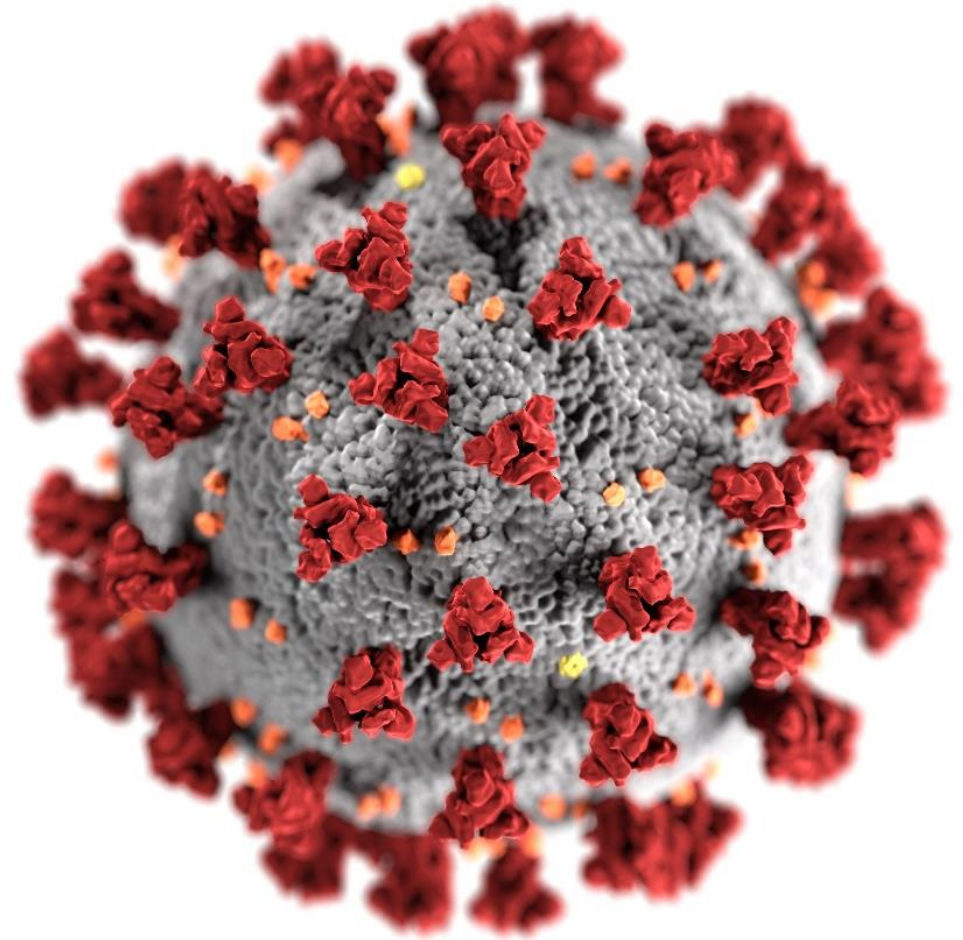


# Updates on COVID-19 Vaccine Effectiveness during Omicron

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ACIP  
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[cdc.gov/coronavirus](https://cdc.gov/coronavirus)

# Organization of presentation

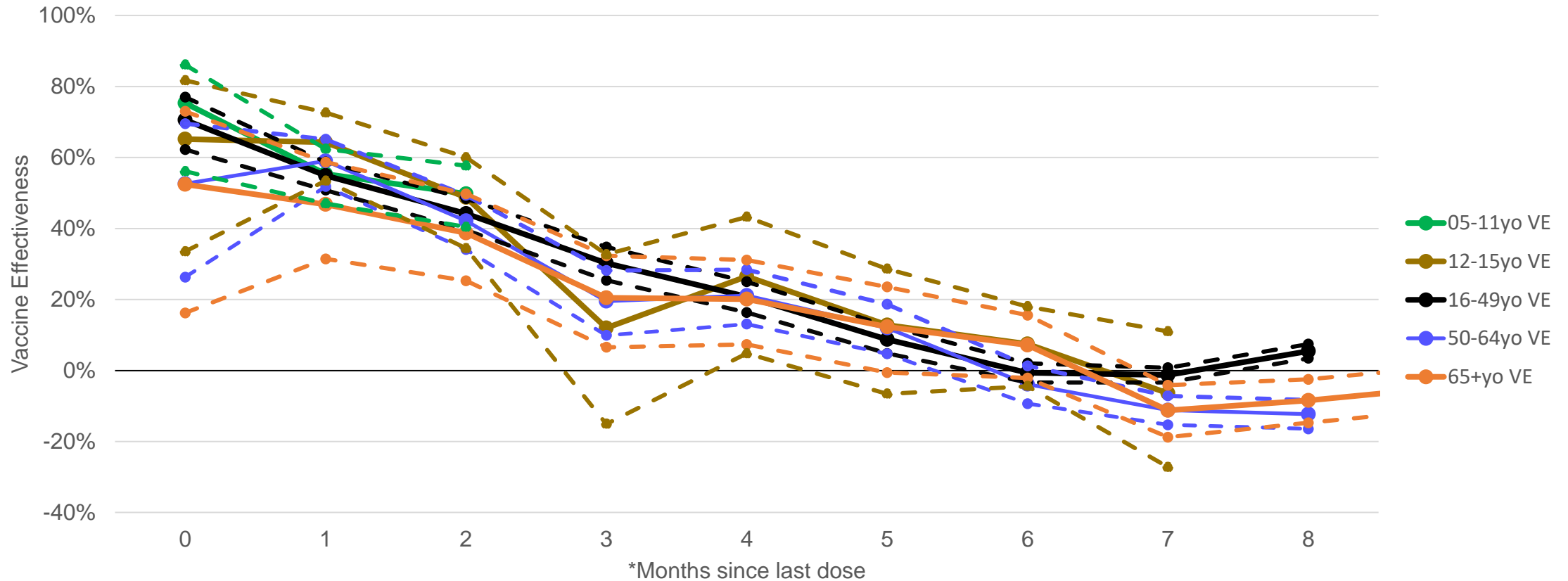
- Presentation organized by outcome, then by age within outcome
  - Infection
  - Emergency department/urgent care (ED/UC)
  - Hospitalization

