Updates on COVID-19 Vaccine Effectiveness during Omicron

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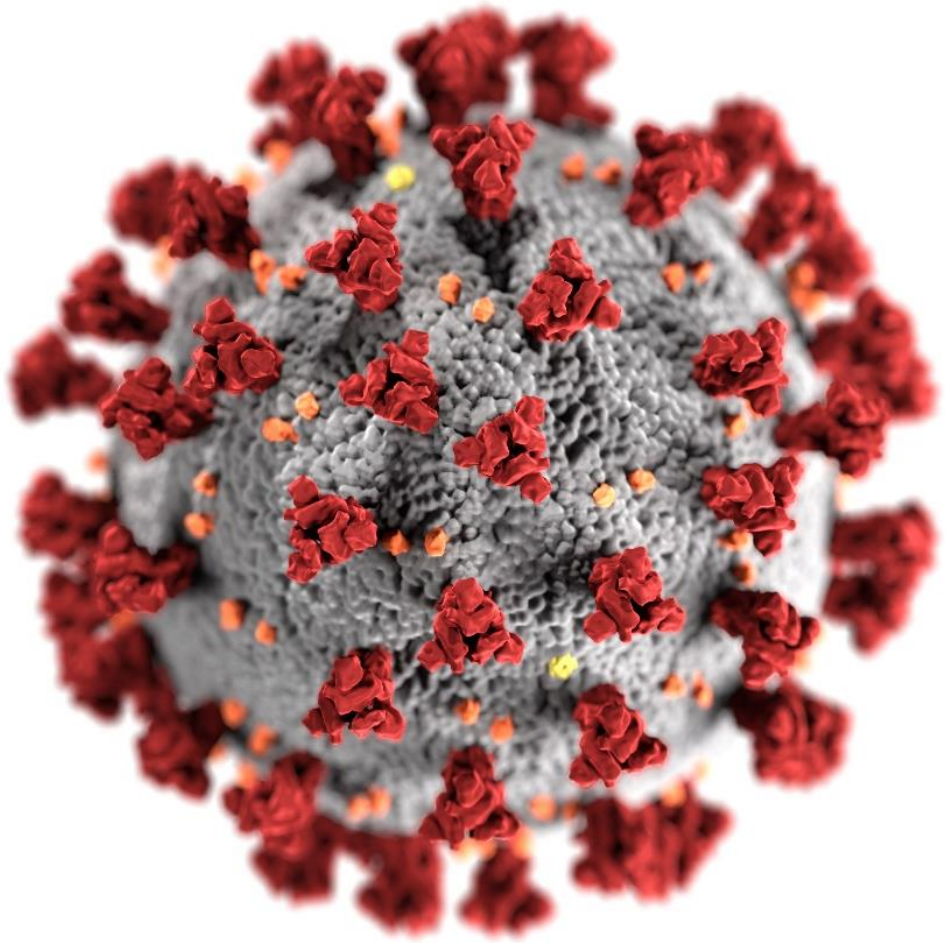
ACIP
September 1, 2022



cdc.gov/coronavirus

Organization of presentation

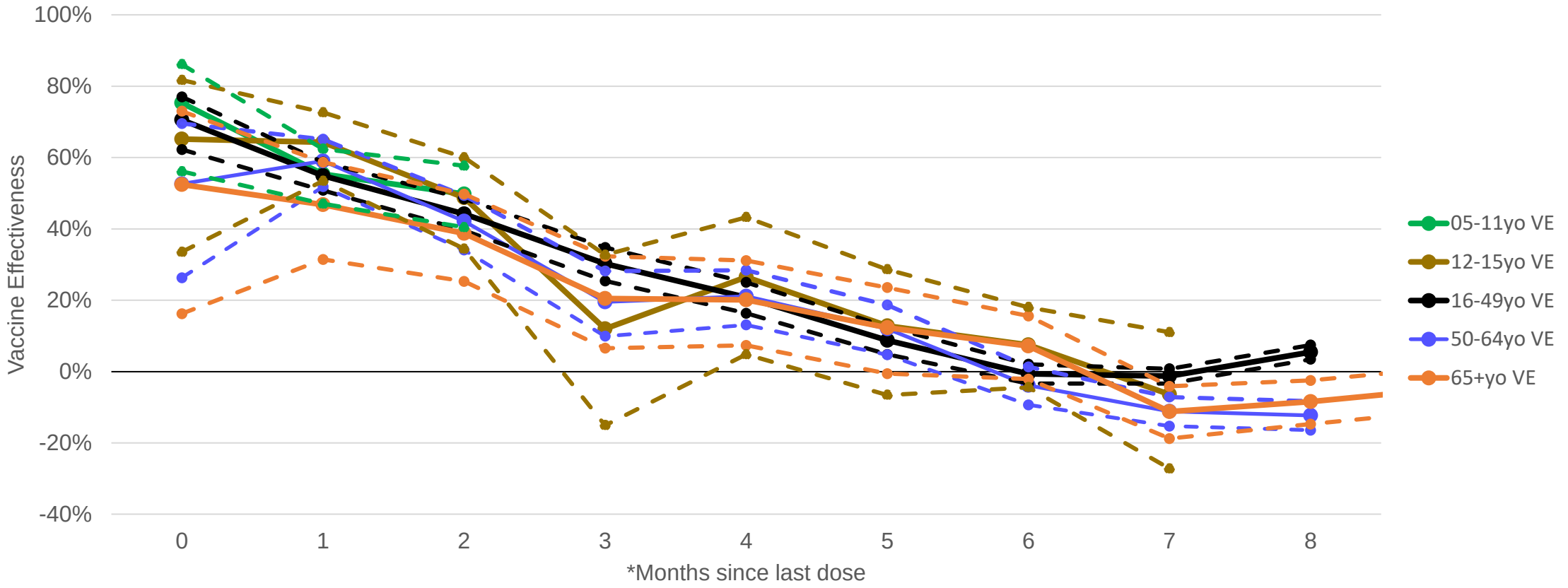
- Presentation organized by outcome, then by age within outcome
  - Infection
  - Emergency department/urgent care (ED/UC)
  - Hospitalization

