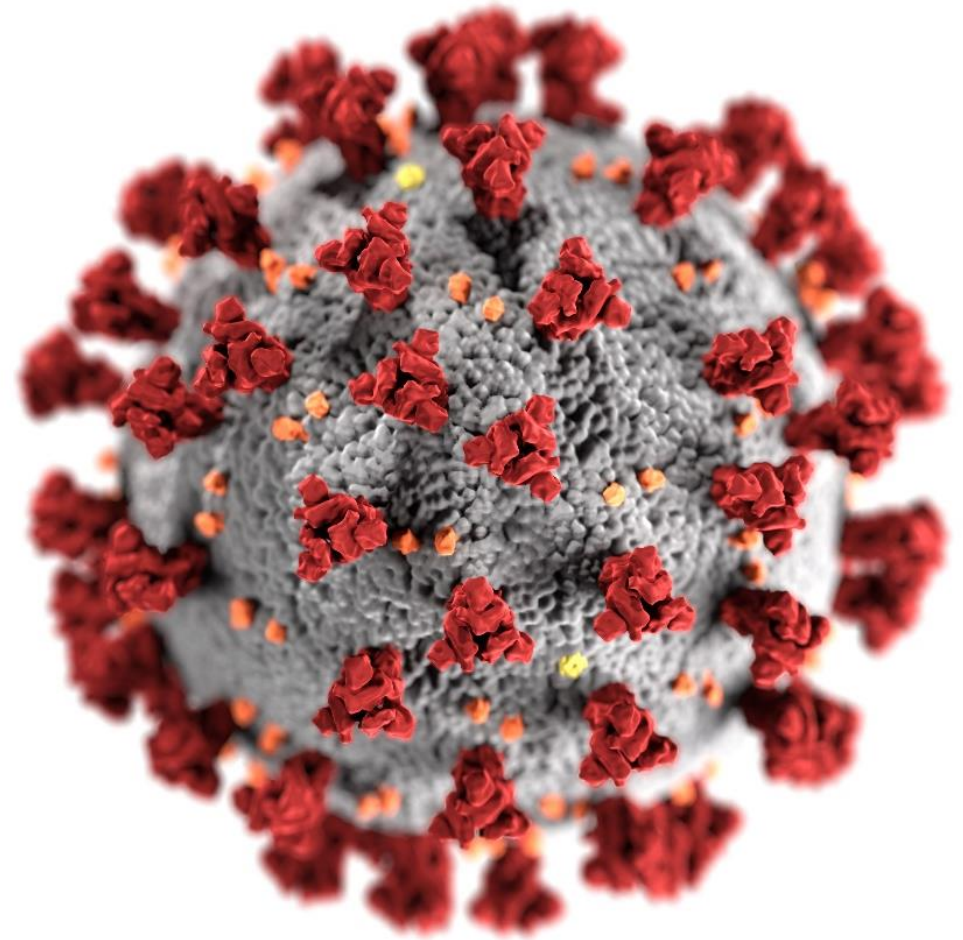


Updates on COVID-19 Vaccine Effectiveness during Omicron

Ruth Link-Gelles, PhD, MPH
LCDR, US Public Health Service
Program Lead, COVID-19 Vaccine Effectiveness
National Center for Immunization and Respiratory Diseases

ACIP
September 1, 2022



cdc.gov/coronavirus

Organization of presentation

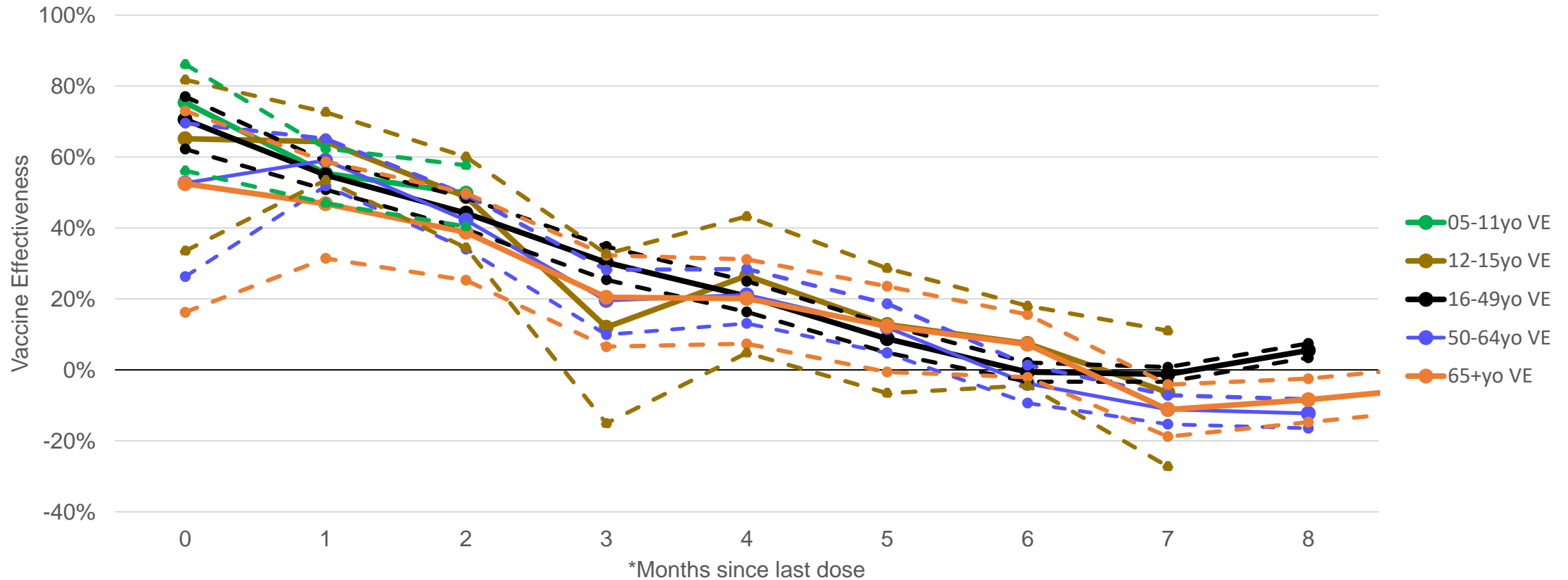
- Presentation organized by outcome, then by age within outcome
 - Infection
 - Emergency department/urgent care (ED/UC)
 - Hospitalization