# **Vaccine effectiveness (VE) against infection with Omicron**

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

- 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  $\geq 1$  COVID-like symptom and nucleic acid amplification testing (NAAT); immunocompromised excluded
- **Adjusted for:**
  - Race, ethnicity, gender, patient state, site census tract's social vulnerability index (SVI), circulating cases of COVID-19 by zip code in the last 7 days, pharmacy partner, test date
- **Period for analysis:**
  - **Tested:** July 2, 2022 – August 20, 2022, BA.4/BA.5 predominant period

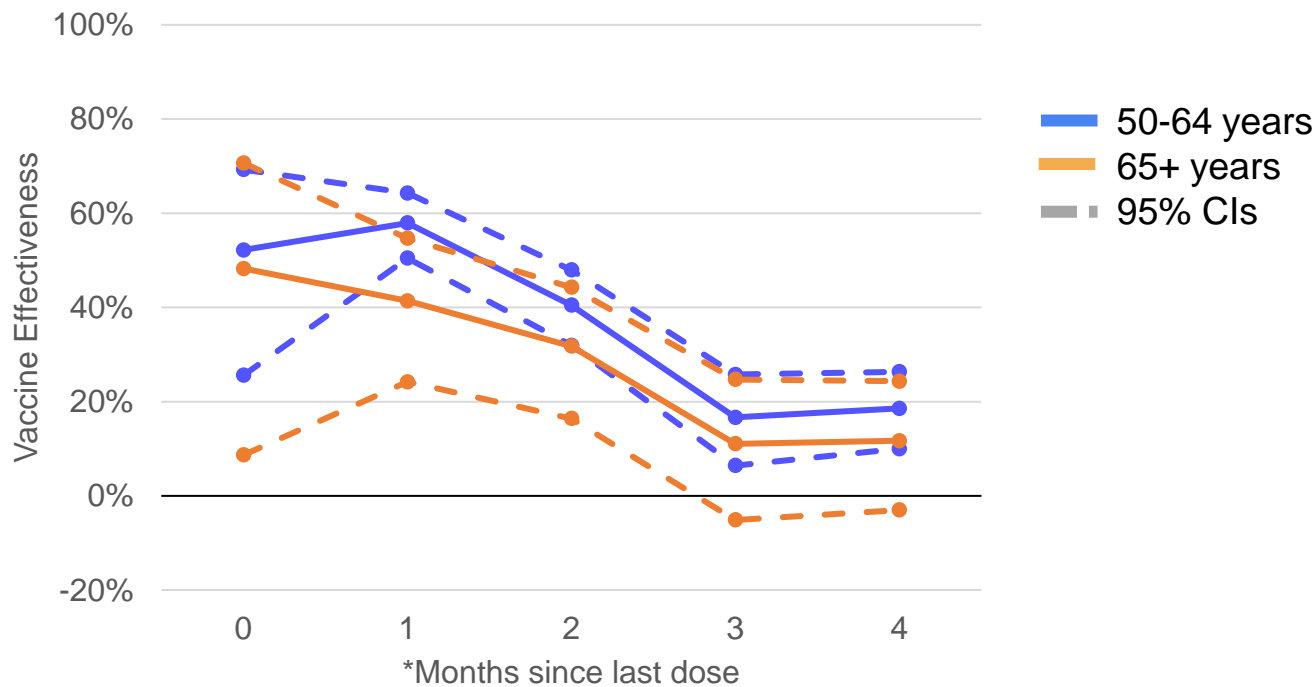
# ICATT: mRNA 3 vs. 2-dose relative VE against symptomatic infection during BA.4/BA.5, ages 5+ years