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

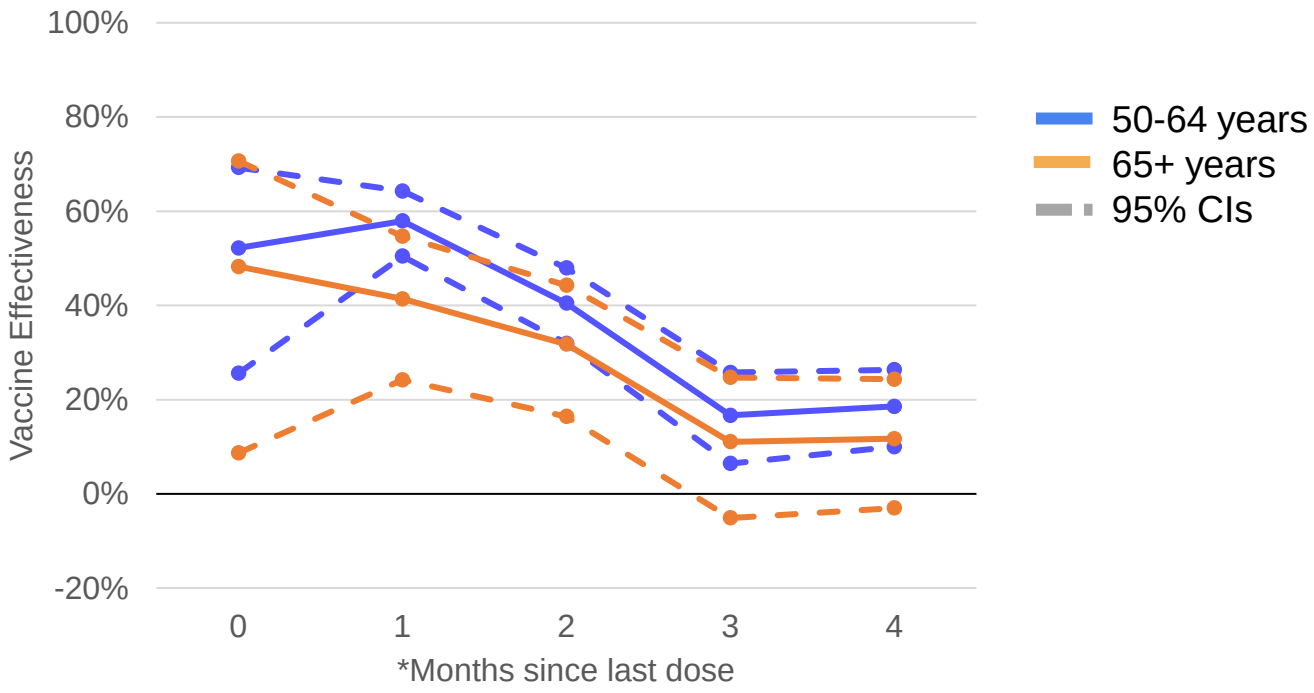


*Vaccination dose dates are collected as month and year. Month 0 represents tests in the same month as last dose (at least 2 weeks after last dose). For all months greater than or equal to 1 the value represents the difference between calendar month of test and calendar month of last dose receipt (at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