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 ≥ 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

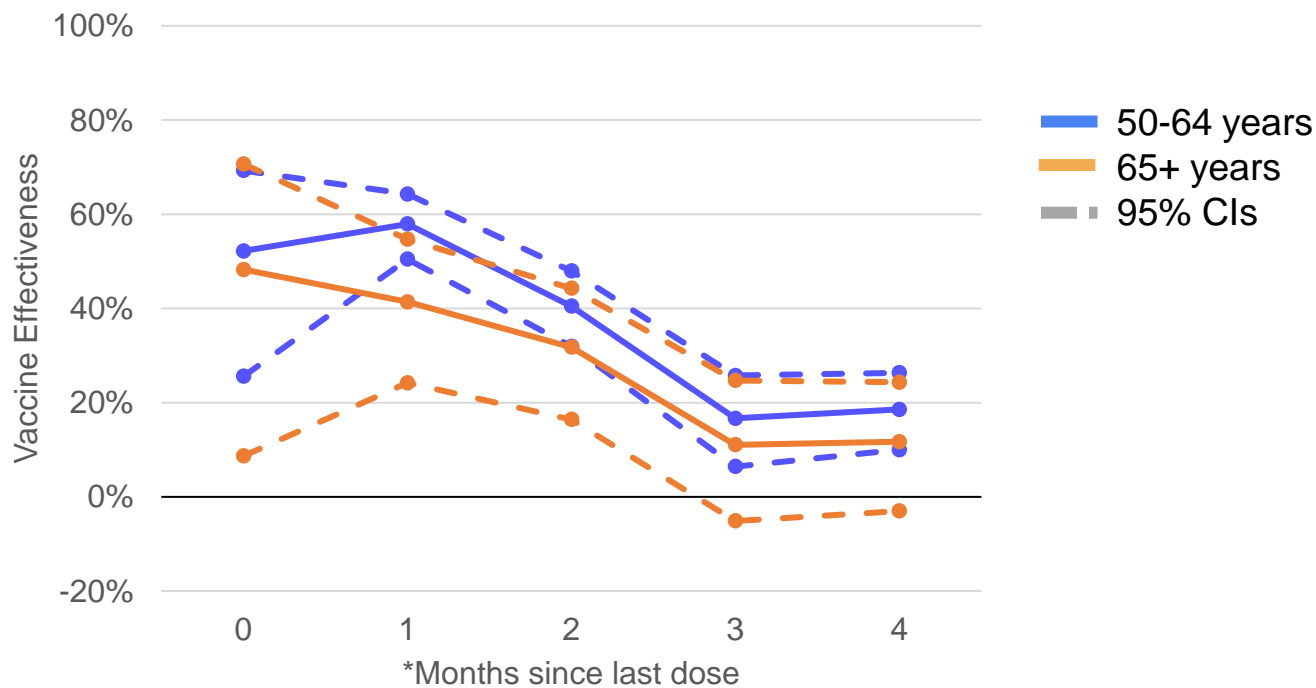
ICATT: mRNA 3 vs. 2-dose relative VE against symptomatic infection during BA.4/BA.5, ages 5+ years