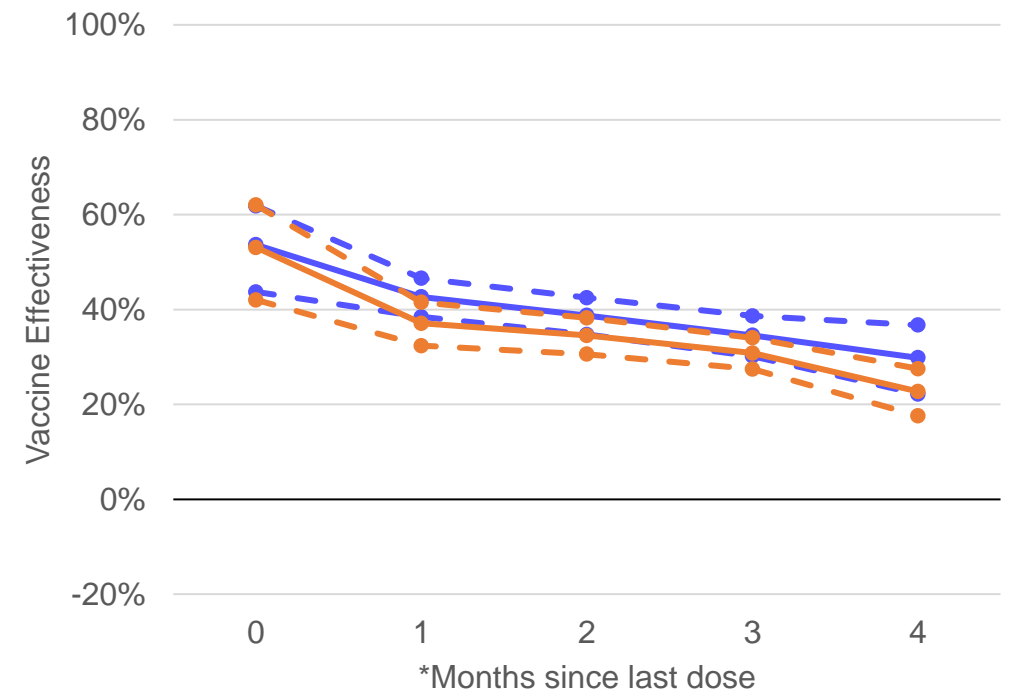
\*Vaccination dose dates are collected as month and year. Month 0 represents tests in the same month as last dose (at least 2 weeks after last dose). For all months greater than or equal to 1 the value represents the difference between calendar month of test and calendar month of last dose receipt (at least 2 weeks after last dose).

# ICATT: mRNA VE against symptomatic infection during BA.4/BA.5, ages 50+ years

## 3 vs. 0-dose absolute VE



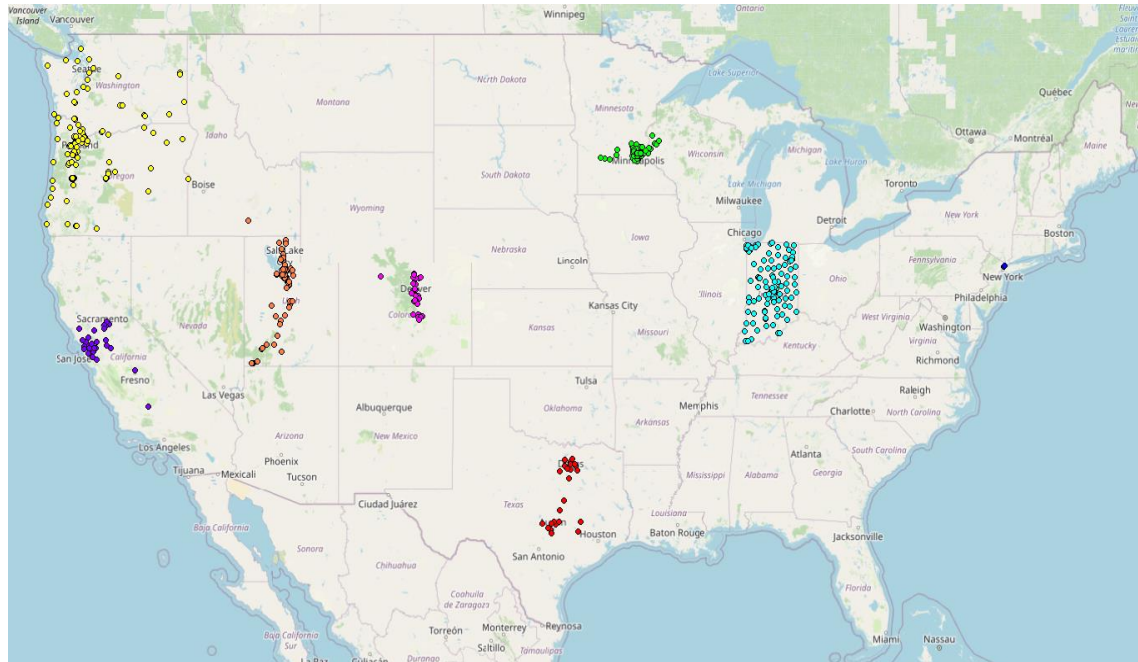
## 4 vs. 3-dose relative VE



\*Vaccination dose dates are collected as month and year. Month 0 represents tests in the same month as last dose (at least 2 weeks after last dose). For all months greater than or equal to 1 the value represents the difference between calendar month of test and calendar month of last dose receipt (at least 2 weeks after last dose).