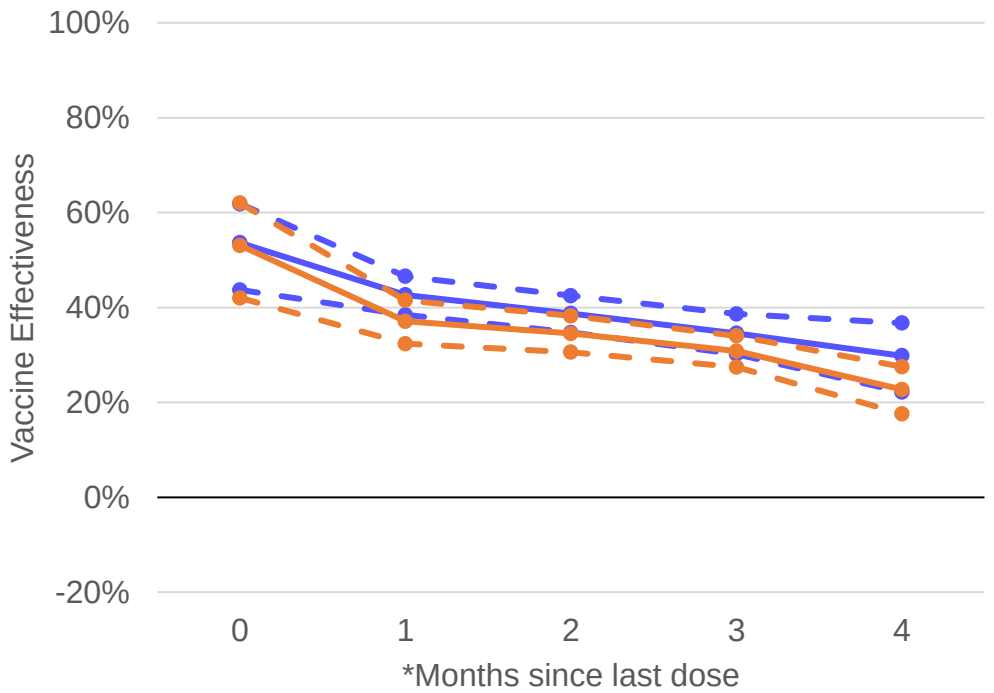
CDC preliminary unpublished data. Prior infection excluded, other methods based on: Fleming-Dutra KE, Britton A, Shang N, et al. Association of Prior BNT162b2 COVID-19 Vaccination With Symptomatic SARS-CoV-2 Infection in Children and Adolescents During Omicron Predominance. *JAMA.* Published online May 13, 2022. doi:10.1001/jama.2022.7493

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



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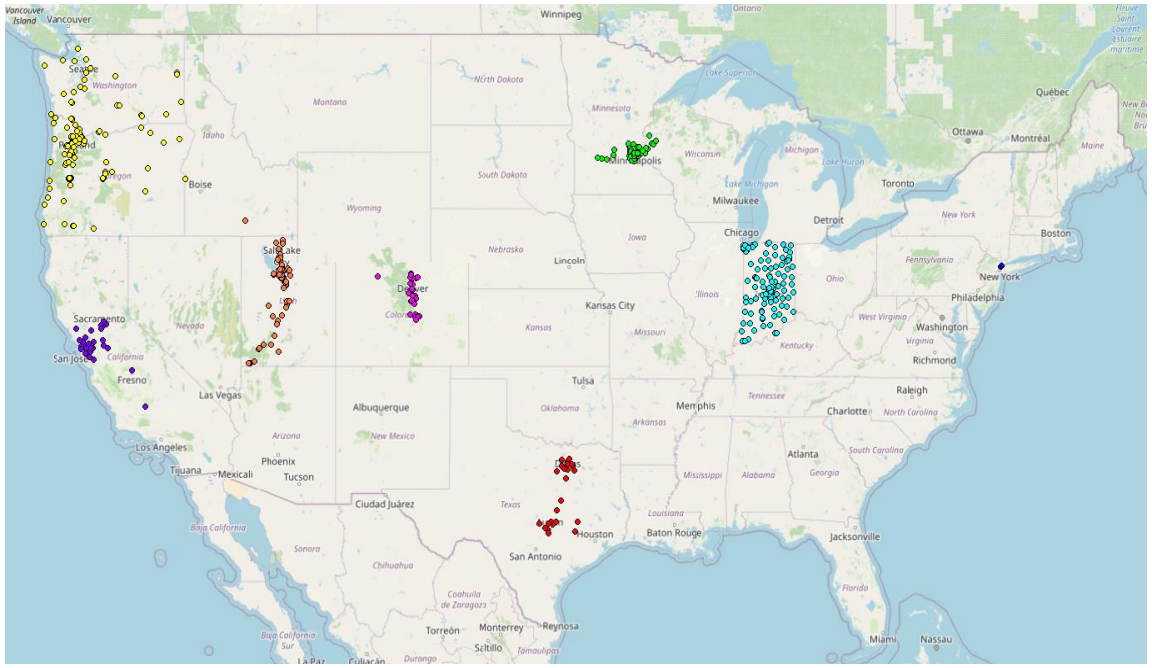
Vaccine effectiveness against emergency department/urgent care (ED/UC) due to Omicron in the US