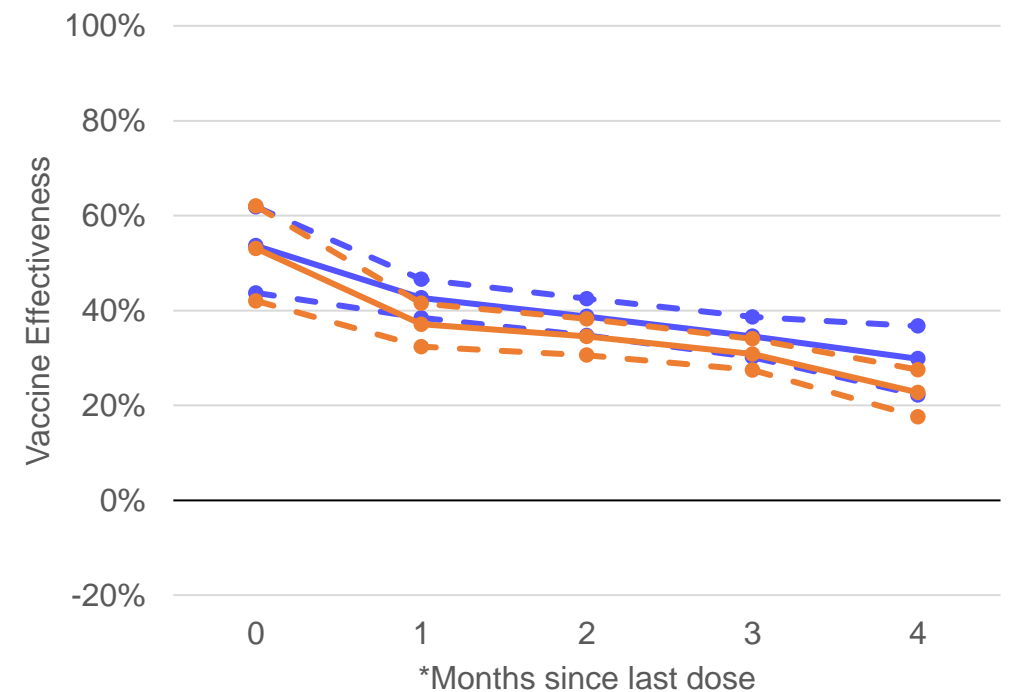
*Vaccination dose dates are collected as month and year. Month 0 represents tests in the same month as last dose (at least 2 weeks after last dose). For all months greater than or equal to 1 the value represents the difference between calendar month of test and calendar month of last dose receipt (at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



