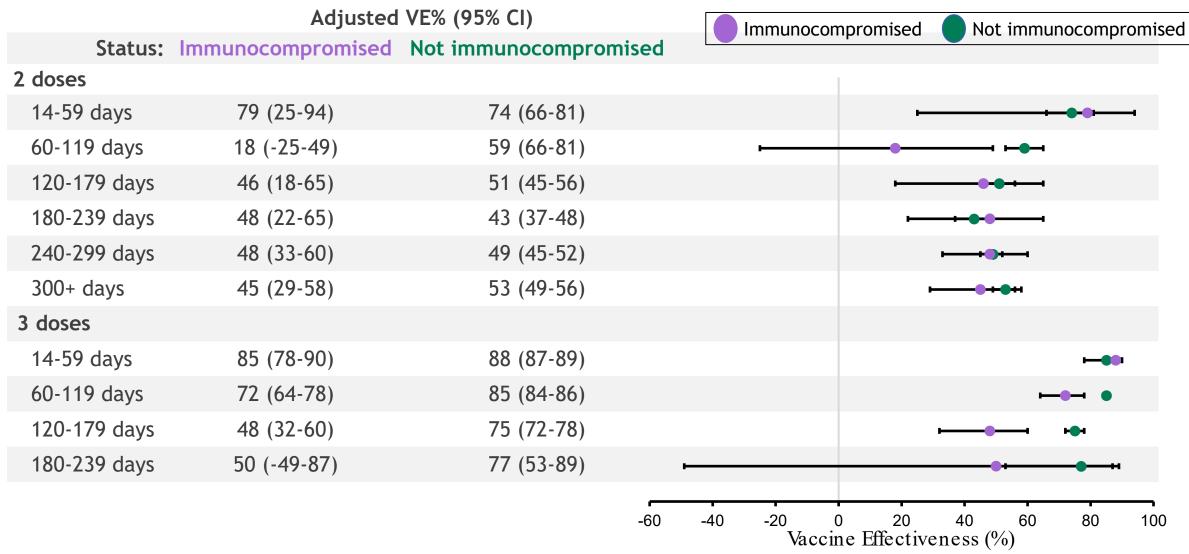
### **VISION Multi-State Network of Electronic Health Records**



- Cases: COVID-like illness (CLI) with positive PCR for SARS-CoV-2 within 14 days before or 72 hours after the admission or encounter
- Controls: CLI with negative PCR for SARS-CoV-2

- Delta vs. Omicron determined by time when Omicron predominated in study site (mid-December 2021)
- VE adjusted by propensity to be vaccinated weights, calendar time, region, local virus circulation, and age
- Vaccination documented by electronic health records and state and city registries

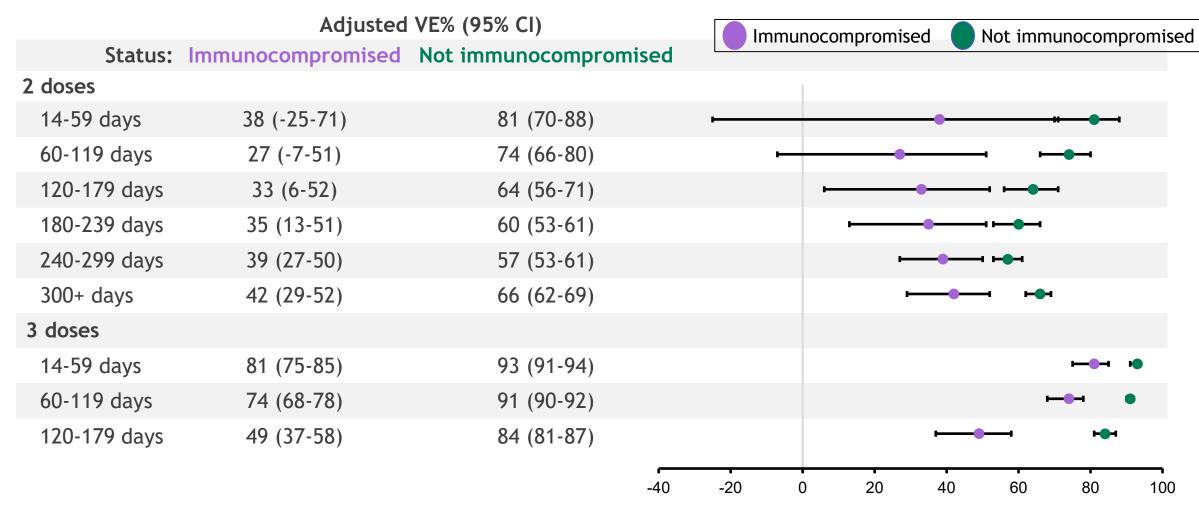
# VISION: mRNA VE for ED/UC visits by number of doses and time since last dose receipt for adults ≥50 years, Dec 2021–Mar 2022, by immunocompromised status