**Vaccine effectiveness against emergency department/urgent care (ED/UC) due to Omicron in the US**

# VISION Multi-State Network of Electronic Health Records

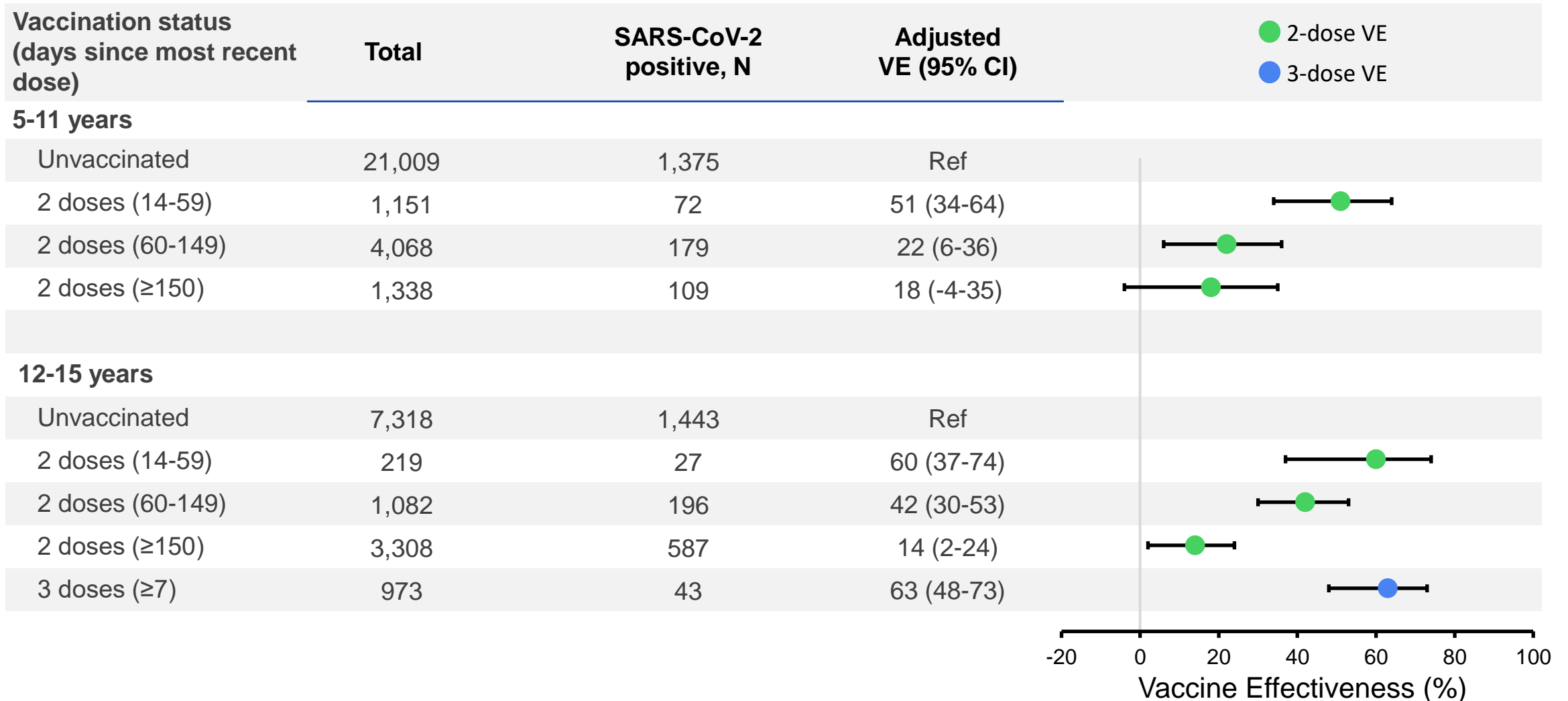


- **Cases:** COVID-like illness (CLI) with positive PCR for SARS-CoV-2 within 14 days before or 72 hours after the admission or encounter
- **Controls:** CLI with negative PCR for SARS-CoV-2