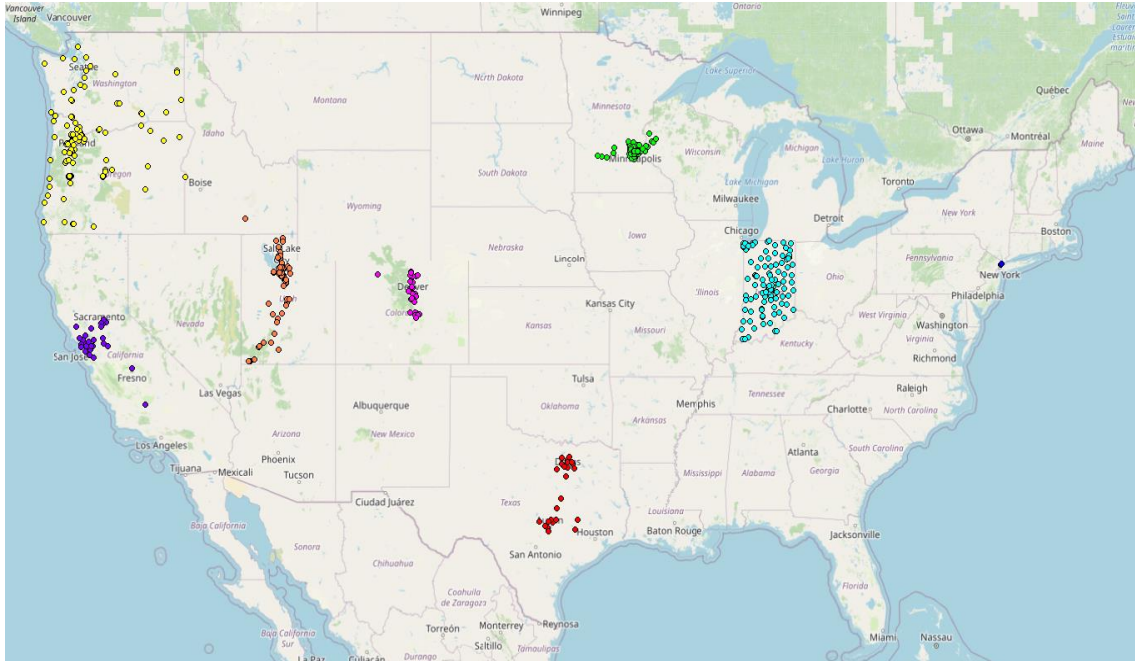
4 vs. 3-dose relative VE



*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

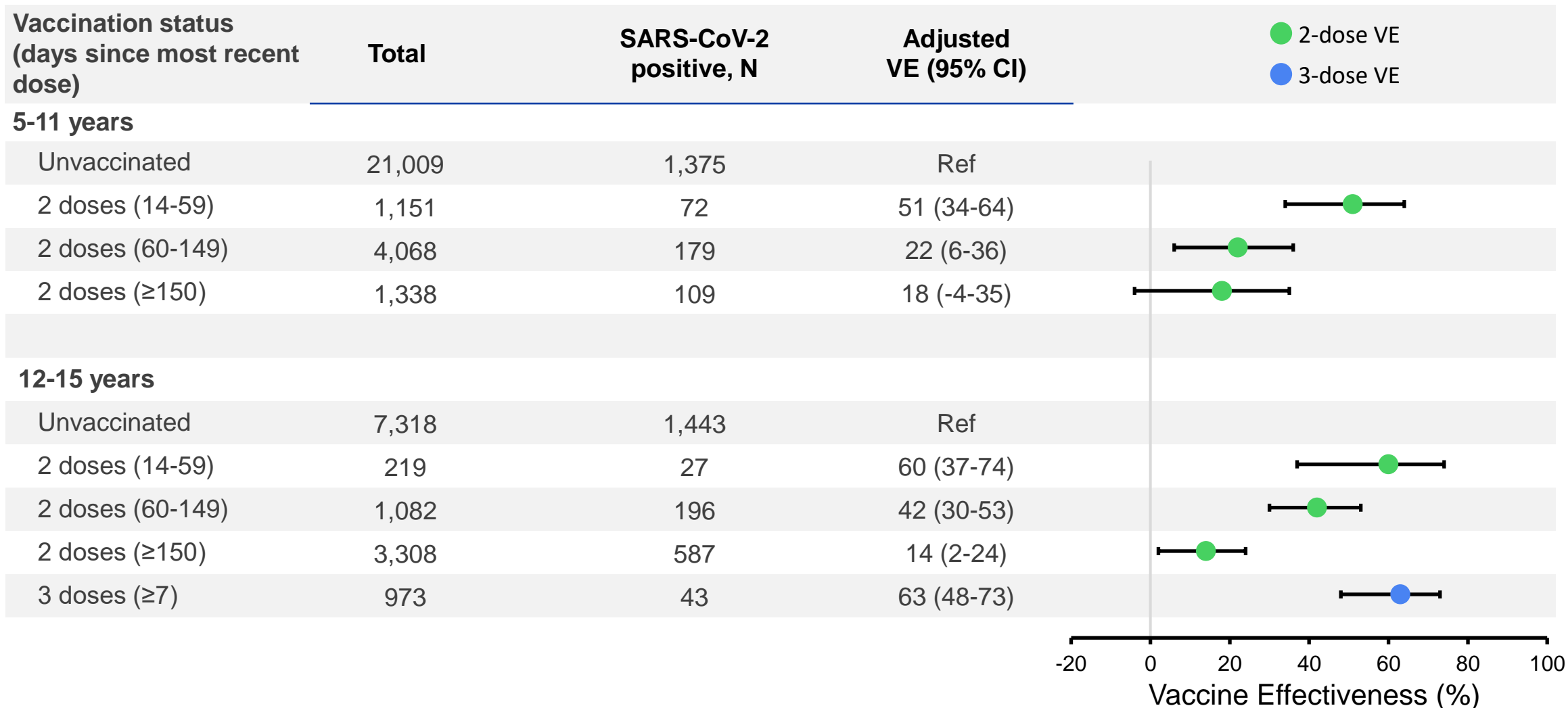
VISION Multi-State Network of Electronic Health Records



- **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

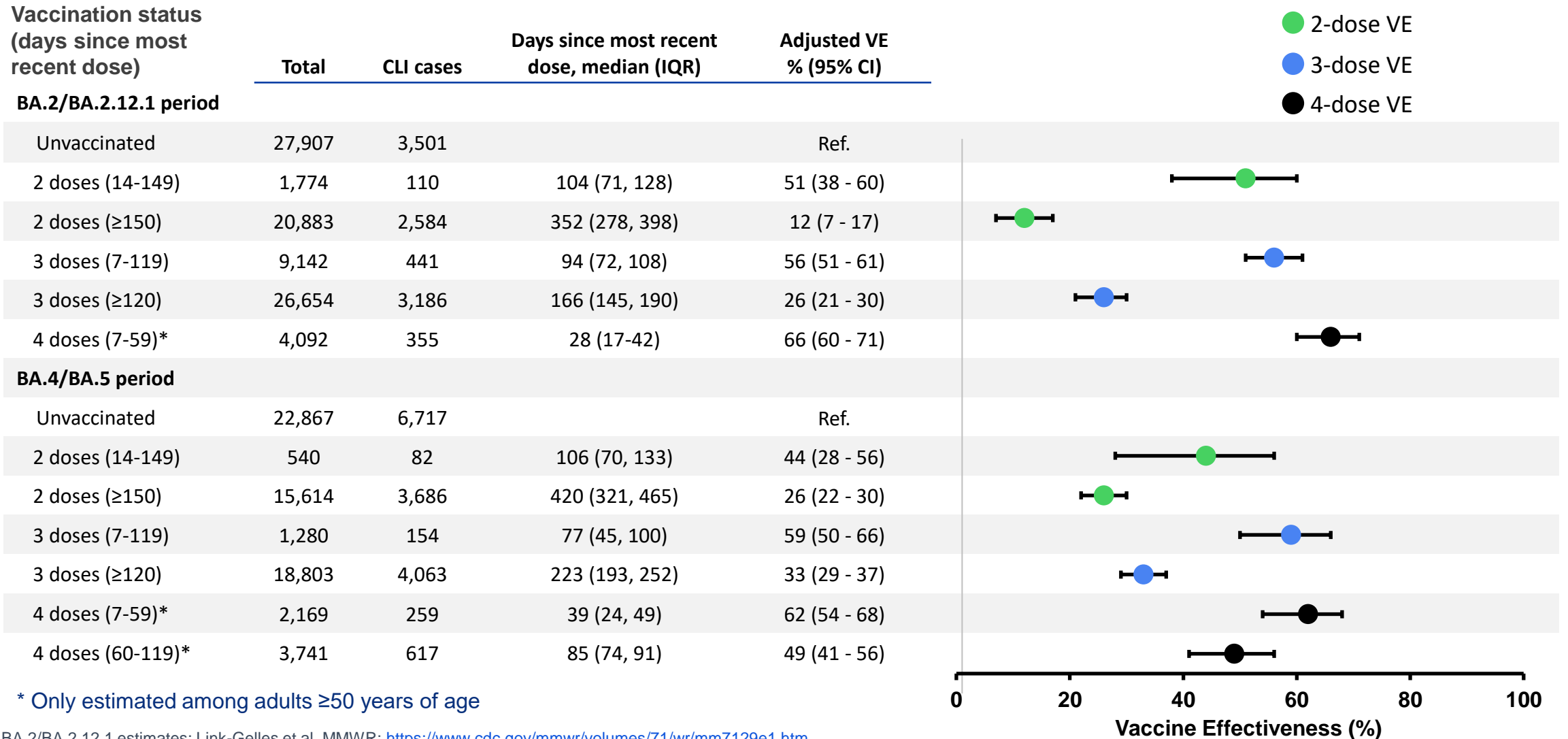
VISION: Pfizer-BioNTech VE for ED/UC visits by number of doses and time since last dose receipt for children and adolescents during Omicron, mid-Dec 2021–mid-Jul 2022



