

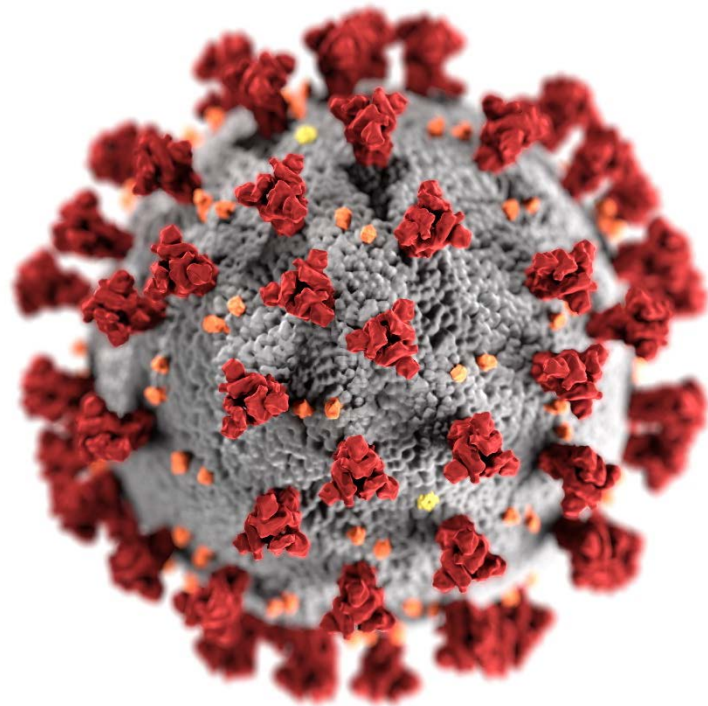
Modeling the Potential Impact of Vaccination Strategies for Nursing Home Residents and Staff

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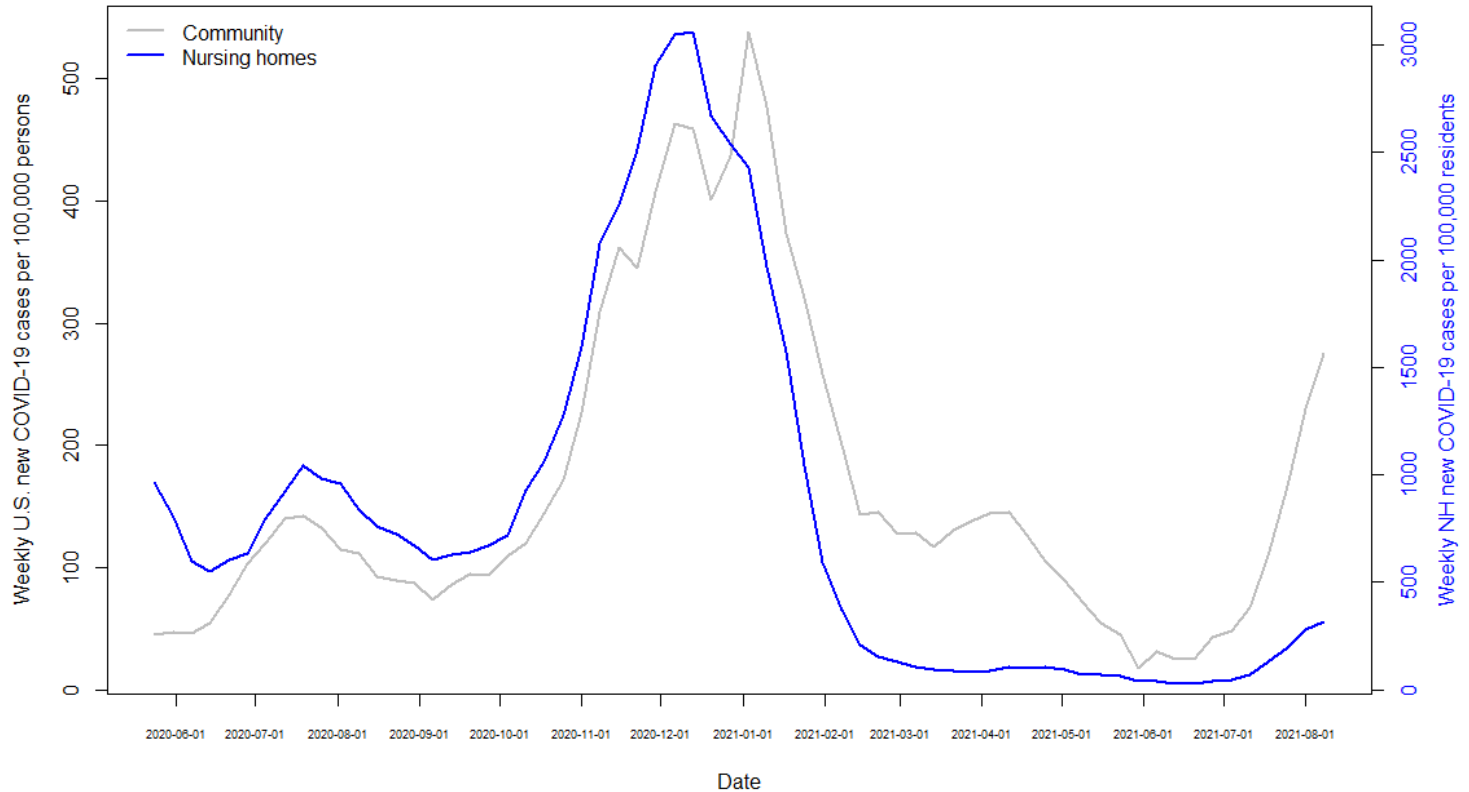