VISION Multi-State Network of Electronic Health Records

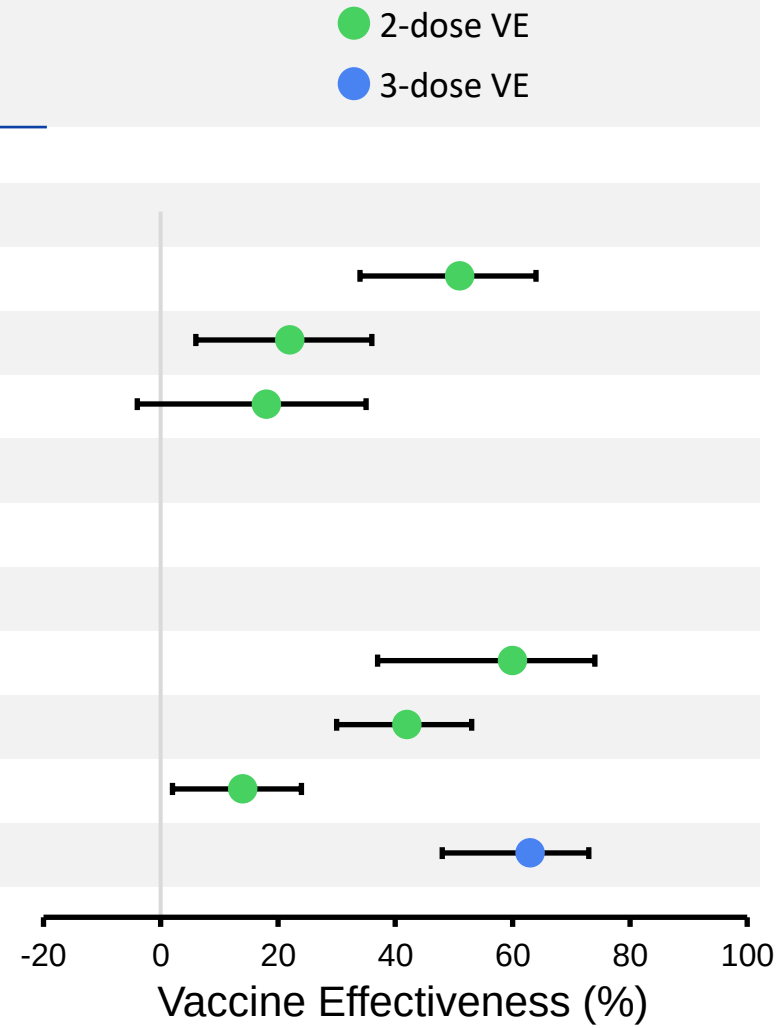


- **Cases**: COVID-like illness (CLI) with positive PCR for SARS-CoV-2 within 14 days before or 72 hours after the admission or encounter
- **Controls**: CLI with negative PCR for SARS-CoV-2

- 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

Vaccination status (days since most recent dose)	Total	SARS-CoV-2 positive, N	Adjusted VE (95% CI)
5-11 years			
Unvaccinated	21,009	1,375	Ref
2 doses (14-59)	1,151	72	51 (34-64)
2 doses (60-149)	4,068	179	22 (6-36)
2 doses (≥150)	1,338	109	18 (-4-35)
12-15 years			
Unvaccinated	7,318	1,443	Ref
2 doses (14-59)	219	27	60 (37-74)
2 doses (60-149)	1,082	196	42 (30-53)
2 doses (≥150)	3,308	587	14 (2-24)
3 doses (≥7)	973	43	63 (48-73)