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

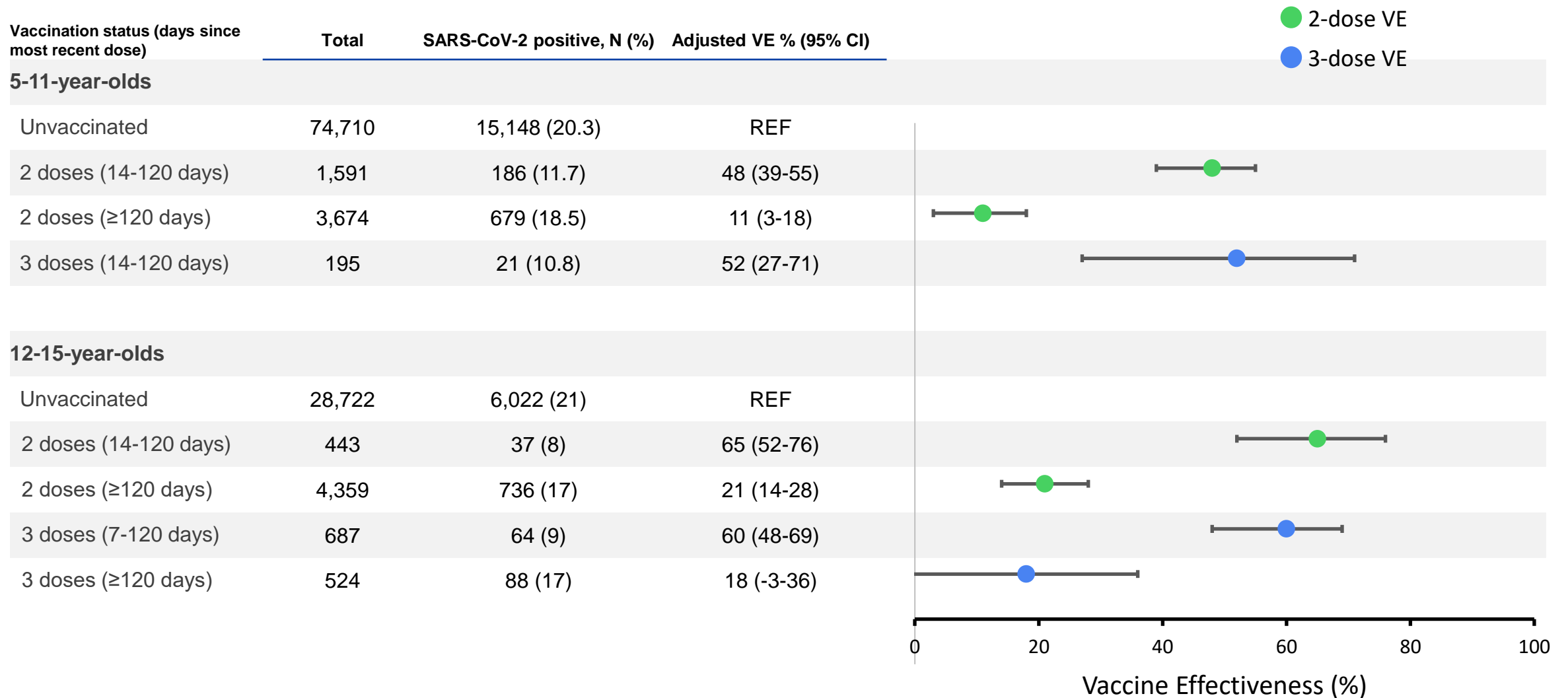
BA.2/BA.2.12.1 estimates: Link-Gelles et al. MMWR: <https://www.cdc.gov/mmwr/volumes/71/wr/mm7129e1.htm>