cdc.gov/coronavirus

Model overview



Weekly rate of COVID-19 cases in communities and in nursing homes



Methods

Overview

- Model nursing home (NH):
 - 100 staff, 100 residents
 - Assumed 100% occupancy
 - Resident turnover explicitly modeled
- Staff: daily probability of infection from community (NHSN)
- Transmission within the nursing home:
 - Stochastic, based on the probability of transmission given contact, no. contacts per day, and total no. of infected individuals
- Non-outbreak screening testing of unvaccinated staff
 - Twice per week (per guidelines in high community transmission settings)

Outcomes

- Total number of both infections and symptomatic cases in:
 - Residents and entire NH (residents and staff)
 - Over 2 months
- Results: 100 simulations

Extension of model: [doi/10.1093/cid/ciab517/6292250](https://doi.org/10.1093/cid/ciab517/6292250)

Parameter	Values
R_0	6 (Delta estimate)
Staff daily probability of community infection	0.001 - 0.003 (NHSN)
Resident vaccination coverage	80%
Staff vaccination coverage	40% - 100%
2 dose vaccine efficacy (VE) against infection (staff)	70%
2 dose VE against infection (residents)	50% - 70%
2 dose VE against symptomatic disease (staff)	90%
2 dose VE against symptomatic disease (residents)	80% - 90%
VE against infectiousness (residents and staff)	50%
Booster dose VE against infection (residents, takes 2 weeks to take effect)	60% - 90%

Cumulative COVID-19 incidence among residents after 2 months by symptom status (shading) and vaccination status (color) for 100 simulations

