

Effectiveness of a Third mRNA Vaccine Against COVID-19-Associated ED or Urgent Care Encounters and Hospitalizations Among Adults

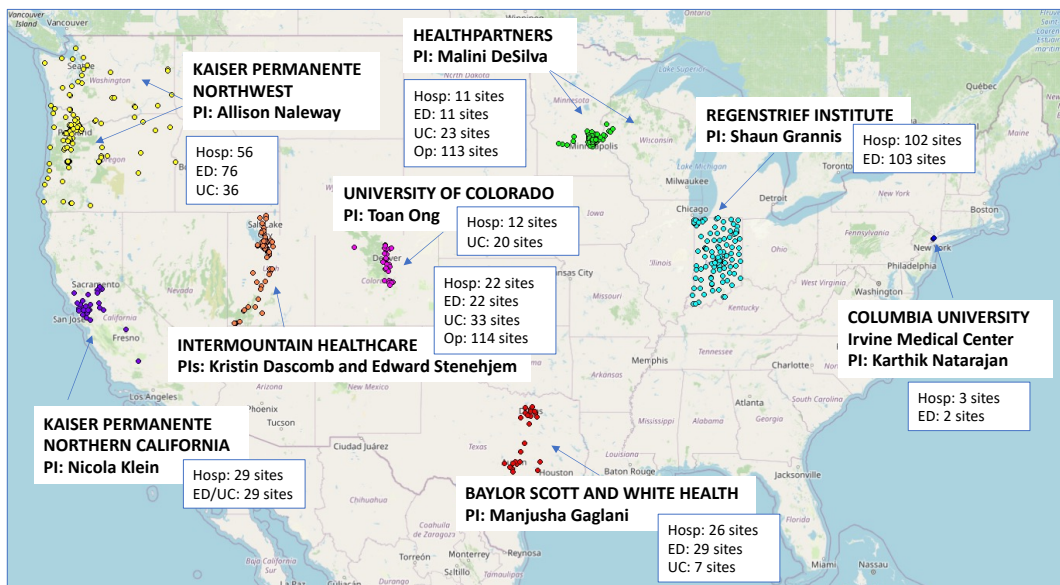
Mark Thompson on behalf of the VISION Network

2/9/2022



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VISION Network Partners



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VISION Network

- 8 integrated healthcare and research centers in 10 states
 - 383 Emergency Departments and Urgent Care Clinics
 - 259 Hospitals
- Built on previous influenza vaccine effectiveness (VE) research infrastructure
- Methods previously published

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Effectiveness of Covid-19 Vaccines in Ambulatory and Inpatient Care Settings

M.G. Thompson, E. Stenehjem, S. Grannis, S.W. Ball, A.L. Naleway, T.C. Ong, M.B. DeSilva, K. Natarajan, C.H. Bozio, N. Lewis, K. Dascomb, B.E. Dixon, R.J. Birch, S.A. Irving, S. Rao, E. Kharbanda, J. Han, S. Reynolds, K. Goddard, N. Grisel, W.F. Fadel, M.E. Levy, J. Ferdinands, B. Fireman, J. Arndorfer, N.R. Valvi, E.A. Rowley, P. Patel, O. Zerbo, E.P. Griggs, R.M. Porter, M. Demarco, L. Blanton, A. Steffens, Y. Zhuang, N. Olson, M. Barron, P. Shifflett, S.J. Schrag, J.R. Verani, A. Fry, M. Gaglani, E. Azziz-Baumgartner, and N.P. Klein

Sept. 8, 2021, DOI: 10.1056/NEJMoa2110362

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Methods

- Eligible medical encounters
 - Aged ≥ 18 years
 - COVID-19-like illness
 - Molecular testing for SARS-CoV-2 within 14 days before or 72 hours after admission or encounter
- Excluded medical encounters
 - 1 or >3 doses
 - 1-13 days since dose 2 or dose 3
 - Ad26.CO2 (Janssen) recipients

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Methods

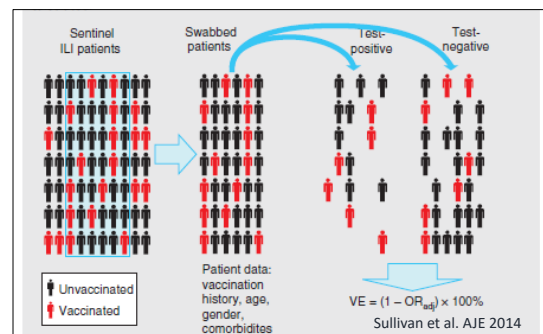
- Start date is August 26, 2021--14 days after first dose 3 recommendation
 - Omicron predominant (>50% of sequenced viruses) date determined for each site from local and state data
 - End date was January 5, 2022
- Immunocompromise defined by ICD codes
- Vaccination status confirmed by EHR and state registries

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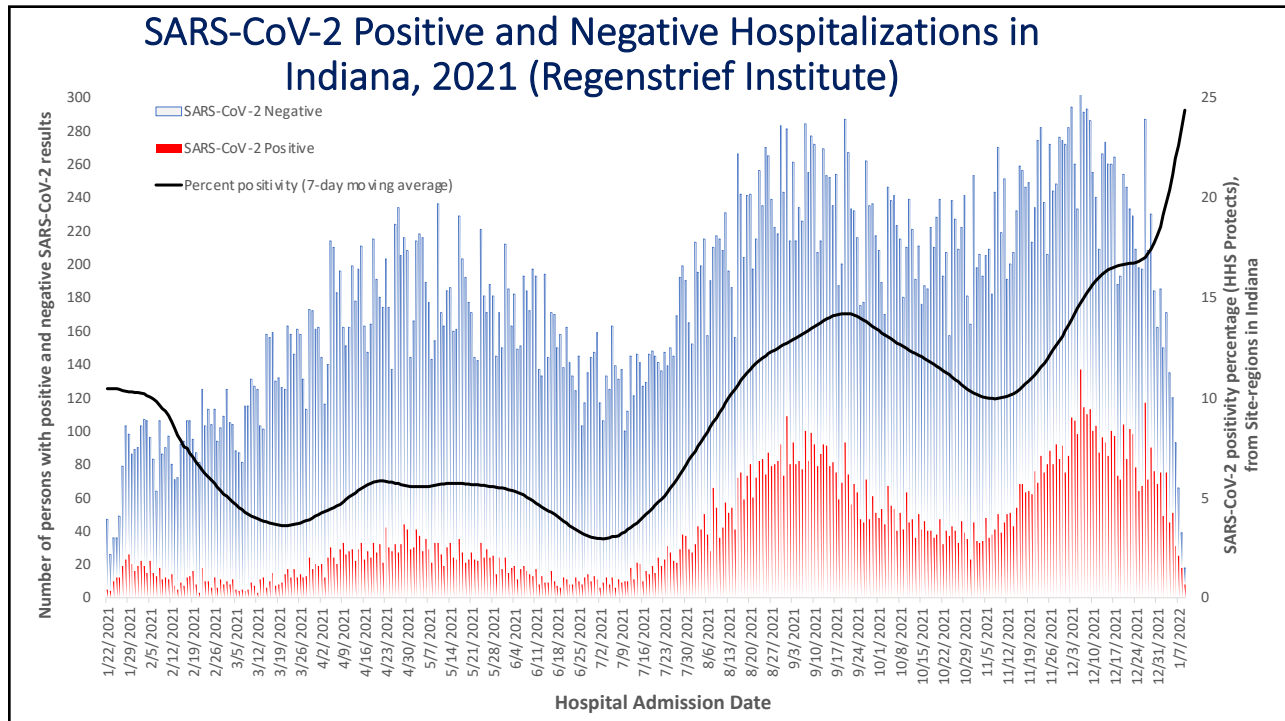