- 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



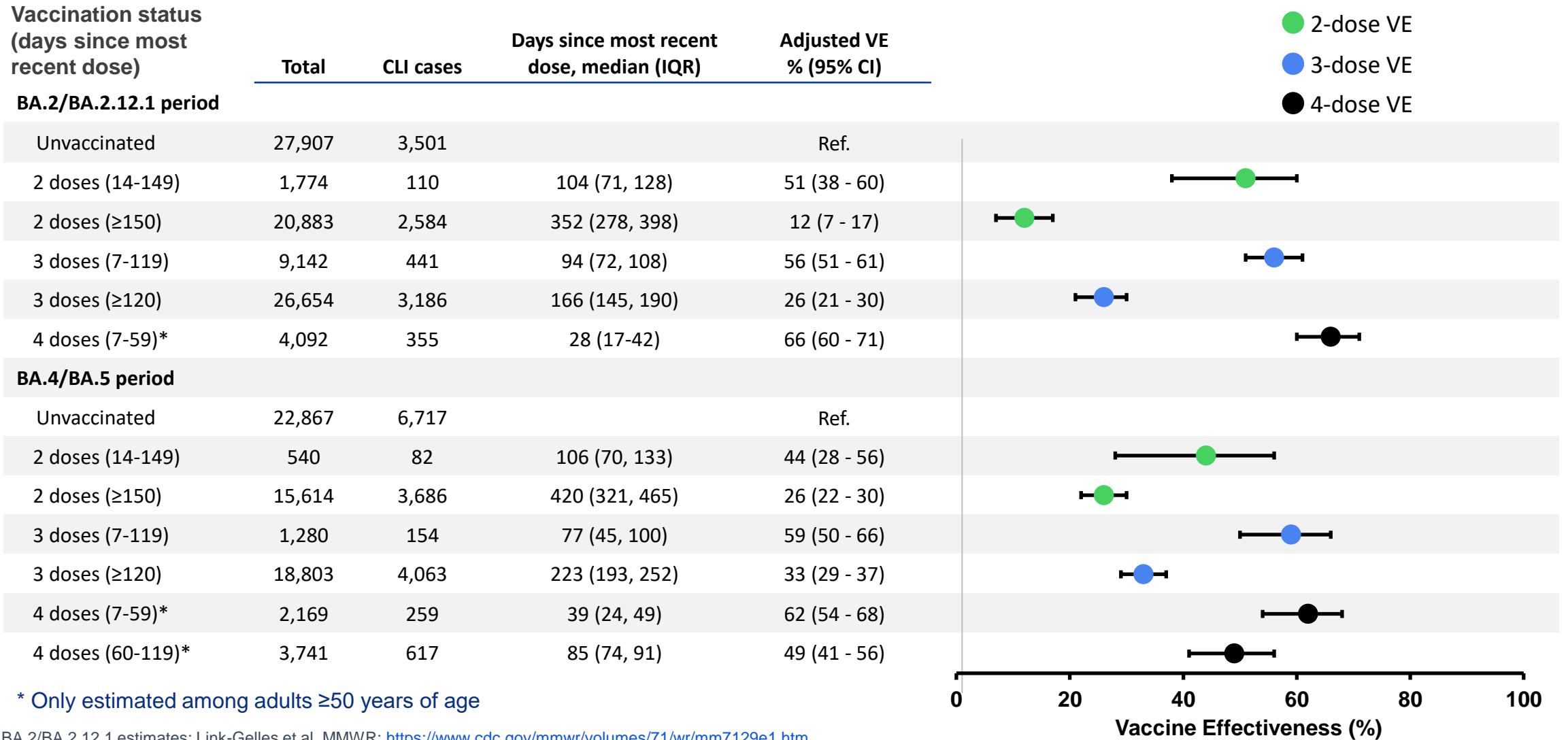
# VISION: Pfizer-BioNTech VE for ED/UC visits by number of doses and time since last dose receipt for children and adolescents during Omicron, mid-Dec 2021–mid-Jul 2022



CDC, preliminary unpublished data. Individuals with prior infections excluded. Adjusted for calendar time, geographic region, age, sex, race, ethnicity, local virus circulation, respiratory or non-respiratory underlying medical conditions, and propensity to be vaccinated

COVID-like illness: included acute respiratory illness (e.g., COVID-19, respiratory failure, or pneumonia) or related signs or symptoms (cough, fever, dyspnea, vomiting, or diarrhea)

# VISION: mRNA VE for ED/UC visits among immunocompetent adults ≥18 years by number of doses and time since last dose receipt, late-Mar–late-Jul 2022



\* Only estimated among adults ≥50 years of age

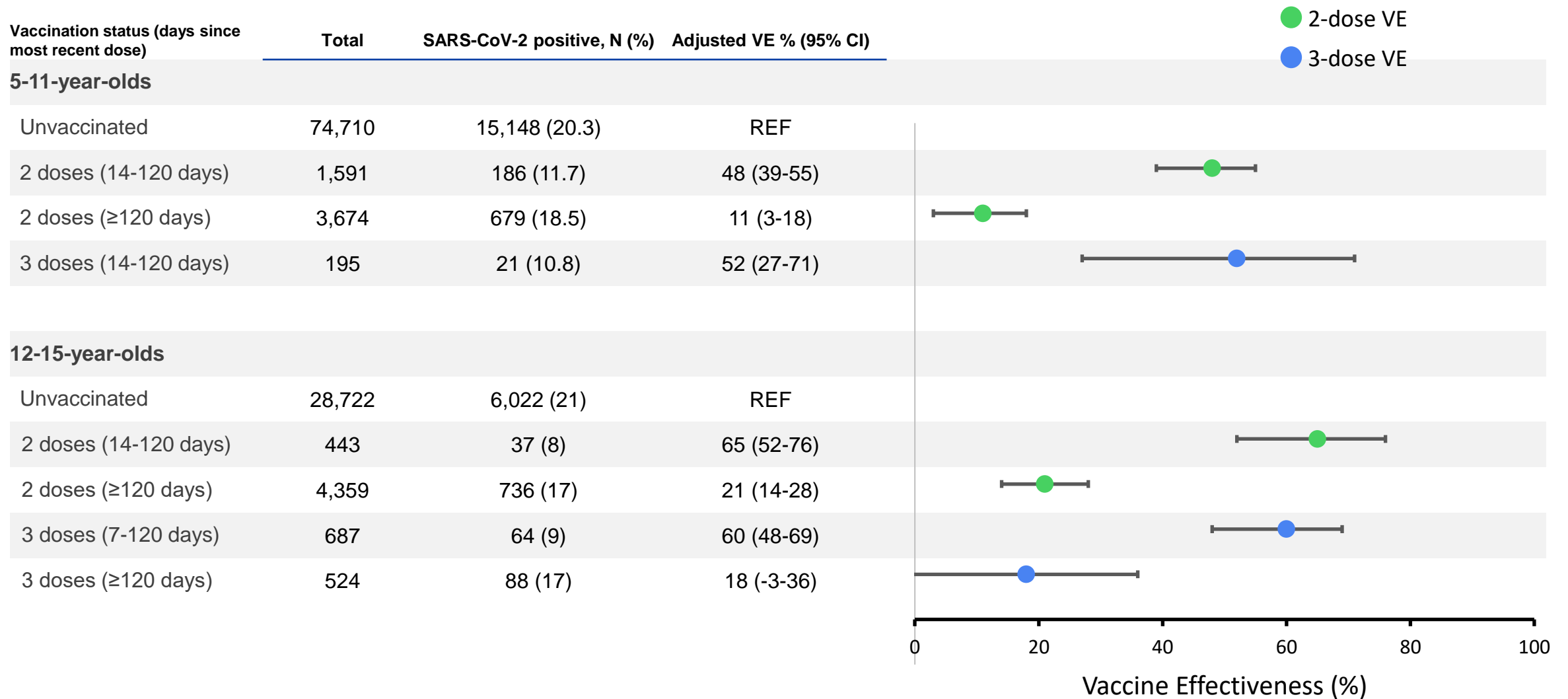
BA.2/BA.2.12.1 estimates: Link-Gelles et al. MMWR: <https://www.cdc.gov/mmwr/volumes/71/wr/mm7129e1.htm>