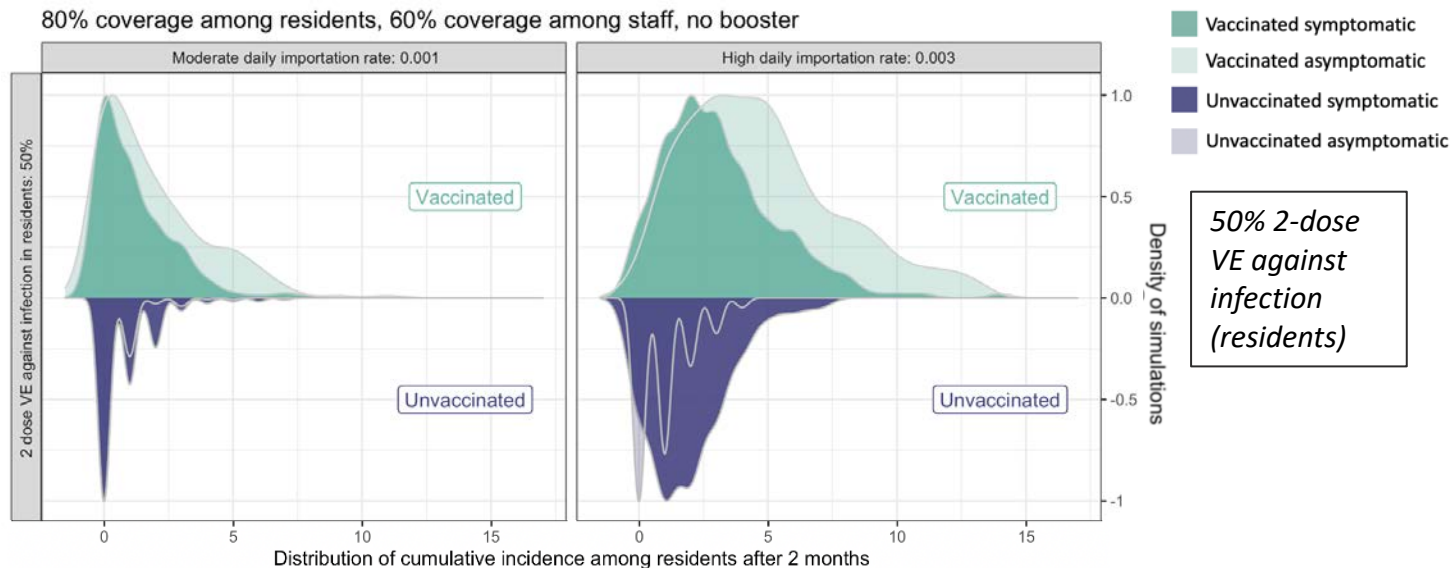
Resident coverage: 80%
Staff coverage: 60%
No boosters

Most cases in vaccinated residents are asymptomatic due to VE against symptomatic disease

While only 20% of residents are unvaccinated, they contribute a large share of symptomatic cases

Higher daily importation rate from community → more NH cases

Increase in NH cases does not necessarily indicate lower or waning VE if community transmission is rising



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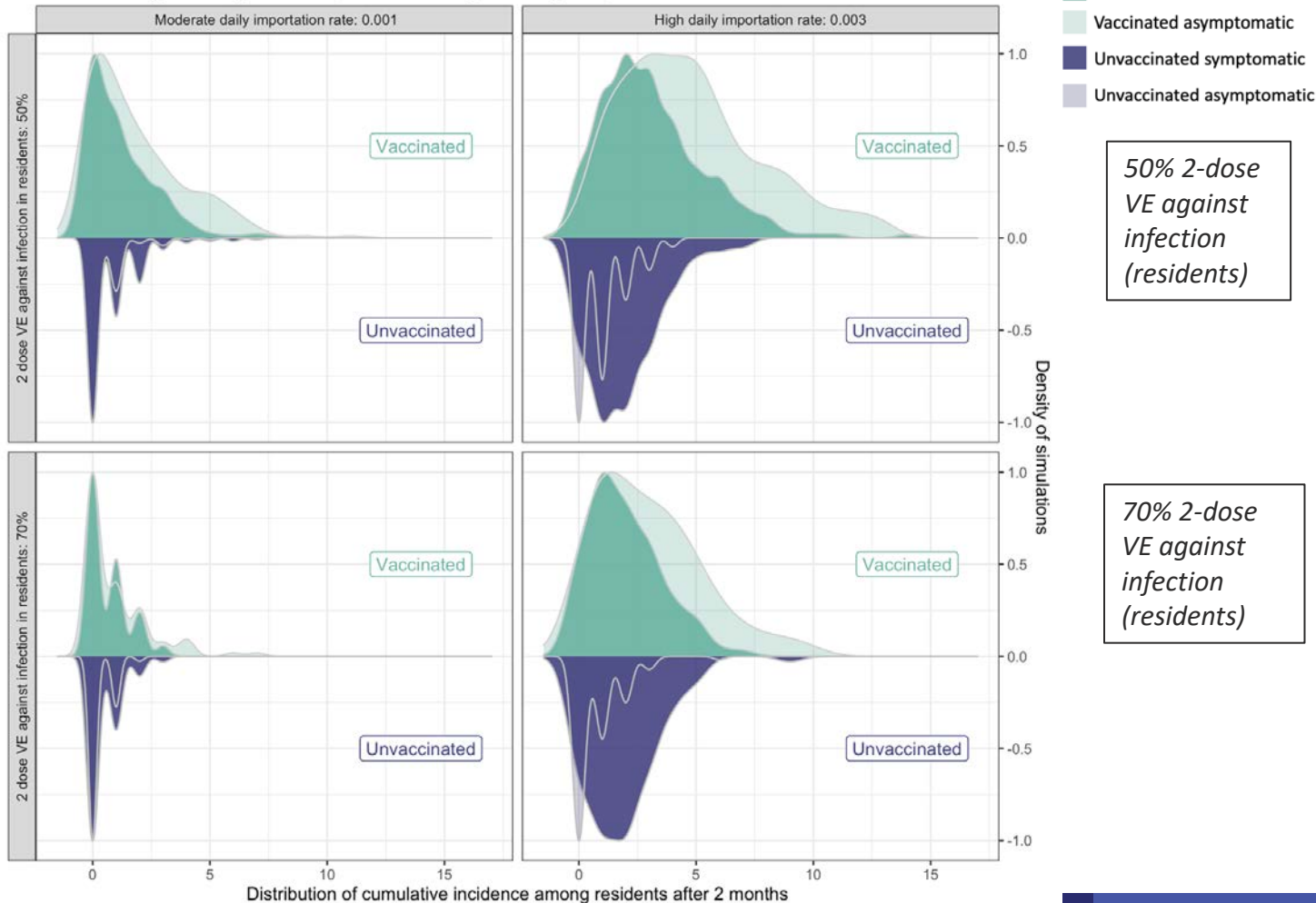
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While only 20% of residents are unvaccinated, they contribute a large share of symptomatic cases