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

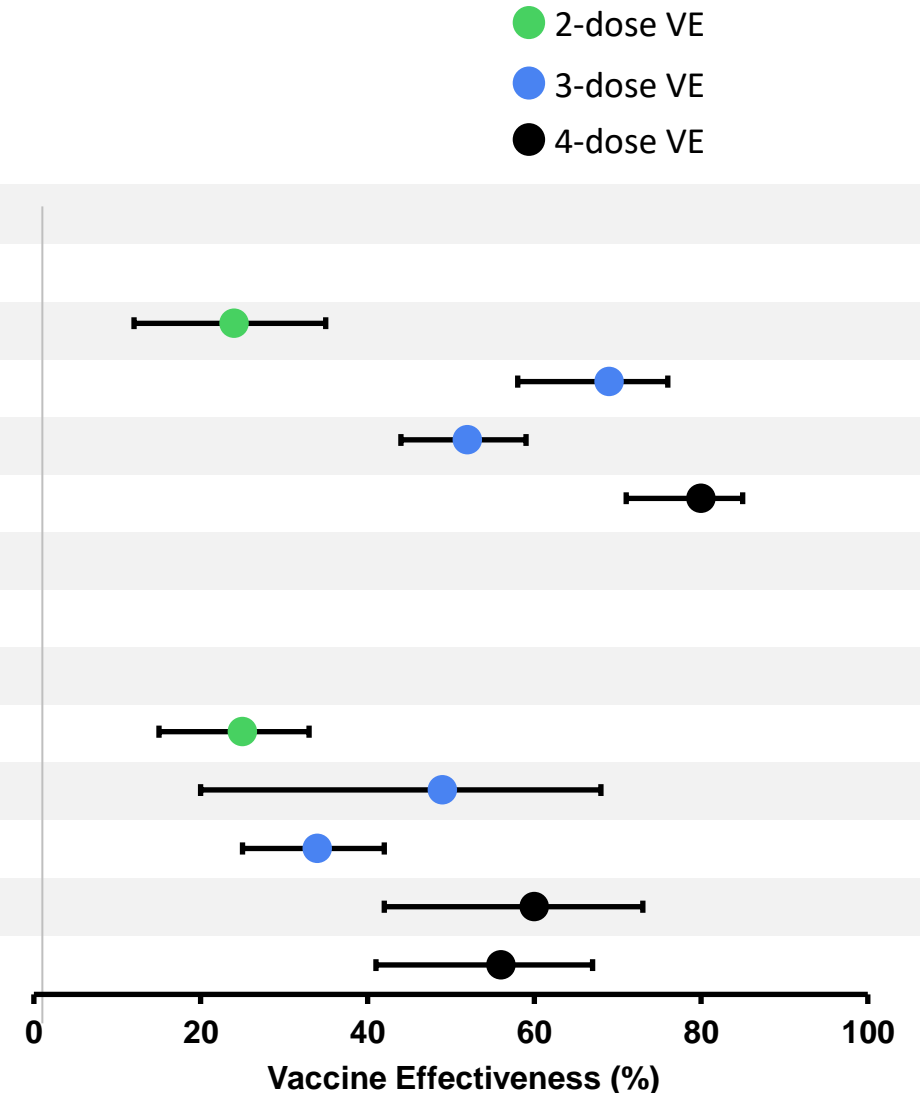
	Total	CLI cases	Days since most recent dose, median (IQR)	Adjusted VE % (95% CI)
Unvaccinated	6,682	494		Ref.
2 doses (14-149)	*	*	*	*
2 doses (≥150)	5,118	393	371 (308, 413)	24 (12 - 35)
3 doses (7-119)	2,350	72	94 (74, 108)	69 (58 - 76)
3 doses (≥120)	7,686	519	168 (146, 191)	52 (44 - 59)
4 doses (7-59)**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