Statistical Model


- Test-negative design
 - Compare odds of vaccination among case-patients with lab-confirmed COVID-19 with control-patients who test negative for SARS-CoV-2



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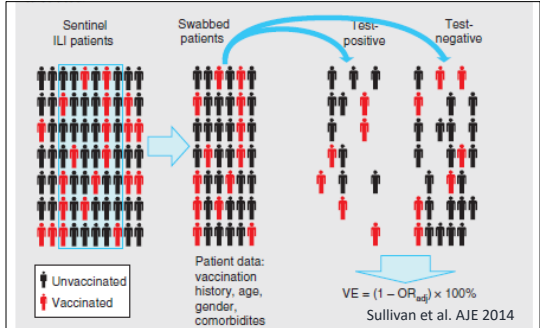
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Statistical Model

- **Test-negative design**
 - Compare odds of vaccination among case-patients with lab-confirmed COVID-19 with control-patients who test negative for SARS-CoV-2

- **Adjusted model**
 - Inverse propensity to be vaccinated weights
 - Socio-demographic characteristics, underlying medical conditions, and facility characteristics
 - Other covariates directly in the model
 - Age
 - Geographic sub-region
 - Calendar time (days since August 26)
 - Local virus circulation on index date



Patient data: vaccination history, age, gender, comorbidities

$VE = (1 - OR_{adj}) \times 100\%$
Sullivan et al. AJE 2014

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mRNA VE Against COVID-19 ED or Urgent Care Encounters

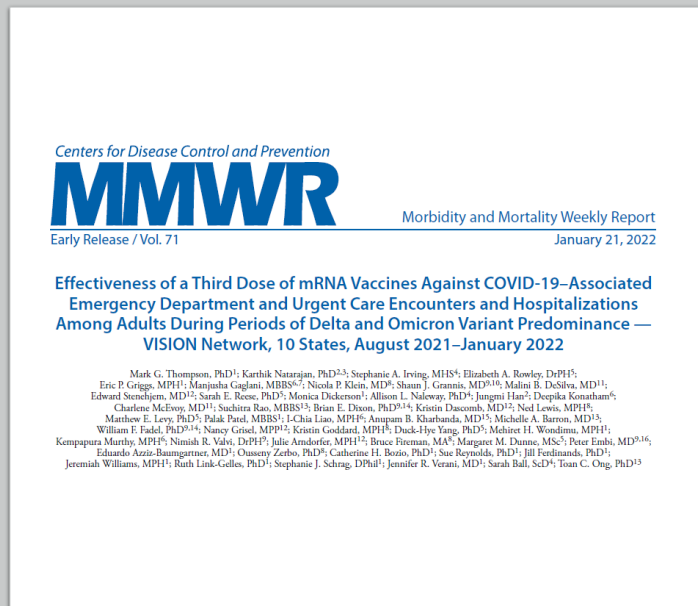
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VE Against ED/UC

- 222,772 encounters with COVID-19-like illness from 383 emergency departments and urgent care clinics
- August 26, 2021 to January 5, 2022



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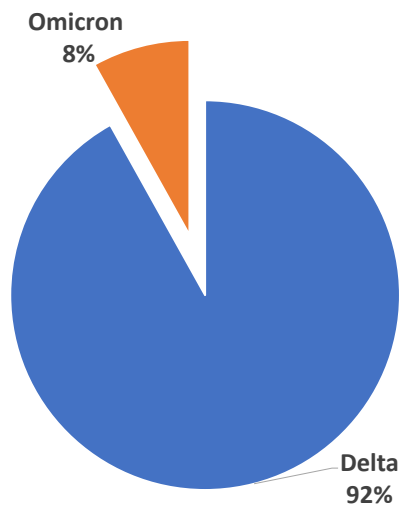
ED/UC: Percent Tested for SARS-CoV-2