BA.4/BA.5 estimates: CDC, preliminary unpublished data. Individuals with prior infections excluded. Adjusted for calendar time, geographic region, age, sex, race, ethnicity, local virus circulation, respiratory or non-respiratory underlying medical conditions, and propensity to be vaccinated.

# Cosmos Multi-State Network of Electronic Health Records

- **Platform:** Cosmos is an opt-in database of more than 162 million patient records drawn from health care organizations using the Epic platform for electronic health records
- **Design:** test-negative, case-control analysis
- **Period:** early April 2022 through mid-August 2022
- **Population:** immunocompetent children and adolescents ages 5–15 years
- **Methods:**
  - **Cases:** COVID-like illness with positive SARS-CoV-2 NAAT within 14 days before or 3 days after the encounter
  - **Controls:** COVID-like illness with negative SARS-CoV-2 NAAT within 14 days before or 3 days after the encounter
  - **VE estimated** using unconditional logistic regression; cases and controls frequency matched by 2-week period and state
  - **adjusted for** race, ethnicity, sex, influenza vaccination status, number of underlying conditions

# Cosmos: mRNA VE for ED/UC visits among children and adolescents by number of doses and time since last dose during Omicron predominance (combined BA.2/2.12.1/4/5 period) April 2022– mid-August 2022



# **Vaccine effectiveness against hospitalization due to Omicron in the US**

# VISION: mRNA VE for hospitalizations among immunocompetent adults ≥18 years by number of doses and time since last dose receipt, late-Mar–late-Jul 2022

Vaccination status  
(days since most recent dose)

BA.2/BA.2.12.1 period

	Total	CLI cases	Days since most recent dose, median (IQR)	Adjusted VE % (95% CI)
Unvaccinated	6,682	494		Ref.
2 doses (14-149)	*	*	*	*
2 doses (≥150)	5,118	393	371 (308, 413)	24 (12 - 35)
3 doses (7-119)	2,350	72	94 (74, 108)	69 (58 - 76)
3 doses (≥120)	7,686	519	168 (146, 191)	52 (44 - 59)
4 doses (7-59)**	1,204	74	27 (17, 41)	80 (71 - 85)