CDC, preliminary unpublished data. Individuals with prior infections excluded. Logistic regression conditioned on calendar week and geographic area, and adjusted for age sex, race, ethnicity, local virus circulation, respiratory or nonrespiratory underlying medical conditions, and propensity to be vaccinated

# Vaccine effectiveness data for hospitalization due to Omicron in the US

# VISION: mRNA VE for hospitalization by number of doses and time since last dose receipt for adults ≥50 years, Dec 2021–Mar 2022, by immunocompromised status



Vaccine Effectiveness (%)

CDC, preliminary unpublished data. Individuals with prior infections excluded. Logistic regression conditioned on calendar week and geographic area, and adjusted for age sex, race, ethnicity, local virus circulation, respiratory or nonrespiratory underlying medical conditions, and propensity to be vaccinated

# VE against COVID-19-associated hospitalizations during Omicron, Dec 16, 2021-Mar 7, 2022

Medical event/vaccination status		SARS-CoV-2 Positive	Row %	VE % (CI)	
Hospitalizations					
Unvaccinated (referent)	12377	6134	49.6		 
1 Janssen vaccine dose (14 - 150 + days)	1194	440	36.9	<b>⊢●</b> 1	37 (27-45)
2 Janssen vaccine doses (7-120 days)	135	43	31.9	<b>⊢−−−−</b> 1	64 (47-76)
1 Janssen/ 1 mRNA vaccine dose (7-120 days)	252	47	18.7	<b>⊢</b> −●−1	78 (69-85)
3 mRNA vaccine doses (7 - 120 days)	5994	613	10.2	•	90 (89-91)
			0.0	25.0 50.0 75.0	100.0

- VE of any booster dose is significantly higher than VE for 1 Janssen dose only
- VE of 3 mRNA doses is significantly higher than Janssen plus booster

Natarajan K, Prasad N, Dascomb K, et al. Effectiveness of Homologous and Heterologous COVID-19 Booster Doses Following 1 Ad.26.COV2.S (Janssen [Johnson & Johnson]) Vaccine Dose Against COVID-19-Associated Emergency Department and Urgent Care Encounters and Hospitalizations Among Adults – VISION Network, 10 States, December 2021-March 2022. MMWR Morb Mortal Wkly Rep. ePub: 29 March 2022. DOI: http://dx.doi.org/10.15585/mmwr.mm7113e2external icon

### Effectiveness of mRNA vaccines for preventing COVID-19 hospitalization, IVY Network

- Population: Adults (≥18 years) hospitalized at
  21 medical centers in 18 states
- Design: Test-negative case-control
- Case status:
  - Cases: COVID-like illness and SARS-CoV-2/RT-PCR (+)





- Controls: COVID-like illness and SARS-CoV-2 RT-PCR (-)
- Testing: SARS-CoV-2 testing within 10 days of illness onset, and admission within 14 days of illness onset

Tenforde MW, Self WH, Naioti EA, et al. Sustained Effectiveness of Pfizer-BioNTech and Moderna Vaccines Against COVID-19 Associated Hospitalizations Among Adults – United States, March-July 2021. MMWR Morb Mortal Wkly Rep 2021;70:1156-1162. DOI: http://dx.doi.org/10.15585/mmwr.mm7034e2

#### Effectiveness of mRNA COVID-19 vaccines against COVID-19associated hospitalization, Dec 26, 2021 – Mar 15, 2022

Gr	oup	No. of vaccinated case-patients/total case-patients	No. of vaccinated control-patients/ total control-patients	Adjusted* vaccine effectiveness
		. (%)	(%)	% (95% CI)
3 0	doses overall	288/909 (32)	508/776 (65)	78 (73–83)
Ir	nmunocompromised	153/250 (61)	191/238 (80)	65 (44–78)
	7–120 days	89/186 (48)	134/181 (74)	73 (55–84)
	>120 days	64/161 (40)	57/104 (55)	54 (16–75)
1	Not immunocompromised	135/659 (20)	317/538 (59)	85 (80–89)
	7–120 days	118/642 (18)	273/494 (55)	86 (81–89)
	>120 days	17/541 (3)	44/265 (17)	79 (59–89)

\*Adjusted for age (18-64 or ≥65 years), sex, race/ethnicity, admission date (biweekly), and US census region CDC preliminary unpublished data

### IVY: VE against invasive mechanical ventilation or inhospital death, by variant, Jul 4, 2021-Jan 24, 2022

	No. vaccinated cases/ Total no. case (%)	No. vaccinated controls/ Total no. controls (%)	Adjusted VE % (95% CI)					
Pre-Delta, 2 doses	13/259 (5.0)	893/1,738 (51.4)	95 (90-97)				I	
Delta	235/1,027 (22.9)	2,741/3,865 (70.9)	89 (87-91)				H	м
2 doses, median 159 days after dose 2	218/1,010 (21.6)	2,402/3,526 (68.1)	88 (86-90)				•	I
3 doses, median 35 days after dose 3	17/809 (2.1)	339/1,463 (23.2)	95 (91-97)					
Omicron	59/154 (38.3)	396/501 (77.0)	86 (79-91)				<b></b>	4
2 doses, median 256 days after dose 2	46/141 (32.6)	193/308 (62.7)	79 (66-87)			-	<b></b>	
3 doses, median 60 days after dose 3	13/108 (12.0)	193/308 (62.7)	94 (88-97)				F	
			0	20	40	60	80	100