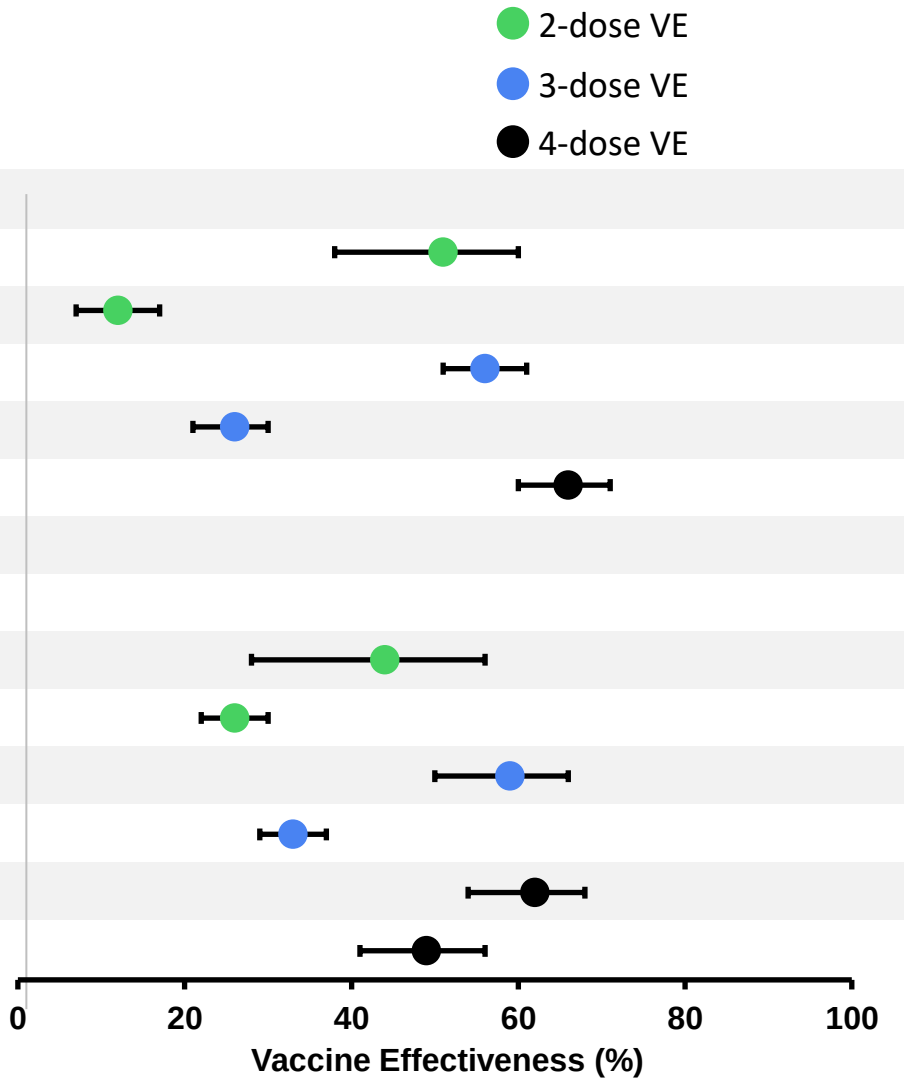


CDC, preliminary unpublished data. Individuals with prior infections excluded. Adjusted for calendar time, geographic region, age, sex, race, ethnicity, local virus circulation, respiratory or non-respiratory underlying medical conditions, and propensity to be vaccinated

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

Vaccination status (days since most recent dose)	Total	CLI cases	Days since most recent dose, median (IQR)	Adjusted VE % (95% CI)
BA.2/BA.2.12.1 period				
Unvaccinated	27,907	3,501		Ref.
2 doses (14-149)	1,774	110	104 (71, 128)	51 (38 - 60)
2 doses (≥150)	20,883	2,584	352 (278, 398)	12 (7 - 17)
3 doses (7-119)	9,142	441	94 (72, 108)	56 (51 - 61)
3 doses (≥120)	26,654	3,186	166 (145, 190)	26 (21 - 30)
4 doses (7-59)*	4,092	355	28 (17-42)	66 (60 - 71)
BA.4/BA.5 period				
Unvaccinated	22,867	6,717		Ref.
2 doses (14-149)	540	82	106 (70, 133)	44 (28 - 56)
2 doses (≥150)	15,614	3,686	420 (321, 465)	26 (22 - 30)
3 doses (7-119)	1,280	154	77 (45, 100)	59 (50 - 66)
3 doses (≥120)	18,803	4,063	223 (193, 252)	33 (29 - 37)
4 doses (7-59)*	2,169	259	39 (24, 49)	62 (54 - 68)
4 doses (60-119)*	3,741	617	85 (74, 91)	49 (41 - 56)



