

## Individual-based modeling reveals that the COVID-19 isolation period can be shortened by community vaccination

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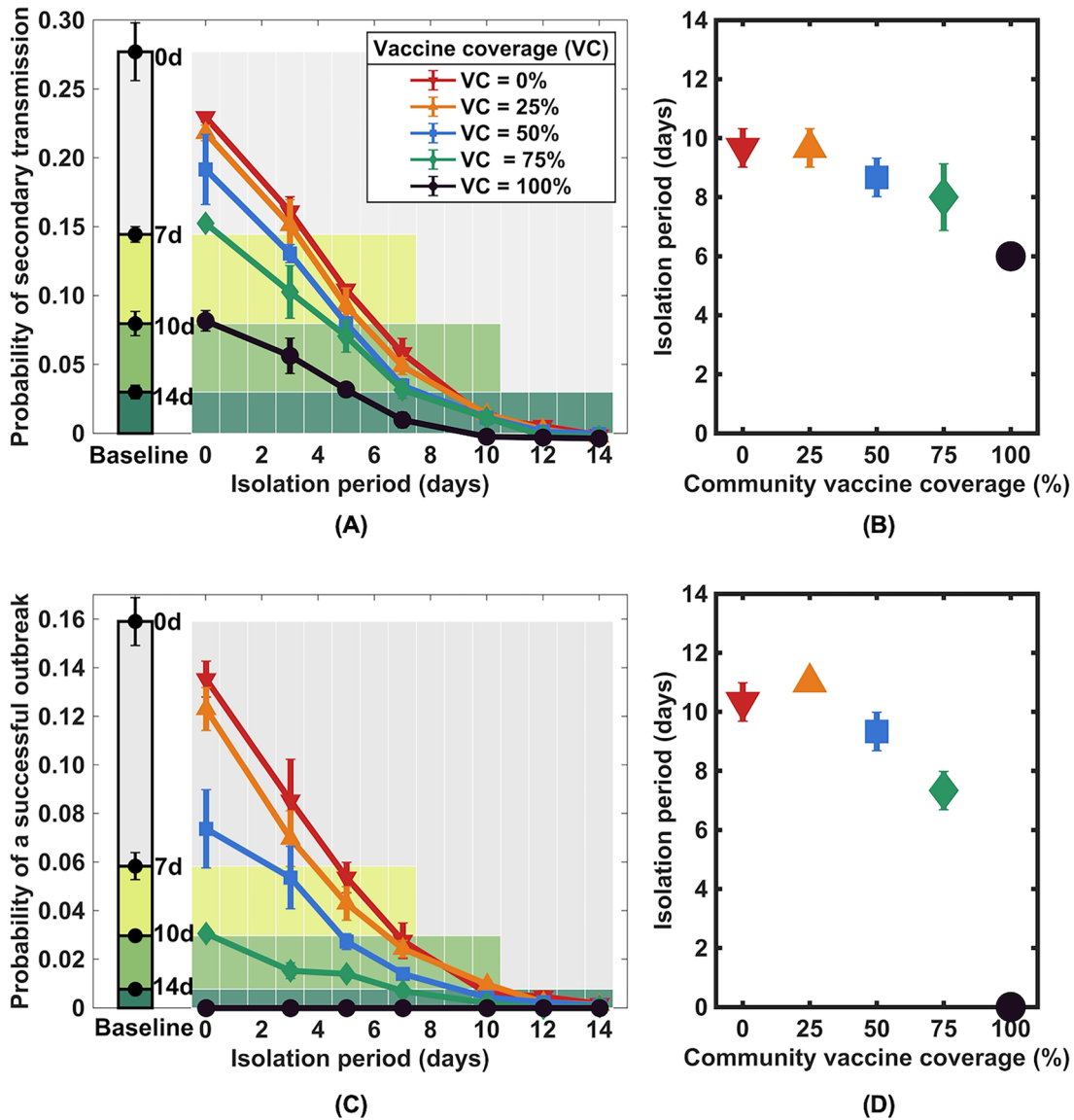
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**Rationale and objective:** When someone is infected with SARS-CoV-2, they are usually isolated and their close contacts are quarantined to prevent the virus from spreading. However, isolating infected individuals for a full 14 days can have a significant impact on their mental and emotional well-being. With the availability of effective vaccines, it is important to explore if the isolation duration can be shortened.

**Summary:** In this study, we used a modeling approach to estimate the likelihood of secondary infections and the risk of an outbreak after isolating a primary case for different periods of time. We considered factors such as the amount of virus in the body and how contagious vaccinated and unvaccinated individuals can be. We also took into account the potential decrease in vaccine effectiveness over time.

By simulating the spread of the Delta variant in a community, we found that in a scenario where no one was vaccinated and no other preventive measures were taken, there was a roughly 3% chance that an unvaccinated individual, after being isolated for 14 days, would infect at least one other person. There was also a less than 1% chance of a sustained chain of transmission occurring.

However, we discovered that if 75% of the community had been fully vaccinated with a specific vaccine (BNT162b2) in the last three months, the isolation period could be shortened to around 7.33 days. In the best-case scenario where everyone in the community is fully vaccinated, isolating individuals infected with the Delta variant may no longer be necessary. Nevertheless, to keep the risk of an outbreak below 1%, a booster vaccination might be needed three months after completing the initial vaccination.



**Graphical summary:** Impact of isolating a primary vaccinated infected individual on post-isolation transmission. Probability of secondary transmission (A) and probability of a successful outbreak in which a chain of transmission can be sustained (C) after a range of isolation periods and vaccination levels in the community. The corresponding probabilities in the baseline scenario where the primary case and all other individuals in the community are unvaccinated are shown as bar graphs on the left side of both subfigures. (B) and (D) show the isolation period equivalent to the 14-day isolation period in the baseline scenarios regarding the probability of secondary transmission and the probability of a successful outbreak, respectively. Error bars indicate 95% CIs.

**Outcome:** The study suggests that with high vaccination coverage and effective vaccines, the duration of isolation for SARS-CoV-2-infected individuals could be reduced, potentially balancing the need for transmission control while minimizing the psychological and emotional impact on patients.

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**Related SDGs goal:** 3. Good health and well-being.

**Related publications:**

Sararat C., Wangkanai J., Wilasang C., Chantanasaro T., Modchang C. Individual-based modeling reveals that the COVID-19 isolation period can be shortened by community vaccination. Scientific reports. (2022) 12:17543.

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