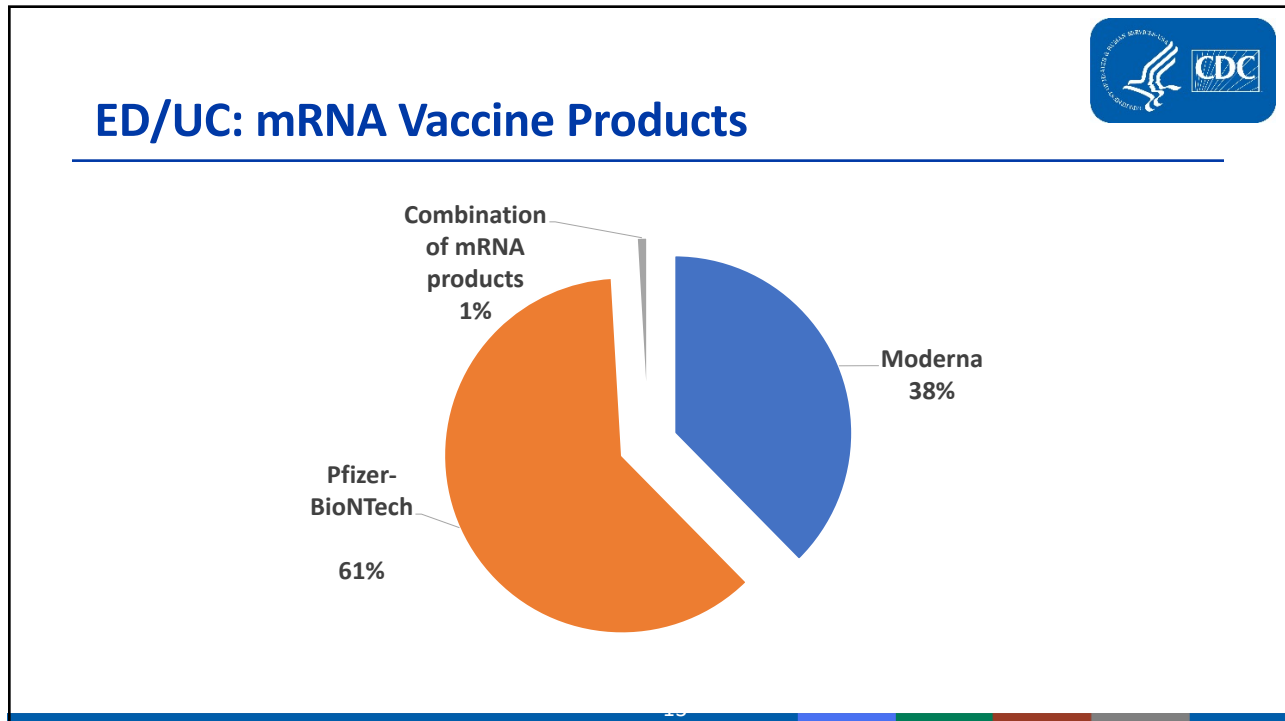
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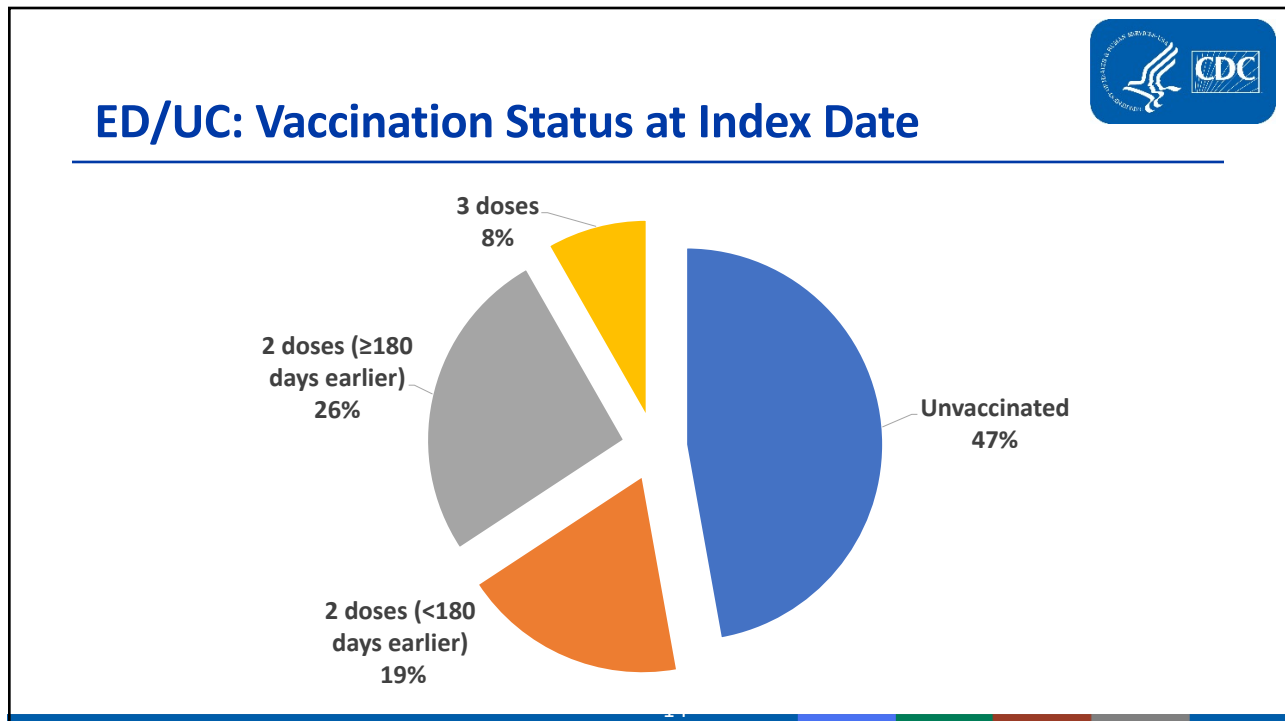
ED/UC: SARS-CoV-2 Lineages