VaccineEffectiveness (%)

Tenforde MW, Self WH, Gaglani M, et al. Effectiveness of mRNA Vaccination in Preventing COVID-19-Associated Invasive Mechanical Ventilation and Death – United States, March 2021 January 2022. MMWR Morb Mortal Wkly Rep 2022;71:459-465. DOI: http://dx.doi.org/10.15585/mmwr.mm7112e1



# Summary: VE of 2 doses of mRNA vaccine increases with increasing severity of outcome during Omicron in adults $\geq 18$ years; 3<sup>rd</sup> dose increases VE

		2-dose Adjusted VE % (95% CI)	<mark>3-dose</mark> Adjusted V % (95% CI)					2-dose	2		3-dose	
Infaction	1mo post-last dose, ICATT	28 (15-40)	65 (62-68)		F		•		F			
Infection	3mos post-last dose, ICATT	11 (3-19)		-								
Emergency	Last dose <59 days ago, VISION	74 (66-81)*	88 (87-89)*							·•	•	
department/ urgent care	Last dose 120-179 days ago, VISION	51 (45-56)*	75 (72-78)*					<b></b>	•••••		-	
	Last dose <59 days ago, VISION	81 (70-88)*	93 (91-94)*								·	•
llessitelization	Last dose 120-179 days ago, VISION	64 (56-71)*	84 (81-87)*						ł	••	<b></b>	
Hospitalization	3 <sup>rd</sup> dose 7-120 days ago, IVY	Not estimated	86 (81-89)**								<b></b>	
	3 <sup>rd</sup> dose >120 days ago, IVY	Not estimated	79 (59-89)**						·			
Critical illness/death	2 <sup>nd</sup> dose median 256 days/3 <sup>rd</sup> dose median 60 days ago, IVY	79 (66-87)	94 (88-97)							<b></b>	I	<b></b>
				0		20	Vac	40 cineEffe	60 ctiveness	(%)	80	100

Booster receipt increases protection across all outcomes.

Booster dose VE remains high among non-immunocompromised individuals 4-6 months after dose.

\*Among non-immunocompromised individuals ≥50 years of age. \*\* Among non-immunocompromised individuals ≥18 years of age.

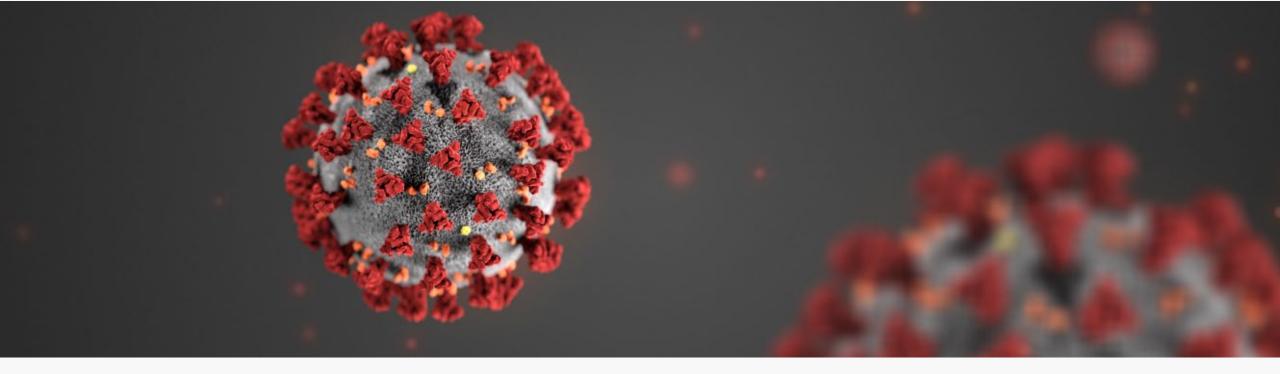
## Summary: mRNA VE during Omicron

	Not immunocompromised	Immunocompromised				
2-dose VE against:						
Infection (+/- symptoms)	Limited protection, fast waning	Not estimated				
ED/UC	Higher protection, some waning	Not estimated				
Hospitalization	Highest protection, some waning	Not estimated				
3-dose VE against:						
Infection (+/- symptoms)	Some protection, evidence of waning	Not estimated				
ED/UC	Some protection, limited waning	Some protection, clear waning				
Hospitalization	Highest protection, limited waning	Highest protection, clear waning				

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For more information, contact CDC 1-800-CDC-INFO (232-4636) TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