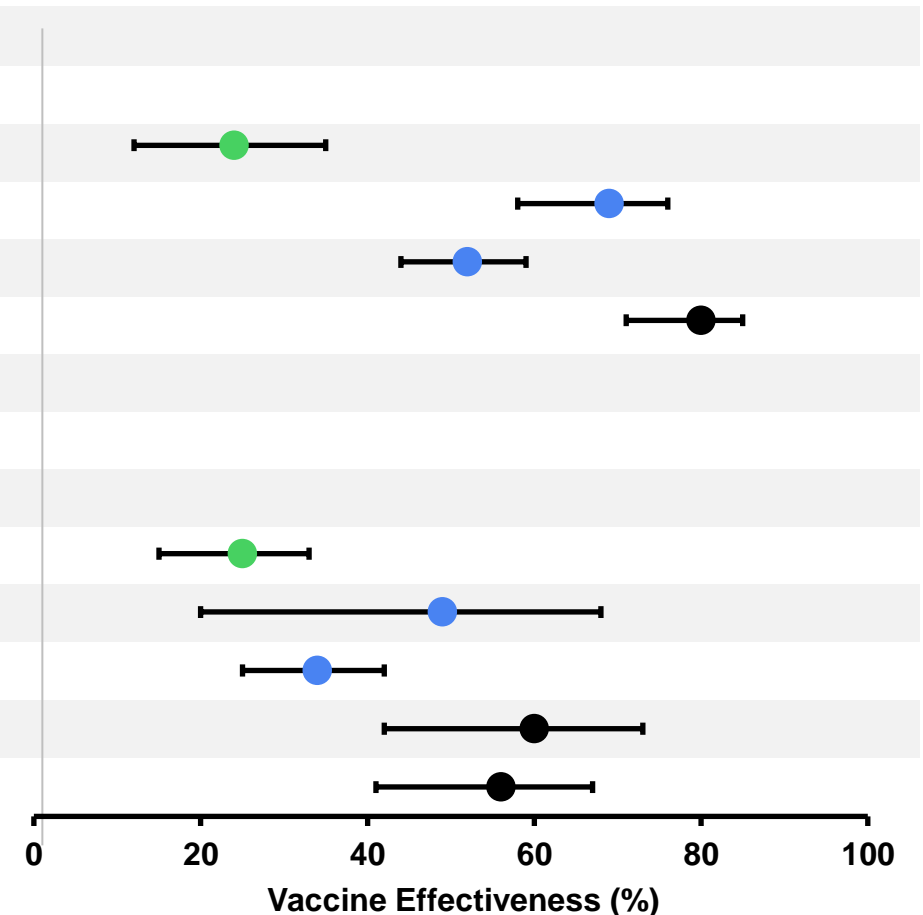
BA.4/BA.5 period

Unvaccinated	4,578	913		Ref.
2 doses (14-149)	*	*	*	*
2 doses (≥150)	3,592	619	445 (369, 484)	25 (15 - 33)
3 doses (7-119)	335	32	76 (46, 100)	49 (20 - 68)
3 doses (≥120)	5,030	869	229 (199, 256)	34 (25 - 42)
4 doses (7-59)**	717	81	38 (23, 49)	60 (42 - 73)
4 doses (60-119)**	1,146	157	84 (73, 97)	56 (41 - 67)

\* Estimates with confidence intervals >50 percentage points are not shown.

\*\* Only estimated among adults ≥50 years of age

● 2-dose VE  
● 3-dose VE  
● 4-dose VE



BA.2/BA.2.12.1 estimates: Link-Gelles et al. MMWR: <https://www.cdc.gov/mmwr/volumes/71/wr/mm7129e1.htm>

BA.4/BA.5 estimates: CDC, preliminary unpublished data. Individuals with prior infections excluded. Adjusted for calendar time, geographic region, age, sex, race, ethnicity, local virus circulation, respiratory or non-respiratory underlying medical conditions, and propensity to be vaccinated.

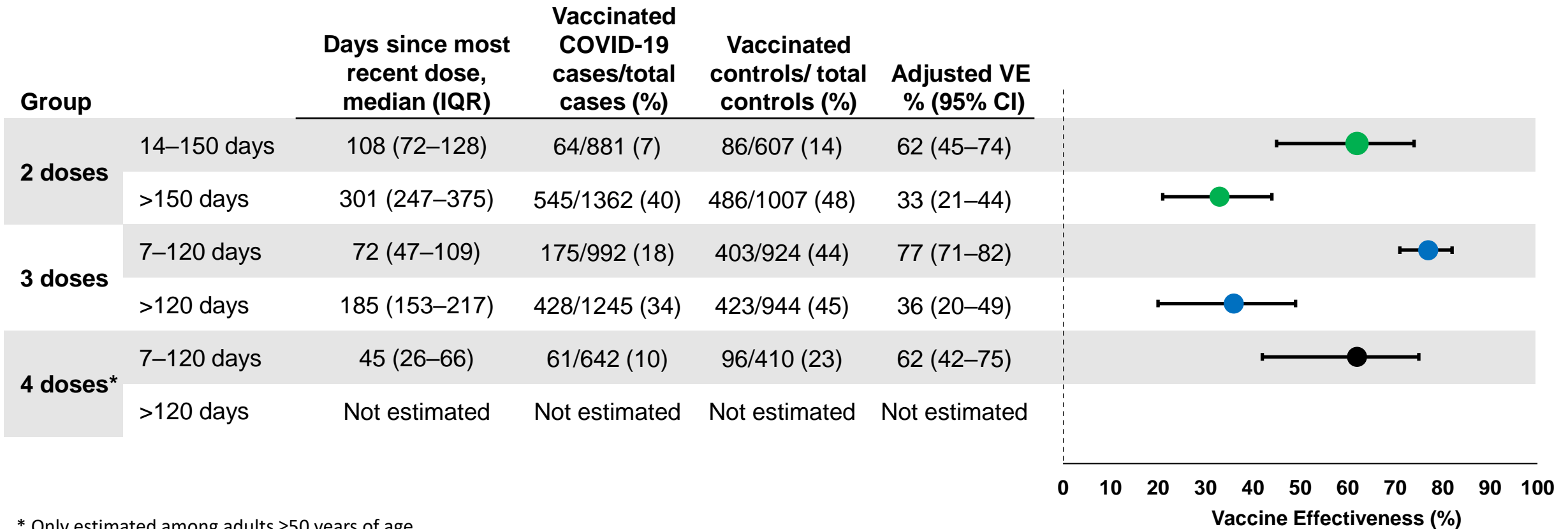
# IVY Network: VE against Omicron variant COVID-19-associated hospitalization