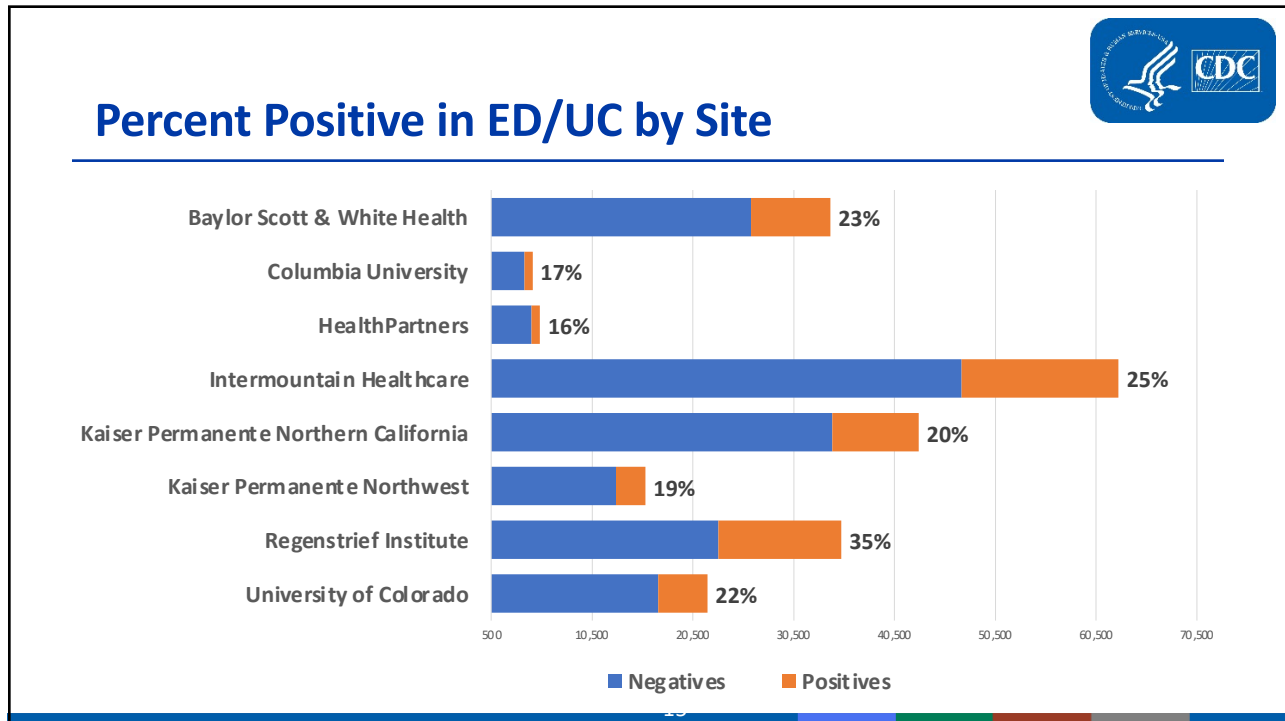
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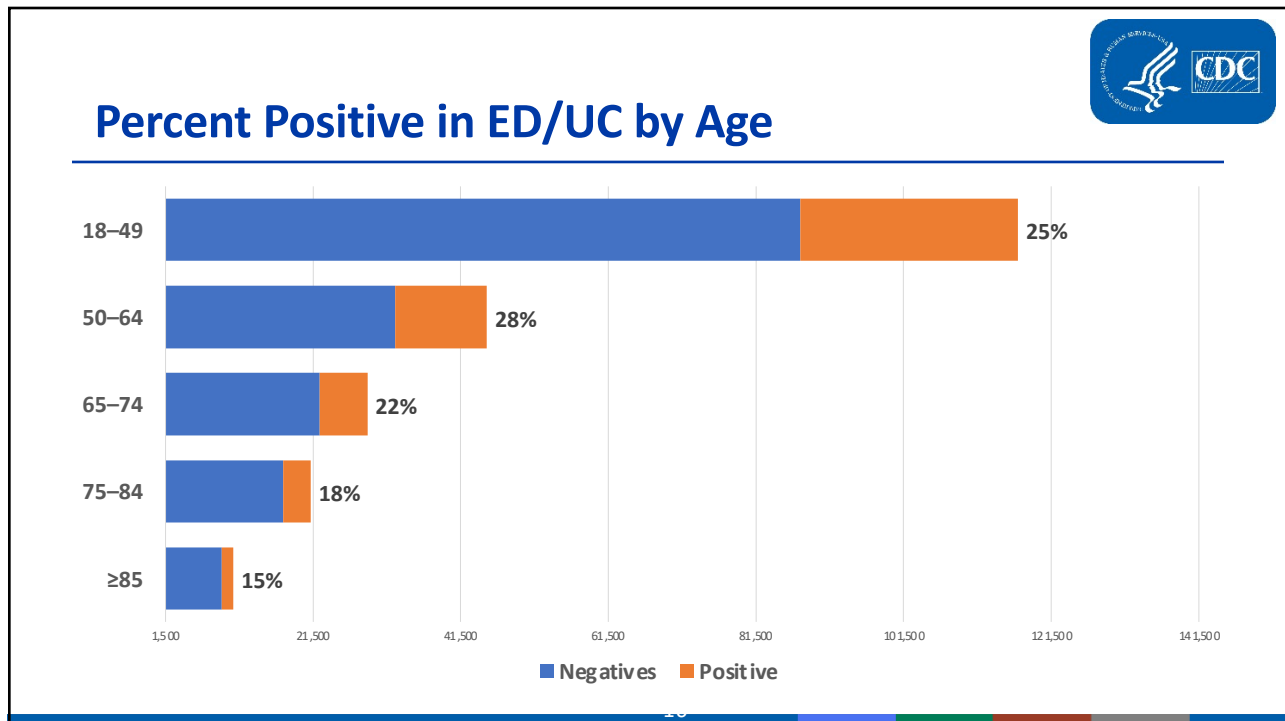
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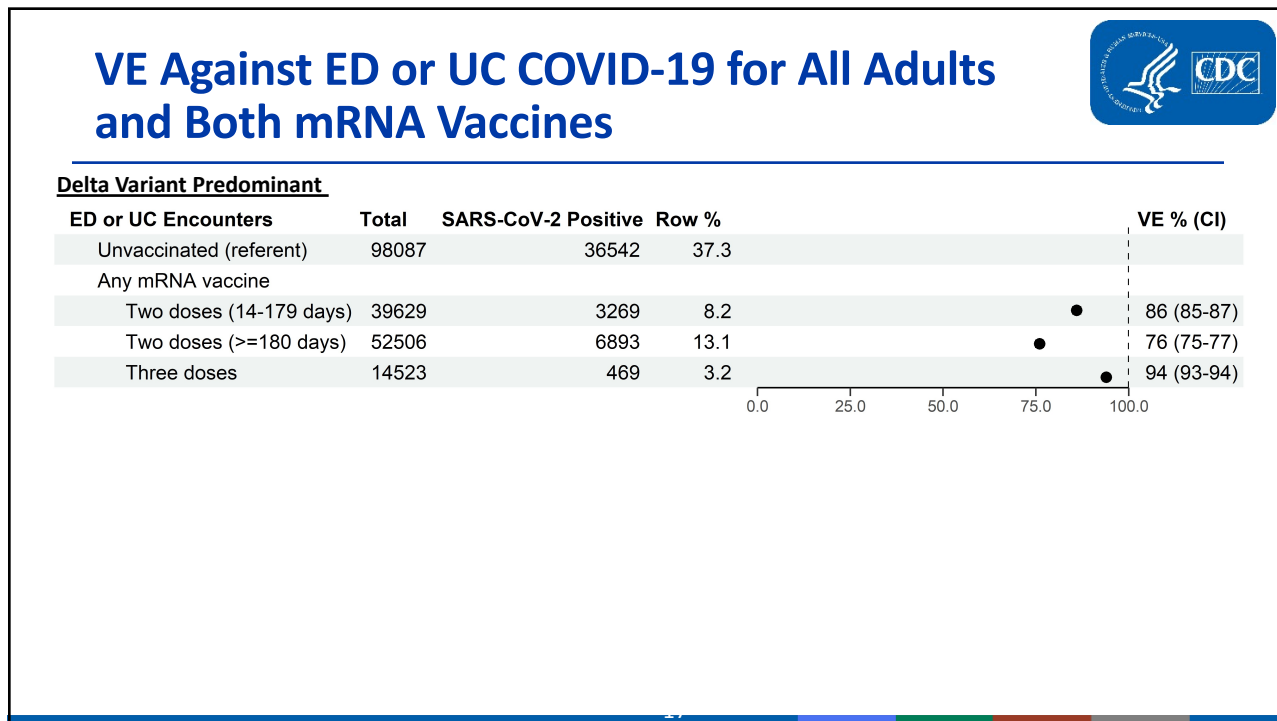
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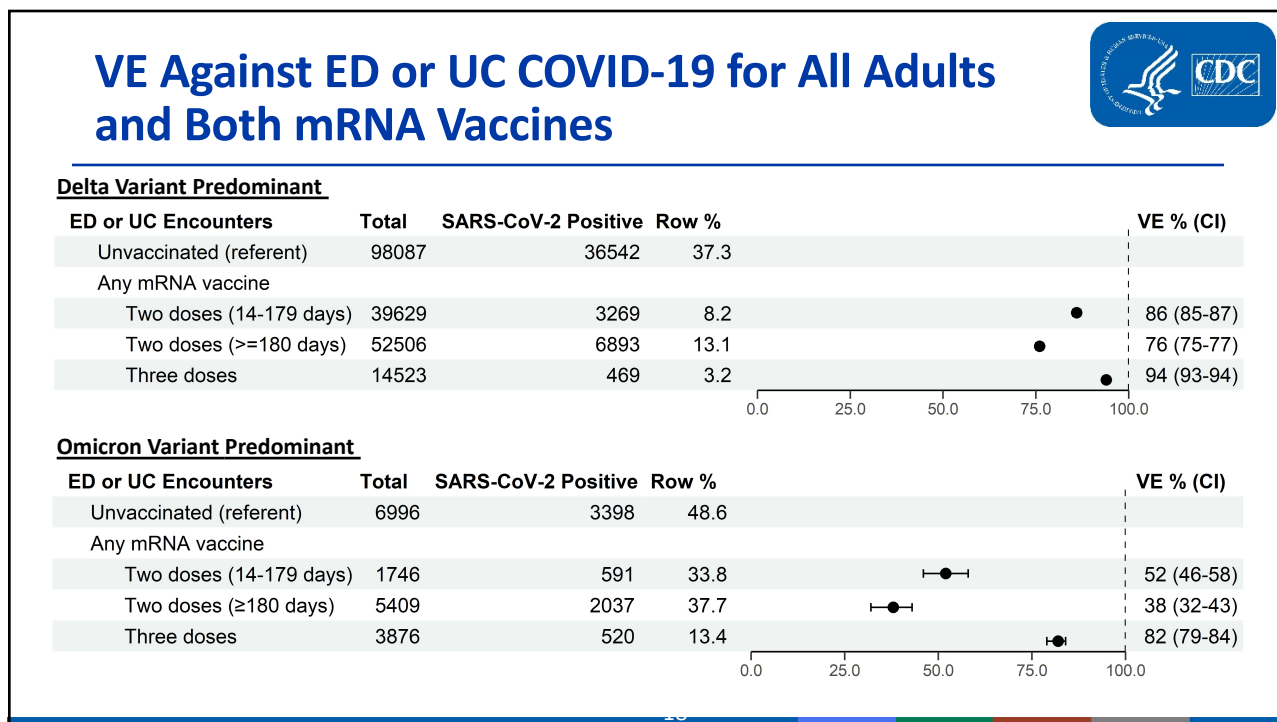
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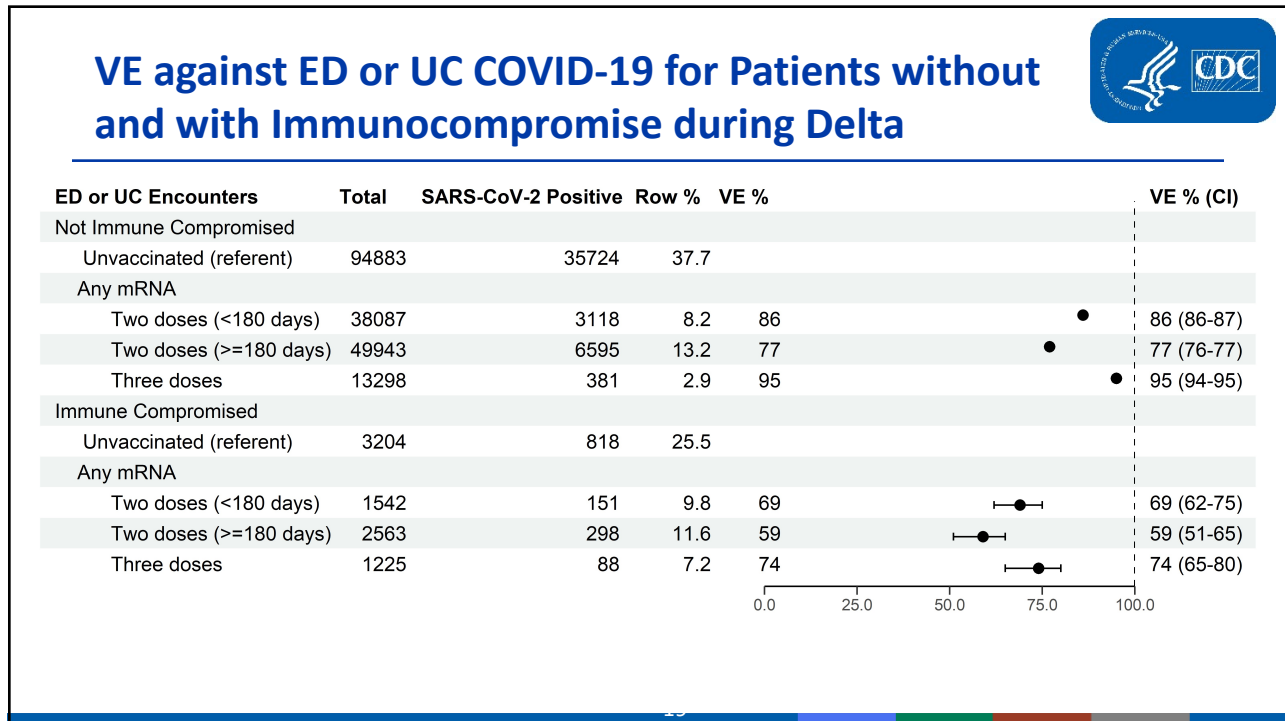
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mRNA VE against COVID-19 Hospitalizations