* 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

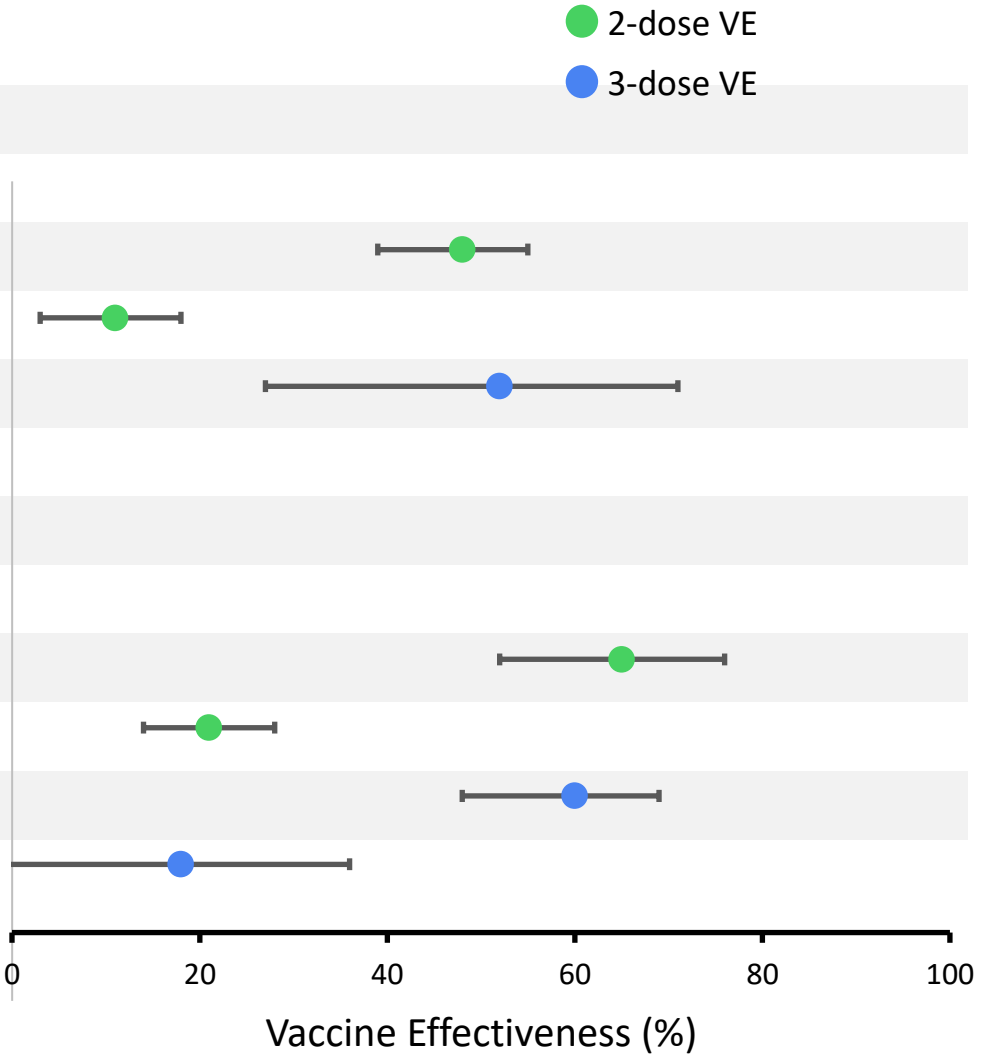
BA.4/BA.5 estimates: CDC, preliminary unpublished data. Individuals with prior infections excluded. Adjusted for calendar time, geographic region, age, sex, race, ethnicity, local virus circulation, respiratory or non-respiratory underlying medical conditions, and propensity to be vaccinated.

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

Vaccination status (days since most recent dose)	Total	SARS-CoV-2 positive, N (%)	Adjusted VE % (95% CI)
5-11-year-olds			
Unvaccinated	74,710	15,148 (20.3)	REF
2 doses (14-120 days)	1,591	186 (11.7)	48 (39-55)
2 doses (≥120 days)	3,674	679 (18.5)	11 (3-18)
3 doses (14-120 days)	195	21 (10.8)	52 (27-71)
12-15-year-olds			
Unvaccinated	28,722	6,022 (21)	REF
2 doses (14-120 days)	443	37 (8)	65 (52-76)
2 doses (≥120 days)	4,359	736 (17)	21 (14-28)
3 doses (7-120 days)	687	64 (9)	60 (48-69)
3 doses (≥120 days)	524	88 (17)	18 (-3-36)