Higher daily importation rate from community → more NH cases

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80% coverage among residents, 60% coverage among staff, no booster

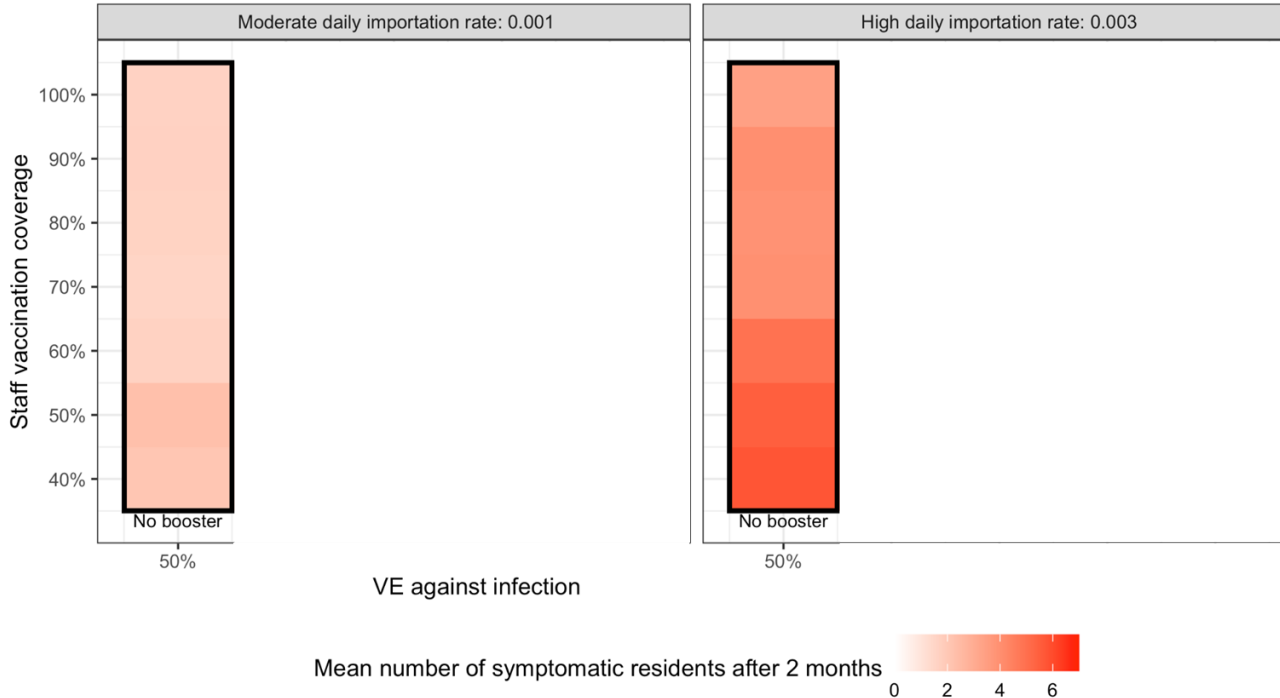


Assessing the impact of varying levels of **staff**
COVID-19 vaccination coverage and providing all
vaccinated residents a **booster dose**