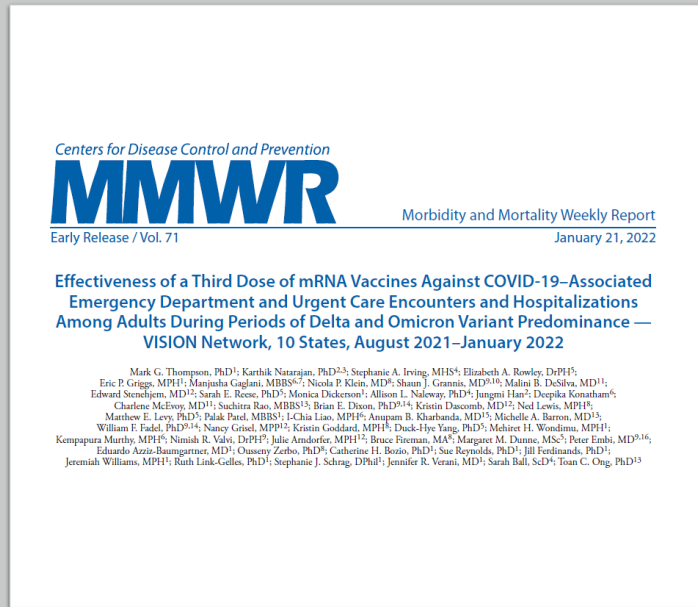
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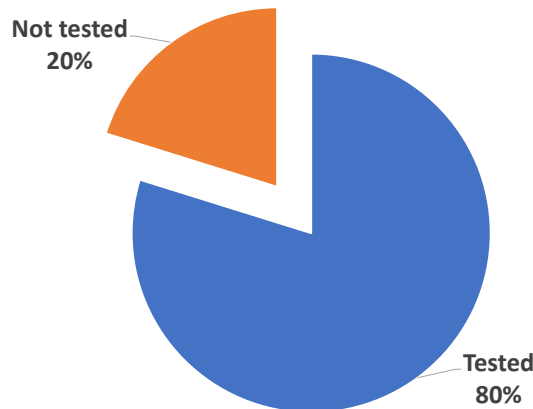
VE against Hospitalizations

- 87,904 hospitalizations with COVID-19-like illness from 259 hospitals
- August 26, 2021 to January 5, 2022