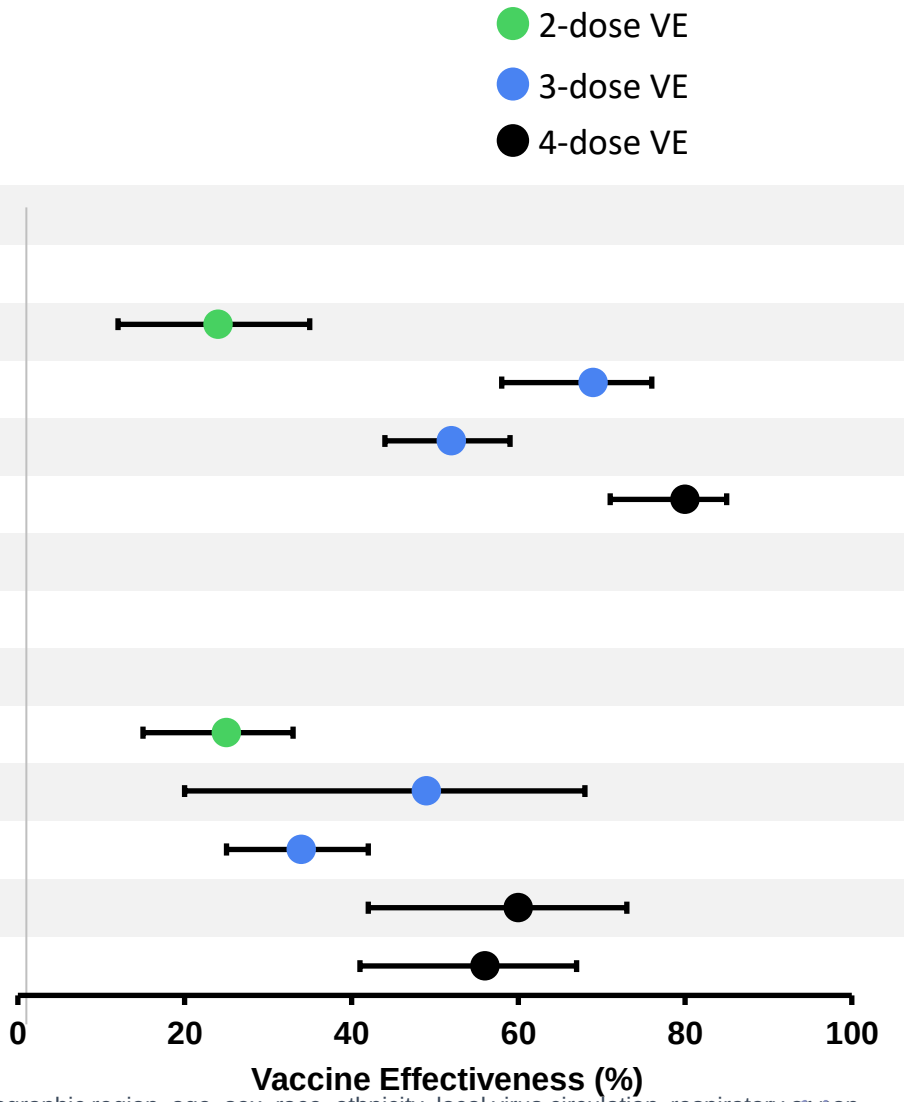


CDC, preliminary unpublished data.

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)	Total	CLI cases	Days since most recent dose, median (IQR)	Adjusted VE % (95% CI)
BA.2/BA.2.12.1 period				
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.

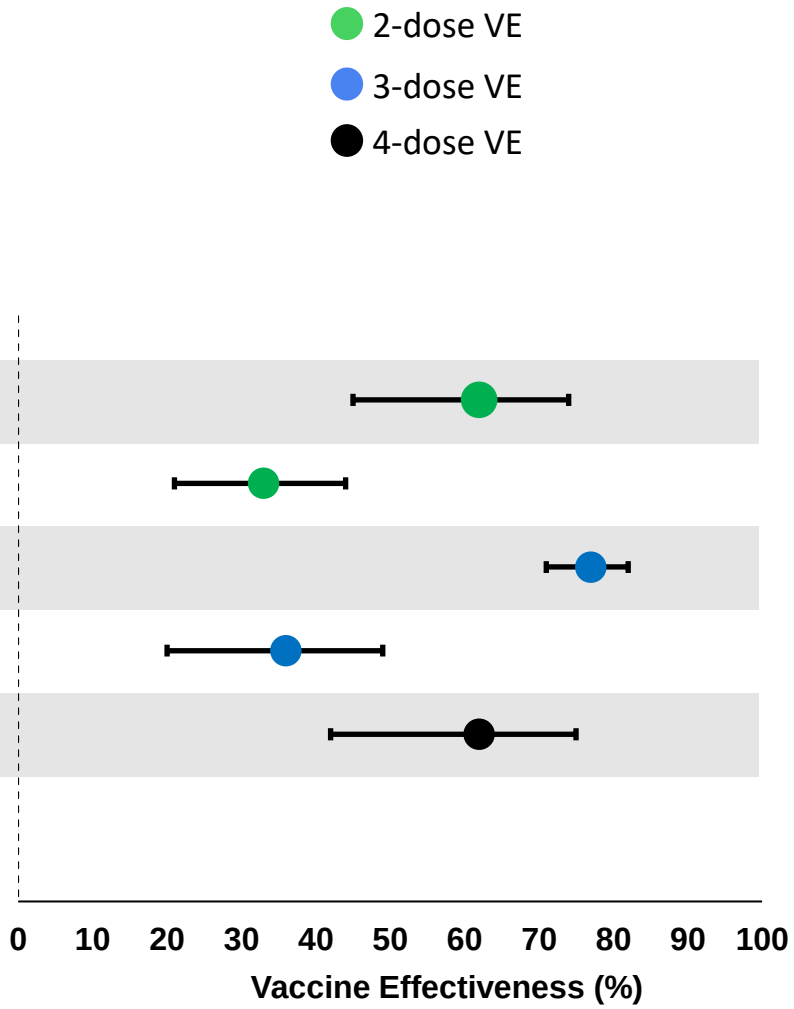
IVY Network: VE against Omicron variant COVID-19-associated hospitalization

