

Correspondence

# Impact of Vaccination on Severe Outcomes in COVID-19 Reinfections and Breakthrough Infections

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**Abstract:** COVID-19 vaccines have demonstrated efficacy in reducing the prevalence of serious illnesses. The relative risk of hospitalization and mortality for patients who get breakthrough infections after immunization versus those who develop reinfections after a prior spontaneous infection is examined in this correspondence. Based on a study on U.S. Veterans who were not vaccinated and experienced reinfections had a much higher risk of experiencing severe illness outcomes compared to those who had received immunizations and experienced breakthrough infections, even if the rates of reinfection and breakthrough infection were similar. Our findings highlight the value of immunization in reducing severe COVID-19 outcomes, even in the presence of reinfections.

**Keywords:** COVID-19, Breakthrough Infection, Reinfection, Vaccination, Severe Disease Outcomes

## How to cite this paper:

Dimaranan, K. A. (2025). Impact of Vaccination on Severe Outcomes in COVID-19 Reinfections and Breakthrough Infections. *World Journal of Nursing Research*, 4(1), 65–66.

DOI: 10.31586/wjnr.2025.6081

Received: February 10, 2025

Revised: March 29, 2025

Accepted: April 9, 2025

Published: April 10, 2025



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## 1. Introduction

The COVID-19 epidemic has presented serious challenges for health systems across the entire world. Although immunization has been shown to reduce the incidence of serious disease, breakthrough infections are still cause for concern. Natural infection, on the other hand, offers some protection; however, reinfections have been reported, often with fatal outcomes. The purpose of this correspondence is to investigate how the risk of serious illness differs for those who get breakthrough infections after vaccination and those who get reinfections after a prior natural infection.

## 2. Methods

Utilizing information from studies on the U.S. Veterans, a retrospective cohort study was performed. Those who had previously contracted COVID-19 but were not vaccinated were compared to those who were vaccinated but developed breakthrough infections in the course of the study. Mortality and hospitalization rates were the main subjects of the analysis. Data were grouped according to age, comorbidities, and immunization status. To evaluate risk reductions, statistical techniques including Kaplan-Meier survival analysis and Cox proportional hazards models were used. References were examined and appropriately referenced [1-5].

## 3. Results

The results show that:

- In comparison to unvaccinated individuals with reinfections (7.31 per 1000 person-days), vaccinated individuals with breakthrough infections had a decreased risk of hospitalization or death (4.69 per 1000 person-days) [1], as shown in Table 1.

- Those who were 65 years of age or older and had more comorbidities were much more likely to experience serious consequences upon reinfection [2].
- More protection was offered by hybrid immunity, which combines immunization and previous infection, than by vaccination alone [3].
- The rates of hospitalization for breakthrough infections were considerably decreased by booster dosages [4].

**Table 1. Comparison of Severe Outcomes in Vaccinated vs. Unvaccinated Individuals**

Group	Hospitalization Rate (per 1000 person-days)	Mortality Rate (%)
Vaccinated	4.69	0.5%
Unvaccinated	7.31	3.4%

#### 4. Discussion

The findings show how crucial vaccination is in lowering the risk of serious COVID-19 consequences. Although breakthrough infections can happen, they are usually not as severe as reinfections in people who have not received vaccinations. Hybrid immunity offers a strong protection and backs laws that promote booster shots. These results are consistent with other studies [2,3], highlighting the necessity of ongoing public health initiatives to increase vaccination rates.

#### 5. Conclusion

This study offers convincing evidence that, even in situations where breakthrough infections occur, vaccination dramatically lowers the likelihood of serious consequences. Natural infection provides some immunity, but reinfected people are more susceptible to serious illness, particularly those who have not had a vaccination. These results highlight how crucial vaccination is in preventing COVID-19, especially in high-risk groups. Booster initiatives should be given top priority in public health policies in order to improve long-term immunity and lower the incidence of serious diseases. The long-term effects of hybrid immunity and its potential to lessen serious outcomes should be investigated in future studies.

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