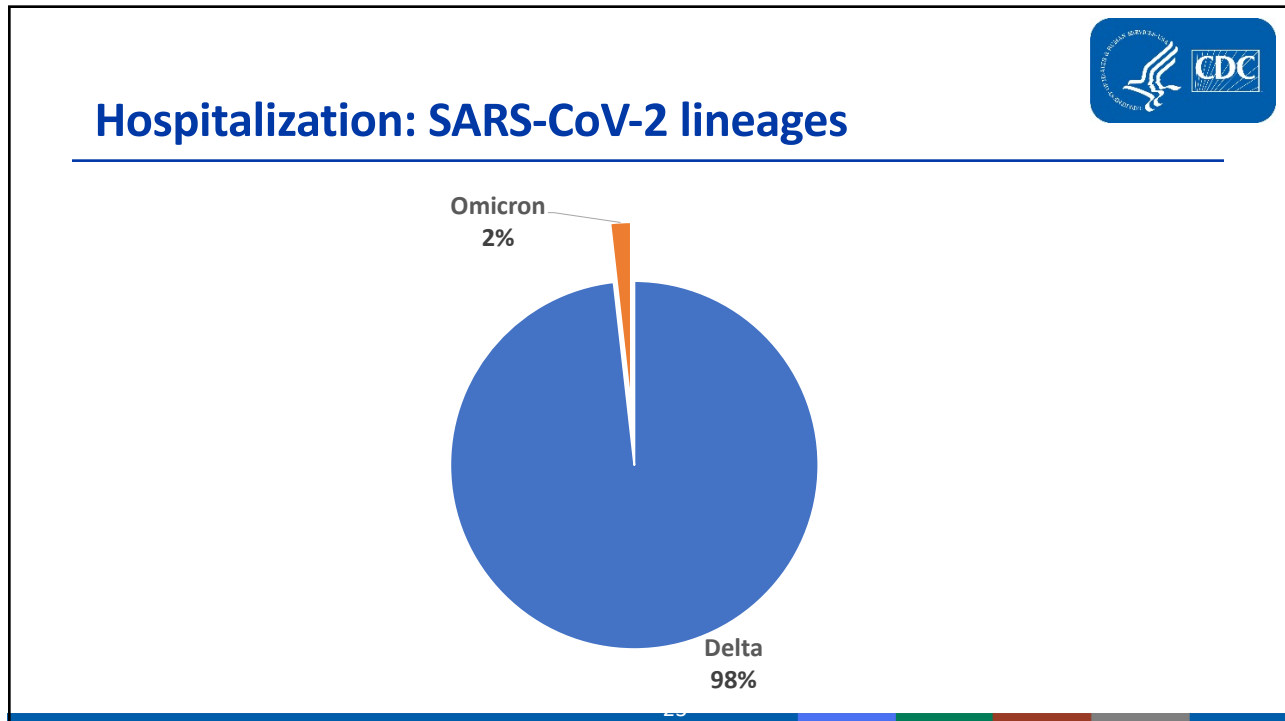


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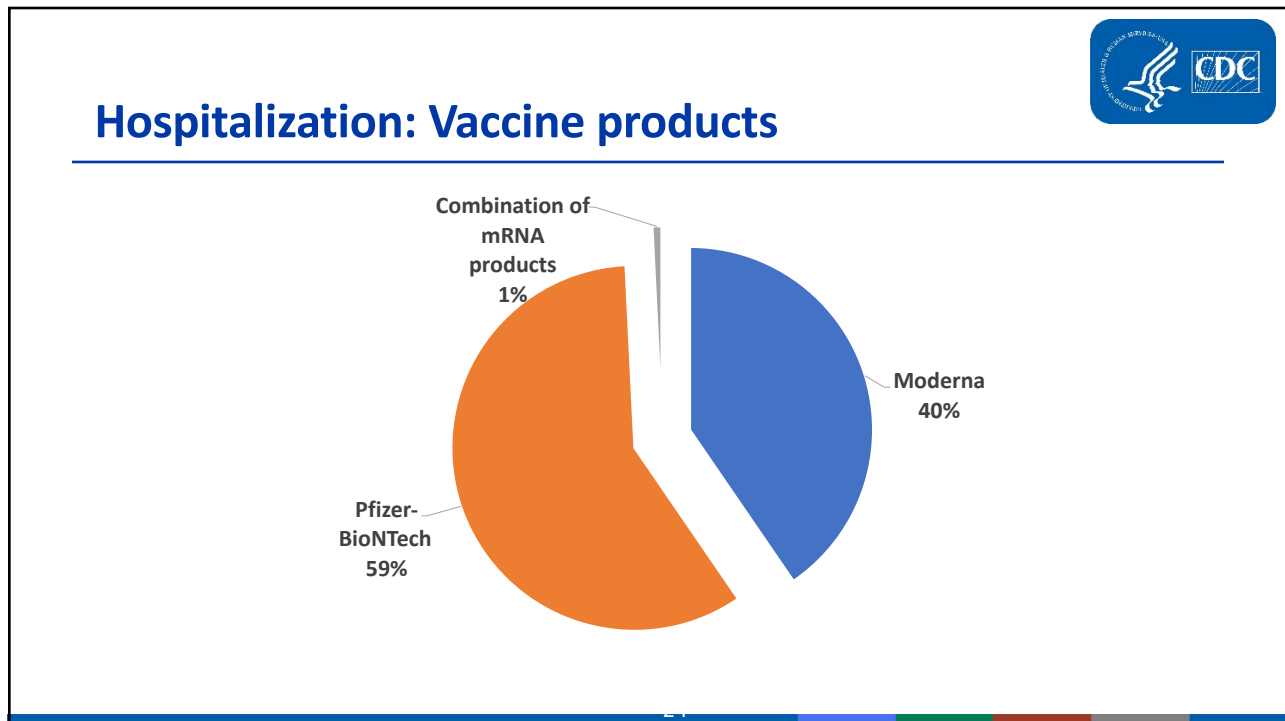
Hospitalization: Percent tested for SARS-CoV-2