- **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 ACUTELY ILL

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

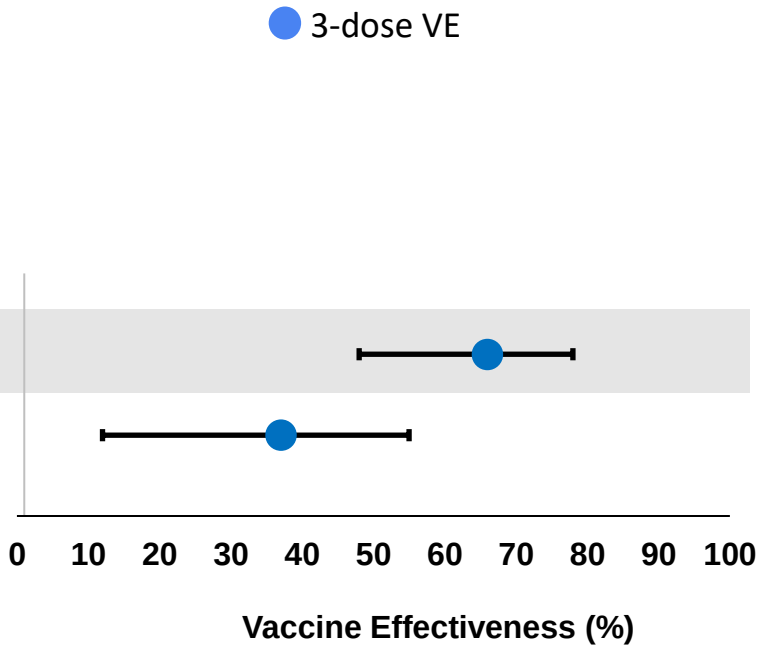
Group		Days since most recent dose, median (IQR)	Vaccinated COVID-19 cases/total cases (%)	Vaccinated controls/ total controls (%)	Adjusted VE % (95% CI)
2 doses	14–150 days	108 (72–128)	64/881 (7)	86/607 (14)	62 (45–74)
	>150 days	301 (247–375)	545/1362 (40)	486/1007 (48)	33 (21–44)
3 doses	7–120 days	72 (47–109)	175/992 (18)	403/924 (44)	77 (71–82)
	>120 days	185 (153–217)	428/1245 (34)	423/944 (45)	36 (20–49)
4 doses*	7–120 days	45 (26–66)	61/642 (10)	96/410 (23)	62 (42–75)
	>120 days	Not estimated	Not estimated	Not estimated	Not estimated



* 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

		Days since most recent dose, median (IQR)	Vaccinated COVID-19 cases/total cases (%)	Vaccinated controls/ total controls (%)	Adjusted VE % (95% CI)
3 doses	7–120 days	75 (46–101)	112/298 (38)	174/299 (58)	66 (48–78)
	>120 days	184 (150–224)	248/434 (57)	222/347 (64)	37 (12–55)



* 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

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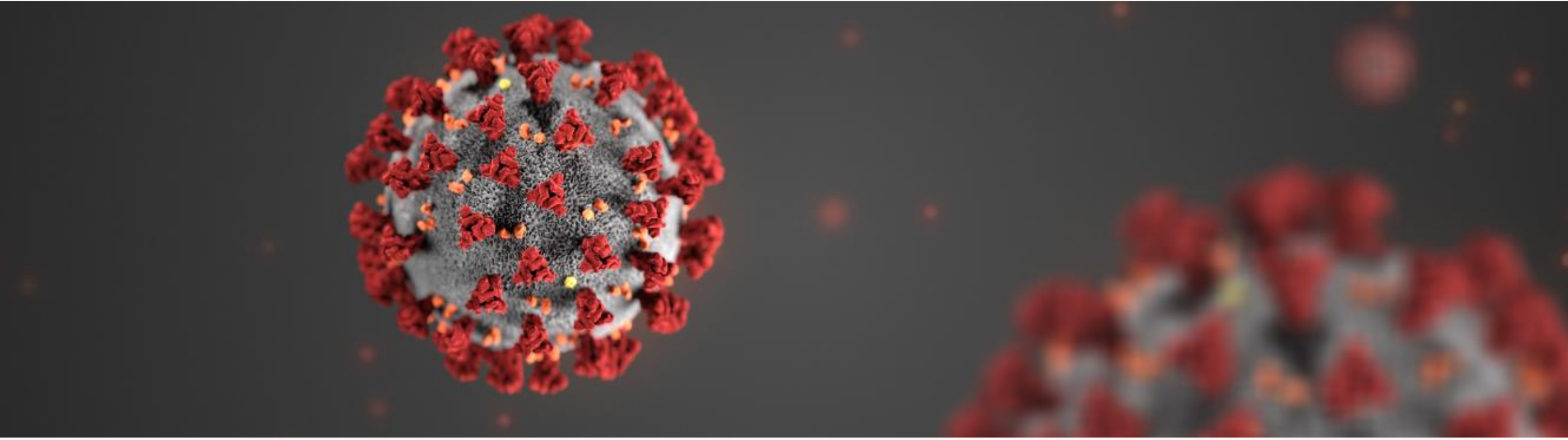

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TTY: 1-888-232-6348 www.cdc.gov

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