Symptomatic COVID-19 cases among residents

Symptomatic cases among residents (2 dose VE against infection in residents: 50%, staff: 70%)

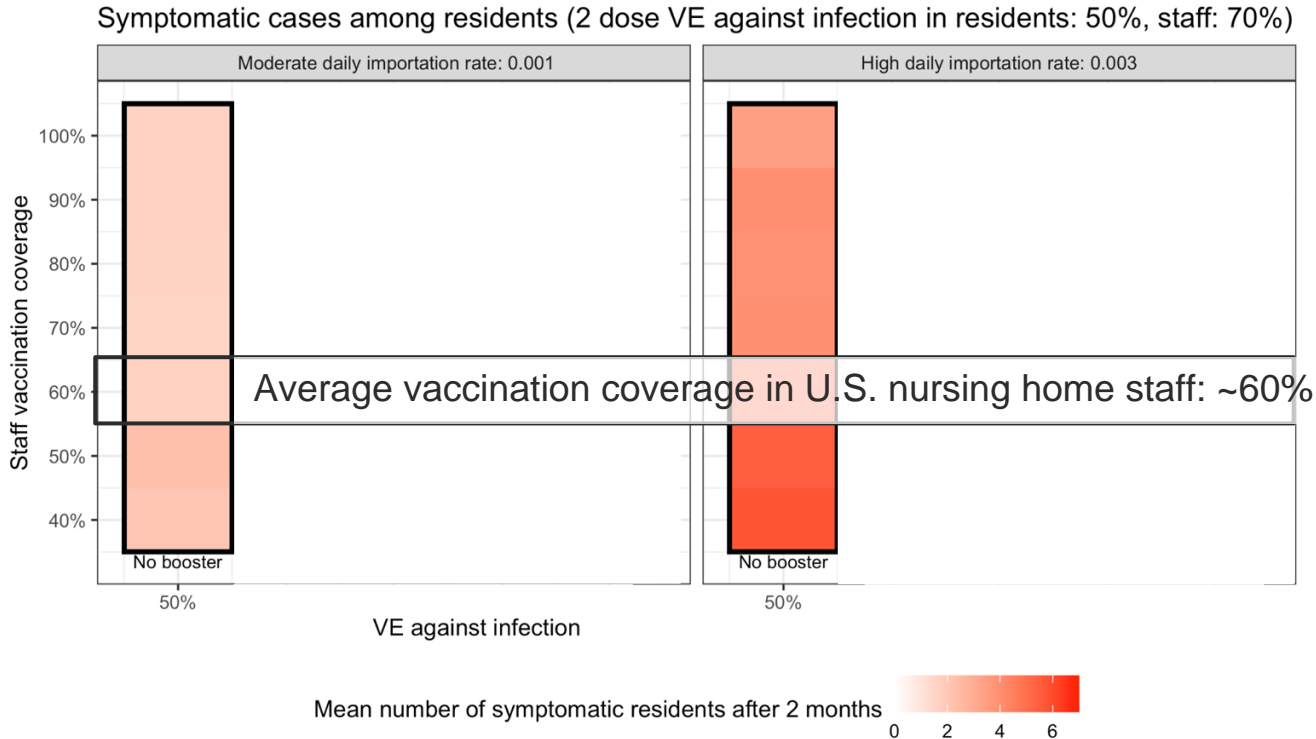


- 217 unique residents in nursing home over 2 months
- Median duration of a nursing home stay is 27 days

Findings

- Higher staff vaccination coverage (top rows) leads to fewer symptomatic cases
- Cumulative cases highly dependent on community transmission rate (left vs. right panel)