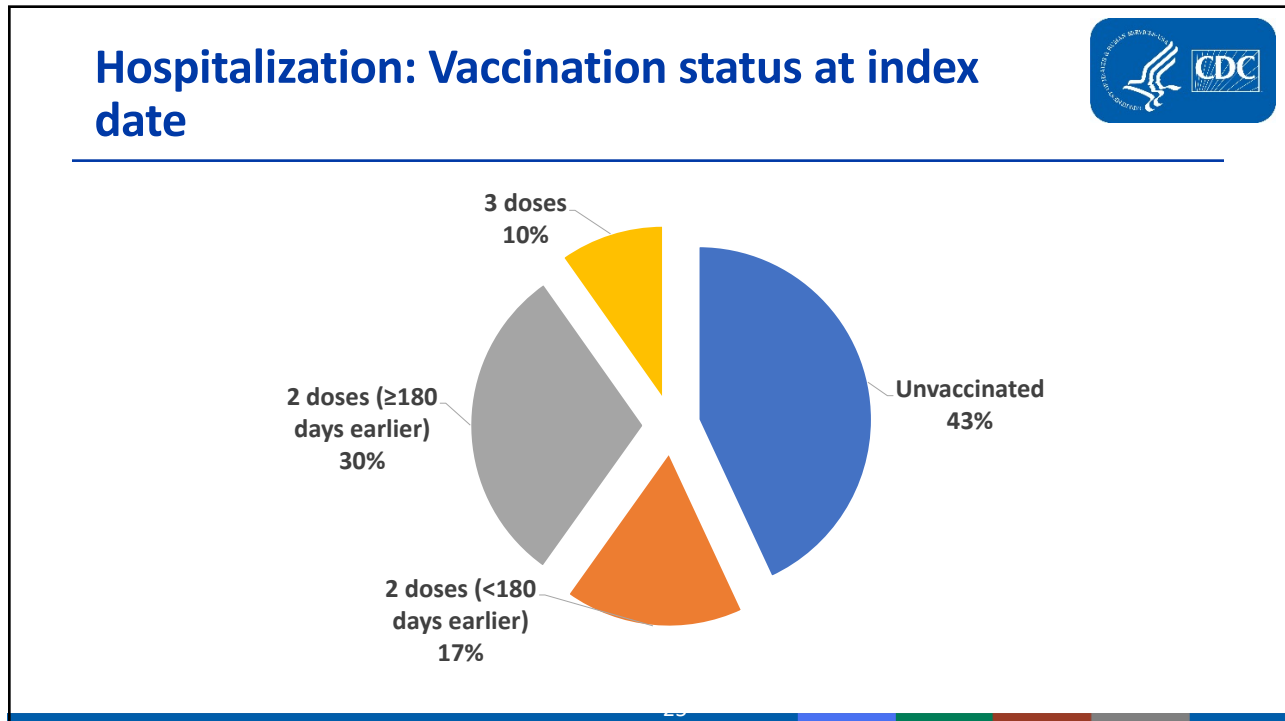
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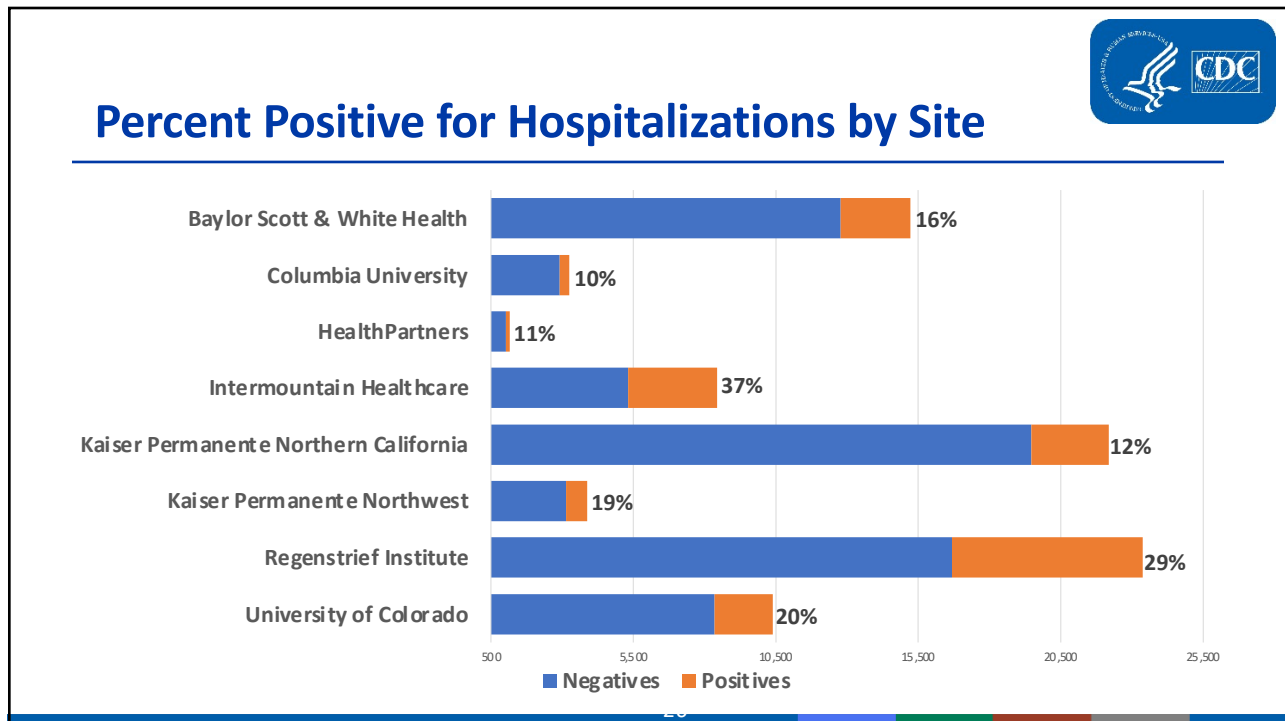
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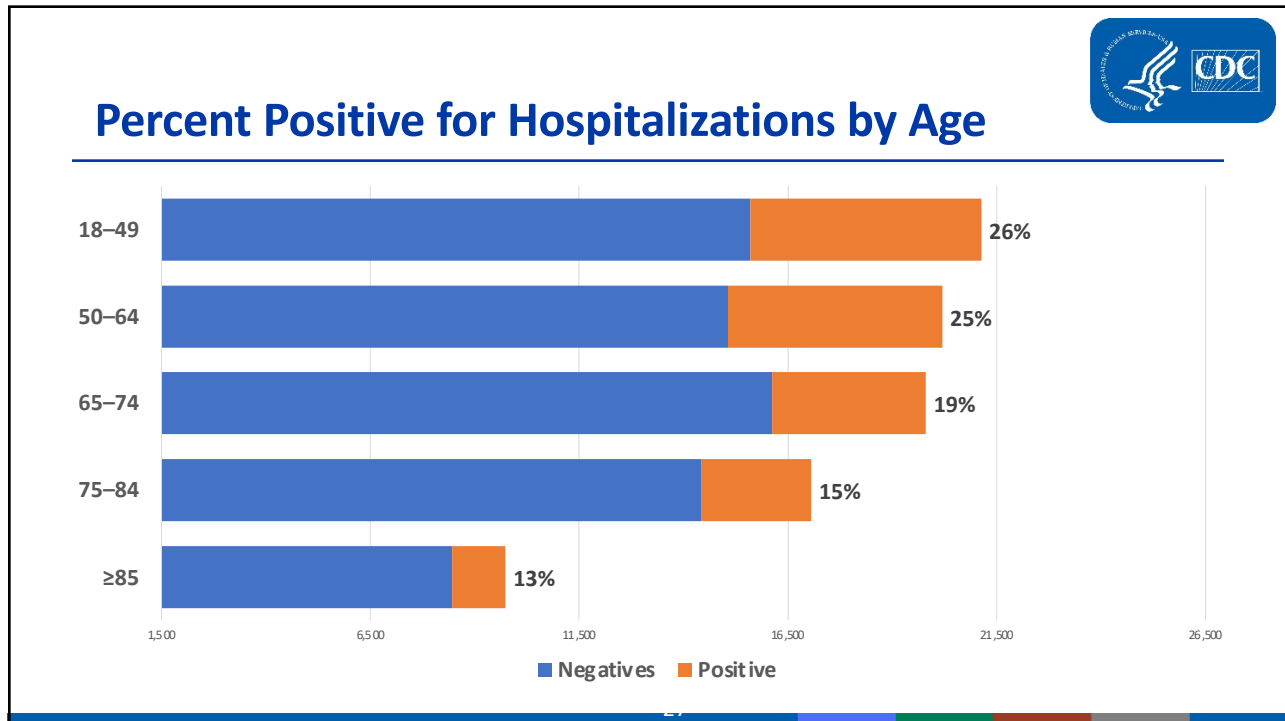
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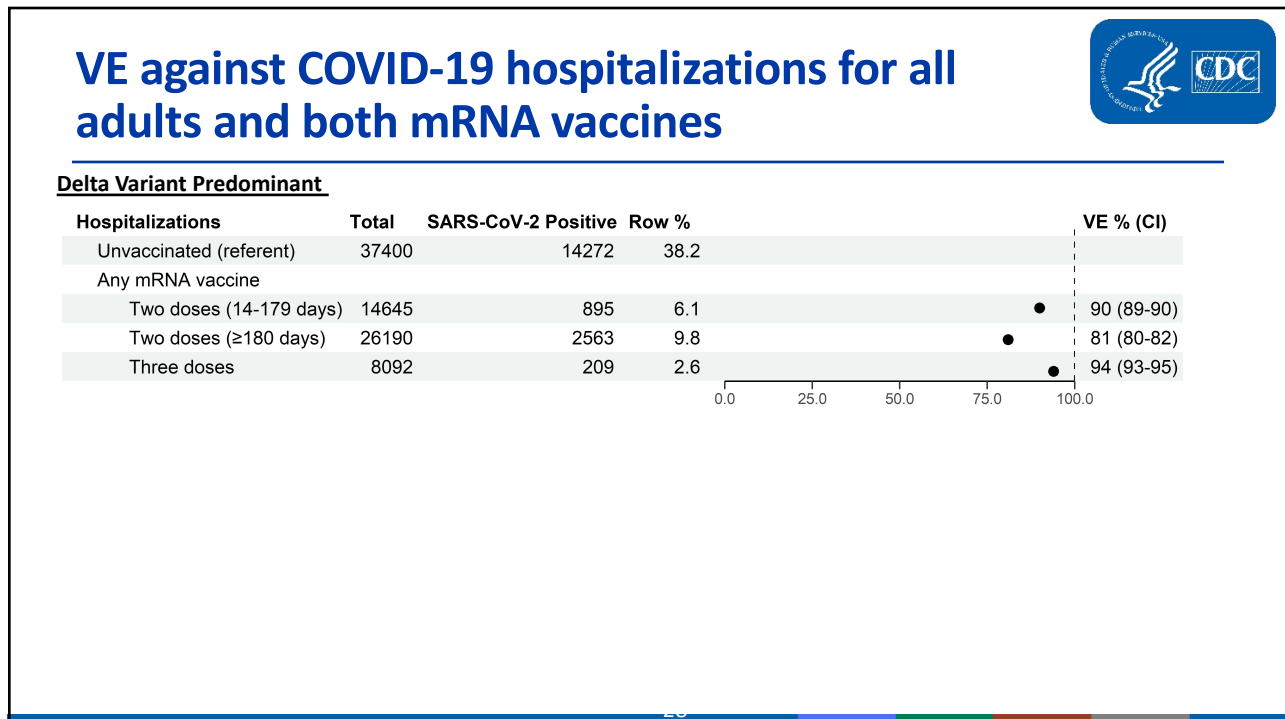
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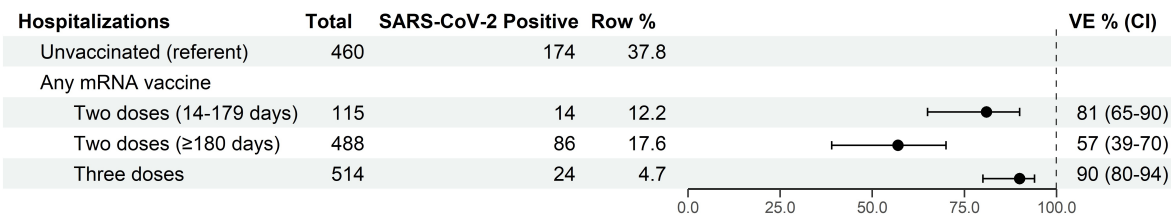
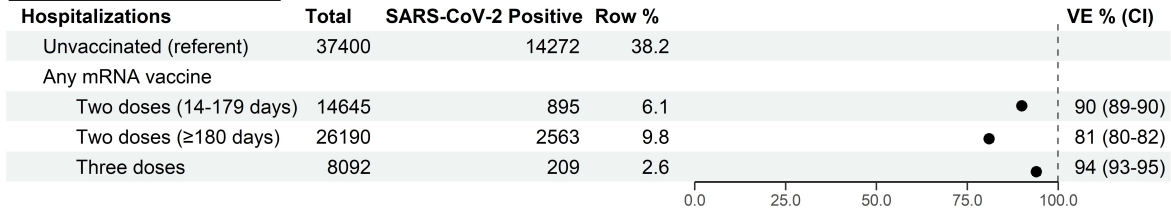