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

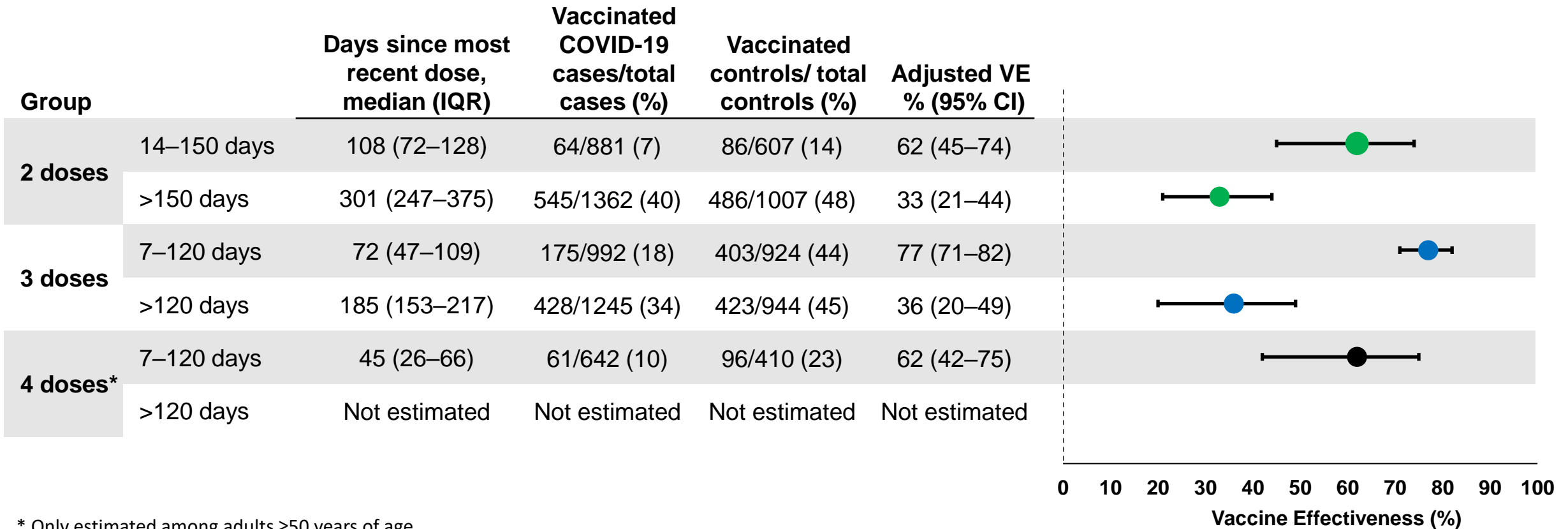
- **Design:** Test-negative, case-control assessment
- **Period:** December 26, 2021–July 31, 2022
- **Population:** Adults (≥ 18 years) hospitalized at 21 medical centers in 18 states
- **Participants have COVID-like illness and test:**
 - Cases: SARS-CoV-2-positive by RT-PCR or antigen tests
 - Controls: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

IVY
INFLUENZA AND OTHER VIRUSES IN THE ACUTE ILL



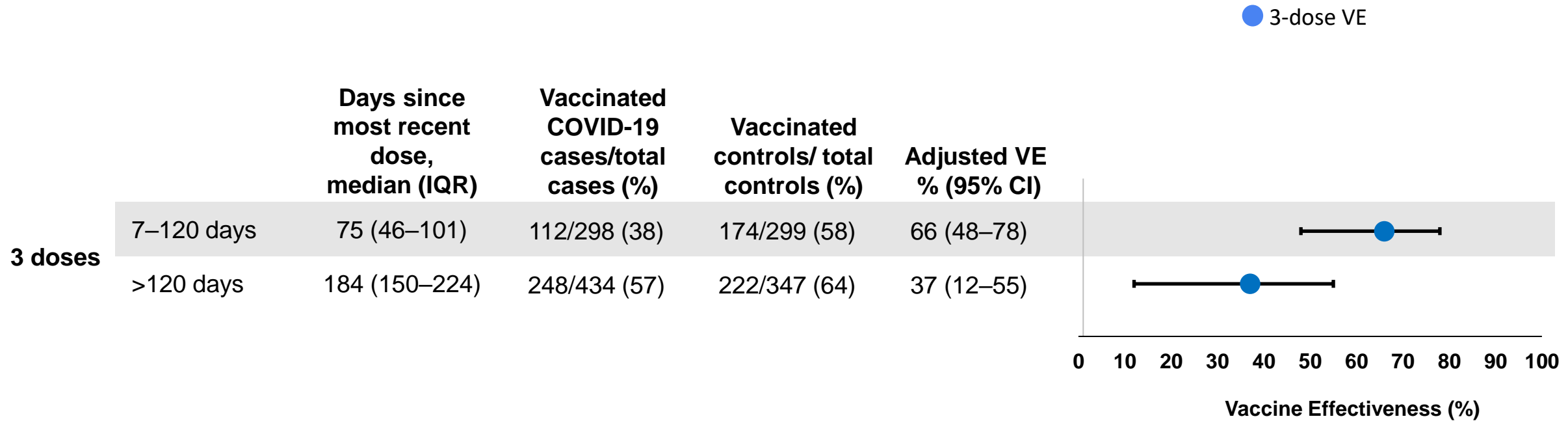
IVY Network: mRNA VE against hospitalization among immunocompetent adults during Omicron period, Dec 26, 2021–Jul 31, 2022

- 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
- 3rd dose provides significant additional protection against infection and severe disease in all ages studied
 - VE post 3rd dose appears to wane more slowly compared with 2 doses alone during Omicron
 - Similar patterns across age groups
- Coverage with 4th dose too low to draw conclusions but additional benefits demonstrated for infection, ED/UC, and hospitalization