- **Design:** Test-negative, case-control assessment
- **Period:** December 26, 2021–July 31, 2022
- **Population:** Adults ( $\geq 18$  years) hospitalized at 21 medical centers in 18 states
- **Participants have COVID-like illness and test:**
  - Cases: SARS-CoV-2-positive by RT-PCR or antigen tests
  - Controls: SARS-CoV-2-negative by RT-PCR
- **VE adjustments:**
  - Age (18–49, 50–64, and  $\geq 65$  years, or continuous for models stratified by age), sex, race/ethnicity, admission date (biweekly), and HHS region



# IVY Network: mRNA VE against hospitalization among immunocompetent adults during Omicron period, Dec 26, 2021–Jul 31, 2022

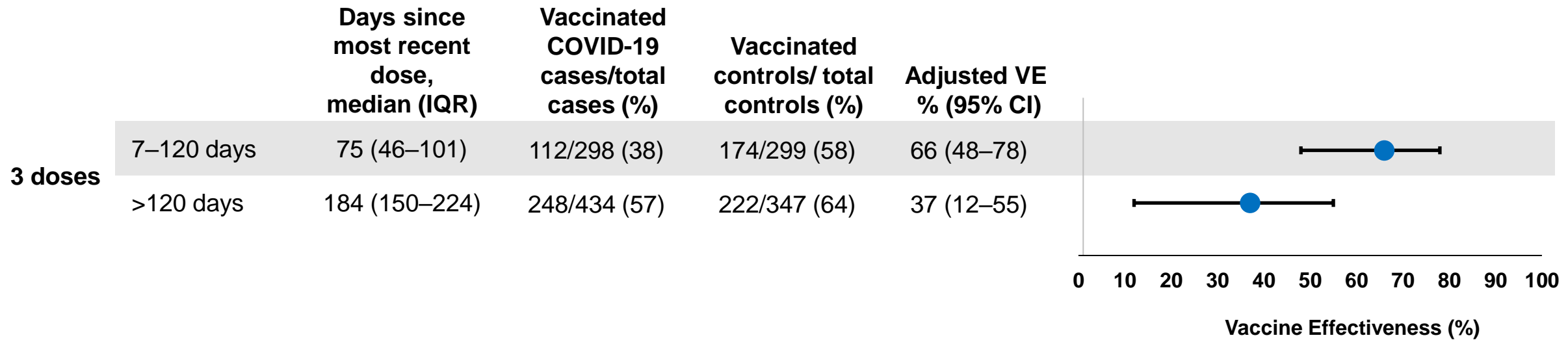
- 2-dose VE
- 3-dose VE
- 4-dose VE



\* Only estimated among adults ≥50 years of age



# IVY Network: mRNA VE against hospitalization among immunocompromised adults during Omicron period, Dec 26, 2021–Jul 31, 2022



\* Not enough data to estimate 2 or 4-dose VE.

# Summary

# Vaccine effectiveness during Omicron

- Effectiveness against severe disease continues to be higher and more sustained over time than effectiveness against infection
- VE during BA.4/BA.5 predominance was generally comparable to VE during BA.2 predominance
- 3<sup>rd</sup> dose provides significant additional protection against infection and severe disease in all ages studied
  - VE post 3<sup>rd</sup> dose appears to wane more slowly compared with 2 doses alone during Omicron
  - Similar patterns across age groups
- Coverage with 4<sup>th</sup> dose too low to draw conclusions but additional benefits demonstrated for infection, ED/UC, and hospitalization

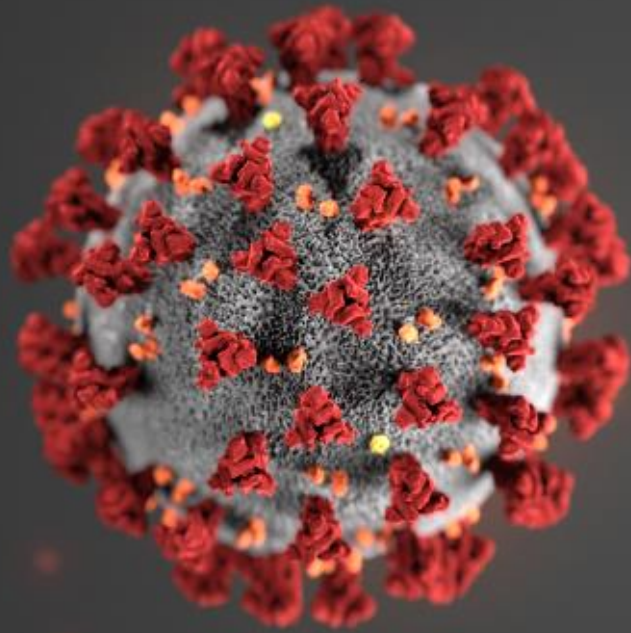
# Acknowledgements

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TTY: 1-888-232-6348 [www.cdc.gov](http://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.