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VE against COVID-19 hospitalizations for all adults and both mRNA vaccines

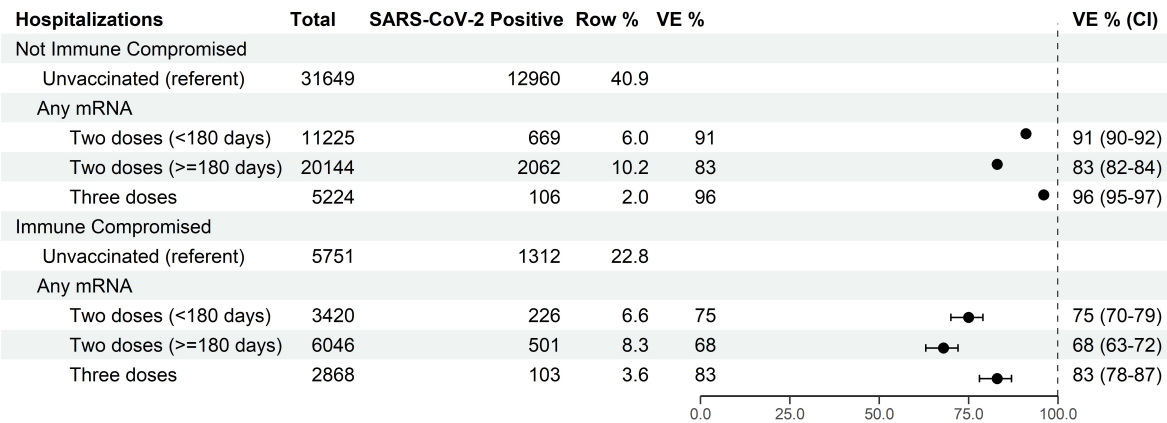


Delta Variant Predominant



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VE against COVID-19 hospitalizations for patients without and with immunocompromise during Delta



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Conclusions

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Strengths



- All encounters were for acute COVID-19-like illness
 - Less likely to include asymptomatic or incidental SARS-CoV-2 infection
- Outcome confirmed by molecular testing
- Vaccination status confirmed by EHR and registries
 - Minimizes false positive reports of vaccination which can bias VE
- Adjustments for propensity to be vaccinated and other factors, including local virus circulation within 37 geographic regions
- Large and heterogeneous set of encounters and hospitalizations

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Limitations

- Only early performance of dose 3
 - Median days from dose 3 to encounter was ~42 days
- Reasons for decline in Omicron are unclear
 - Consistent with immune evasion of variant
- Unmeasured and residual confounding (e.g., mask use, work and community exposure) can bias estimates

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Conclusions

- VE has declined since Omicron predominance
- VE was significantly lower among patients who received their 2nd mRNA dose ≥ 180 days earlier
- VE increased following 3rd mRNA dose
- VE against COVID-19-associated hospitalizations was higher than VE against ED/UC visits
- Immunocompromised individuals had lower VE for all doses, although VE is highest following their 3rd primary dose

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Other forthcoming findings

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COVID-19 IM Meeting Slide Submission Template



Acknowledgements

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