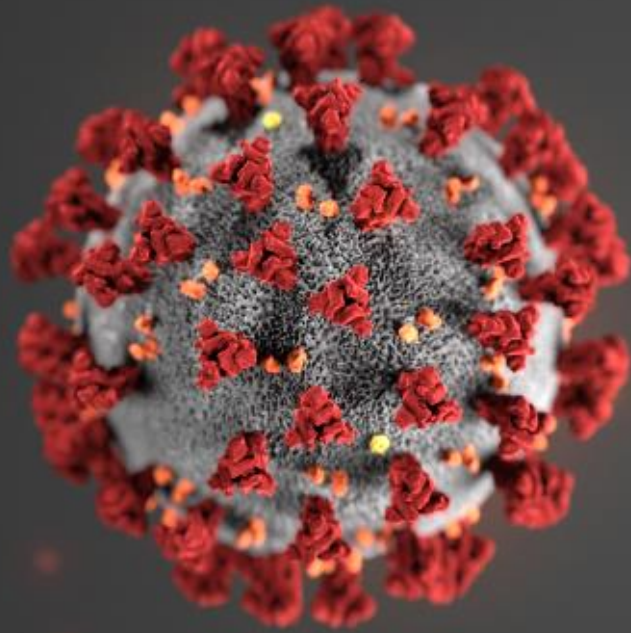
Acknowledgements

CDC COVID-19 Vaccine Effectiveness and Policy Team

- Tamara Pilishvili
- Sara Oliver
- Amadea Britton
- Allison Ciesla
- Monica Godfrey
- Katherine Fleming-Dutra
- Morgan Najdowski
- Lauren Roper
- Evelyn Twentyman
- Ryan Wiegand

PIs and study staff for ICATT, VISION, COSMOS, IVY

- Katherine Adams
- Levi Bonnell
- Alexandra Dalton
- Ashley Fowlkes
- Matthew Levy
- Samantha Olson
- Manish Patel
- Zach Smith
- Diya Surie
- Mark Tenforde
- Mark Thompson
- Laura Zambrano
- Joe Deckert
- Eric Barkley
- Alex Piff
- Caleb Cox
- Johnston Thayer



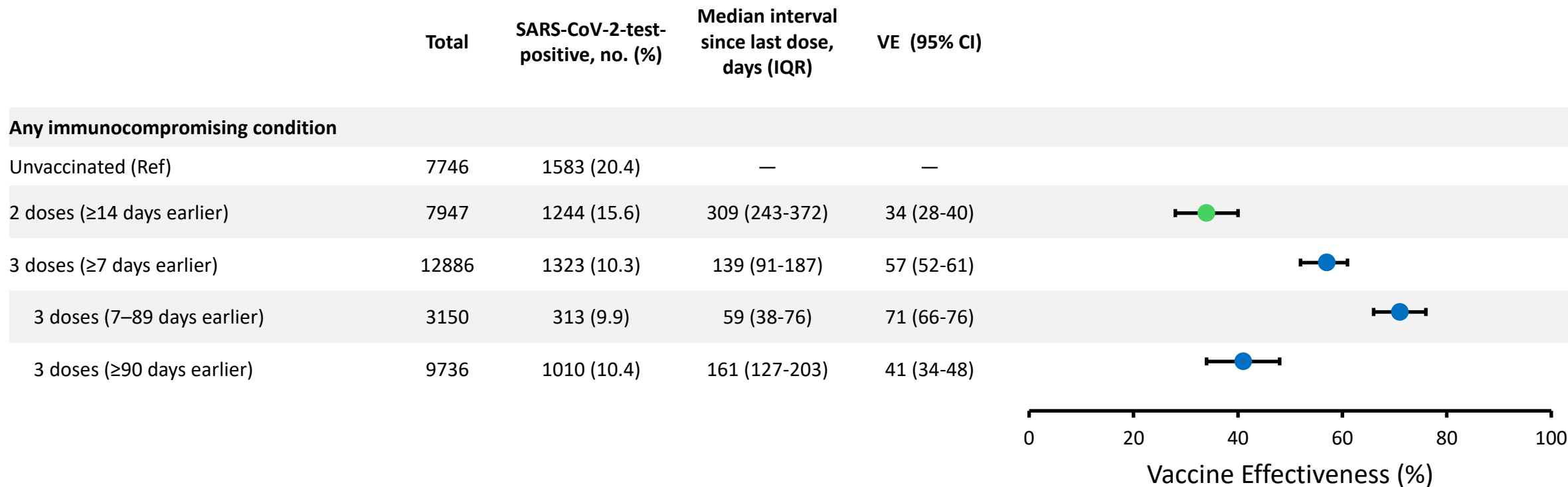
For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

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.



Back-up slides

VISION: mRNA VE for hospitalizations among immunocompromised adults ≥18 years by number of doses and time since last dose during Omicron predominance (all subvariants), mid-Dec 2021 – late-Jul 2022



Cosmos Multi-State Network of Electronic Health Records

- [Cosmos](#) is a database of more than 162 million patient records drawn from health care organizations using the Epic platform for electronic health records
- Inpatient and outpatient HIPAA-limited data are contributed by participating Epic EHR customers.
- Participation is opt-in for all sites
- Currently contributing organizations in all 50 U.S. states and included records align closely to population metrics of the U.S. census