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- Higher staff coverage and higher booster VE (top right) leads to fewer symptomatic cases
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Total symptomatic and asymptomatic COVID-19 infections among residents

Total infections among residents (2 dose VE against infection in residents: 50%, staff: 70%)



Findings

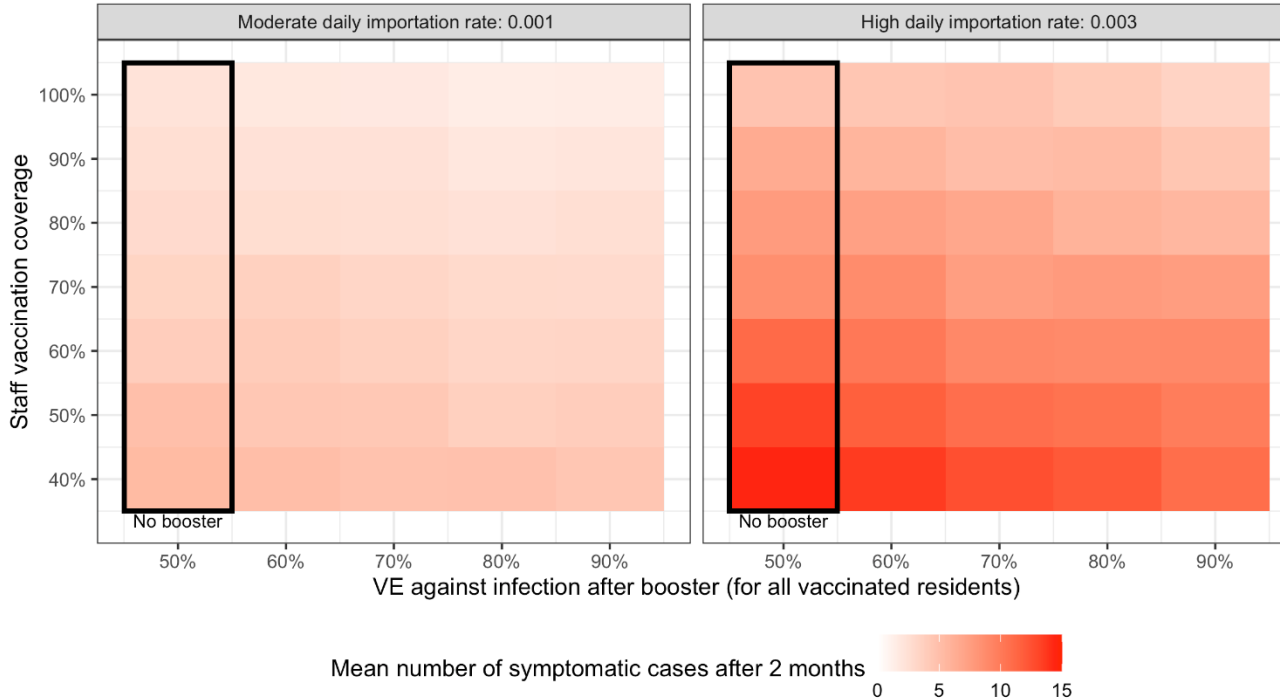
- There are higher numbers of infections when looking at total infections (symptomatic and asymptomatic) compared to symptomatic cases only.

Trends remain the same:

- Higher staff coverage and higher booster VE (top right) leads to fewer infections
- Cumulative cases highly dependent on community transmission rate (left vs. right panel)

Symptomatic COVID-19 cases in nursing home (residents and staff)

Symptomatic cases in nursing home (2 dose VE against infection in residents: 50%, staff: 70%)

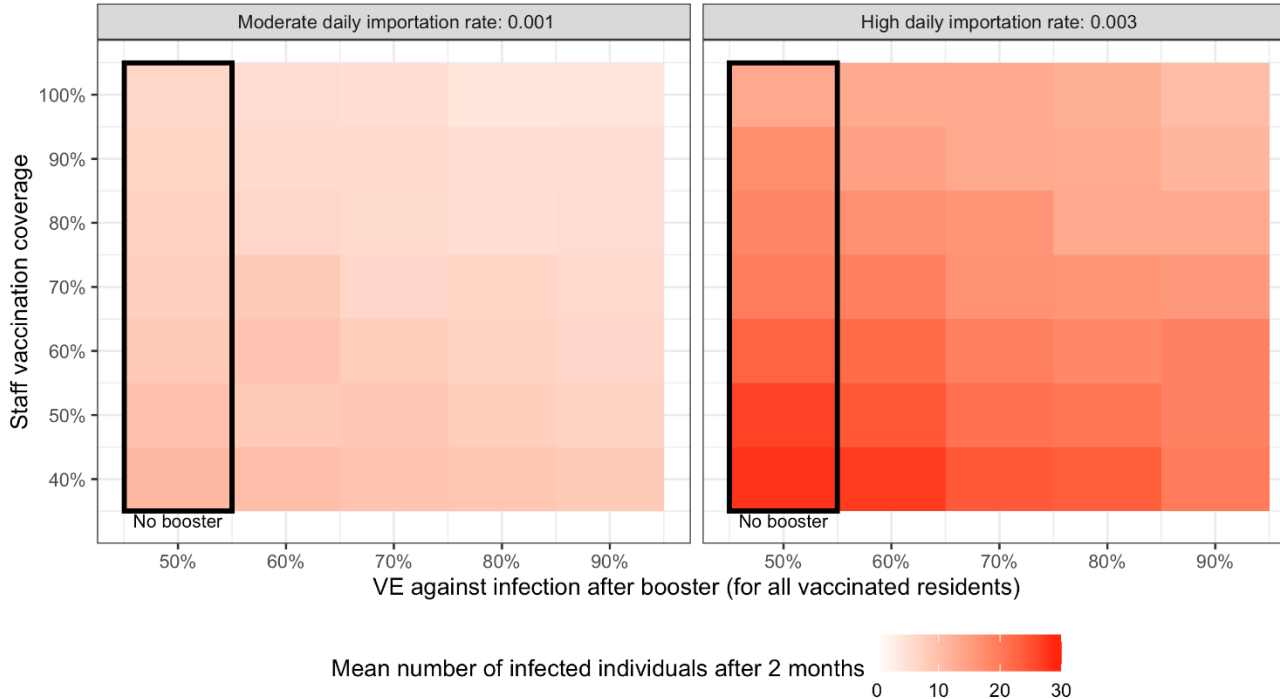


Findings

- Similar trends when looking at all symptomatic cases in NH (residents and staff) as in residents only
- This shows a larger impact of increasing staff coverage due to direct protection for staff

Total COVID-19 infections (symptomatic and asymptomatic) in nursing home (residents and staff)

Total infections in nursing home (2 dose VE against infection in residents: 50%, staff: 70%)



Findings

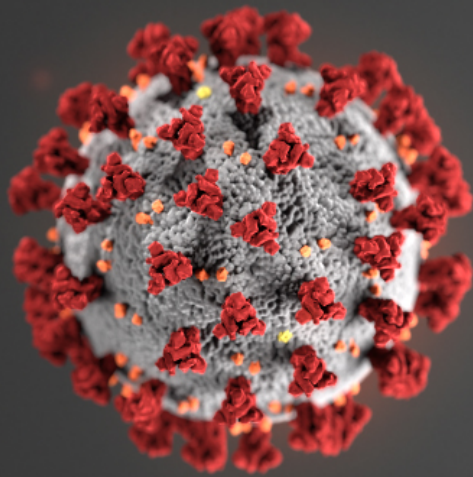
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Limitations

- We modeled VE against infection, VE against symptomatic disease, and VE against infectiousness as point estimates
 - These estimates may vary (e.g., by vaccine type, age of vaccinated persons, immunocompromising conditions of vaccinated persons)
- We modeled an average nursing home and did not capture all facility-level heterogeneity
- Previous COVID-19 infections are not modeled which may underestimate the level of prior immune protection
- We do not explore the impact of vaccine supply shortages in this model

Summary

- Maximizing COVID-19 vaccination coverage among staff remains a critical tool for preventing cases in nursing homes
- Boosters for nursing home residents can help reduce cases
 - Magnitude of their effect depends on their effectiveness and staff vaccine coverage
 - Even with highly effective boosters, cases in nursing homes will persist when community transmission is high, highlighting the need for continued infection prevention and control strategies
- Community transmission remains a key driver of cases in nursing homes



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.

