
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

JAMDA 22 (2021) 1602–1605

JAMDA

journal homepage: www.jamda.com

Research Letters

# Emerging Evidence on Effectiveness of COVID-19 Vaccines Among Residents of Long-Term Care Facilities

*To the Editor:*

The development and deployment of several COVID-19 vaccines within a little over a year after the pandemic started is seen as a success story in high-income countries. However, evidence on the effectiveness of the various vaccine candidates among users of long-term care (LTC) services was missing at the time of market entry. Given the disproportionate mortality burden carried by this population throughout the pandemic, it is important to understand whether vaccines protect the often frail and vulnerable users of LTC from infection and severe outcomes. We aimed to monitor and summarize emerging evidence on the effects of COVID-19 vaccines in LTC users.

## Methods

We conducted weekly searches of one academic literature database (MEDLINE via PubMed) between February 22 and May 11, 2021, to identify any original research articles reporting on the effect of COVID-19 vaccines in users of LTC. Eligible studies either focused solely on LTC or reported data separately for LTC users. We also searched 2 additional databases on May 11, 2021 (Web of Science; CINAHL Plus). We extracted key findings from included studies and summarized them narratively. This was a pragmatic and rapid review to monitor emerging evidence. We did not register a protocol for this work.

## Results

We identified 17 studies reporting on effects of COVID-19 vaccines in LTC users (including 5 preprints). All studies were conducted in institutional care facilities and none reported on community- or home-based care.

Studies reporting estimates of vaccine effectiveness are summarized in Table 1. Large cohort studies from England and Denmark (not yet peer-reviewed) estimated vaccine effectiveness against infection at 60% or higher 4 weeks or more after the first dose,[1] or 1 week after the second dose.[2] These results are not directly comparable because of different intervals between first and second doses in the 2 countries. Two smaller studies found similar levels of protection against infection, and 1 also showed protection from severe outcomes (Table 1).[3,4]

The impact of vaccination campaigns was assessed in 4 ecological studies (3 from the United States, 1 from Spain). Exploiting natural variation in vaccine rollout, 2 studies found significantly lower rates of new infections among residents of LTC facilities in the weeks following the start of vaccination drives compared with what would be expected without vaccinations, although evidence of the impact on death rates was less consistent.[5,6] Another study found decreased risk of infections once 50% of residents in a facility had received their first dose, although the effect varied over time.[7] A Spanish study estimated COVID infections and deaths were reduced by three-quarters once 70% of LTC residents were fully vaccinated.[8]

Four studies documented breakthrough infections among vaccinated LTC residents. Three studies from Germany, Northern Ireland, and the United States reported substantial outbreaks despite high first-dose vaccination rates of residents, with attack rates between 18% and 34% in affected facilities.[3,9] Potential for breakthrough infections in fully vaccinated residents (ie, infection occurred more than 2 weeks after administration of the second dose) was reported in studies from the United States and Northern Ireland.[4,10,11] Viral load in vaccinated, infected residents may be smaller compared with unvaccinated residents.[12]

Five studies investigated immune response among LTC users, consistently showing higher antibody levels in residents with prior infections. In residents without prior infections, immune response may be insufficient for approximately half of the residents after the first dose,[13–15] and for some even after the second dose.[16] Those with prior infection also had higher antibody levels after the second dose, but other characteristics (including frailty and cognitive impairment) were not associated with different antibody levels.[17]

## Discussion

Following the widespread rollout of vaccinations in LTC facilities, there is now a growing body of evidence on the effectiveness of COVID-19 vaccinations in these populations. Studies range from providing evidence of vaccine effectiveness at the individual level, facility level, and documenting immune response.

These studies fill a gap that was left by the large registration trials of COVID-19 vaccines, which systematically excluded older and frail people.[18] Although narrow inclusion criteria may have helped speed up the completion of trials, the fact that evidence on vaccine effectiveness in the population most severely hit by the pandemic only emerges now highlights the issue of continued underrepresentation of vulnerable populations in pharmaceutical trials.

A key issue in achieving high levels of protection is the takeup of vaccines among LTC staff. Although not covered in this evidence

Work on this manuscript was supported by the National Institute for Health Research (NIHR), Policy Research Programme (PRP)—Recovery, Renewal, Reset: Research to inform policy responses to COVID-19 in the health and social care systems (grant number: NIHR202333). The views expressed in this publication are those of the author(s) and not necessarily those of the NIHR or the Department of Health and of Social Care.The authors declare no conflicts of interest.

**Table 1**
Studies of Vaccine Effectiveness in LTC Users

| Study (Country) | Vaccine Studied | Study Overview | VE Estimates |
|---|---|---|---|
| Britton et al[3] (United States) | BioNTech/Pfizer | Outbreak report after breakthrough infections; 2 facilities (463 residents, 81% had at least 1 dose) | VE against infection after first dose: 63% (95% CI 33-79). |
| Cavanaugh et al[4] (United States) | BioNTech/Pfizer | Outbreak report after breakthrough infections; 1 facility (83 residents, 90% had 2 doses) | VE among fully vaccinated residents (>14 d after second dose): against infection 66% (95% CI 41-81); against symptomatic illness 87% (95% CI 66-95); against death 94% (95% CI 45-99) |
| Rask-Moustsen Helms et al[1] (Denmark) | BioNTech/Pfizer | Cohort study; 39,040 residents at LTC facilities (95% vaccinated with at least 1 dose) | No protective effect against infection after first dose VE against infection after second dose: 52% (95% CI 27-69) after 0-7 d, and 64% (95% CI 14-84) beyond 7 d |
| Shrotri et al[2] (England) | Oxford/AstraZeneca and Pfizer/BioNTech | Cohort study; 10,412 residents at LTC facilities (88% vaccinated with at least 1 dose) | VE against infection after first dose: 56% (95% CI 19-76) at 28-34 d; 62% (95% CI 23-81) at 35-48 d |

CI, confidence interval; VE, vaccine effectiveness.

summary, we are aware of quantitative and qualitative work in this area that aims to better understand willingness to be vaccinated and barriers to achieve high levels of uptake.

## References


1. Rask Moustsen-Helms I, Emborg H-D, Nielsen J, et al. Vaccine effectiveness after 1st and 2nd dose of the BNT162b2 mRNA Covid-19 Vaccine in long-term care facility residents and healthcare workers-a Danish cohort study. medRxiv 2021:1–11 [Epub ahead of print].
2. Shrotri M, Krutikov M, Palmer T, et al. Vaccine effectiveness of the first dose of ChAdOx1 nCoV-19 and BNT162b2 against SARS-CoV-2 infection in residents of Long-Term Care Facilities (VIVALDI study). medRxiv 2021:1–24 [Epub ahead of print].
3. Britton A, Slifka KMJ, Edens C, et al. Effectiveness of the Pfizer-BioNTech COVID-19 vaccine among residents of two skilled nursing facilities experiencing COVID-19 outbreaks—Connecticut, December 2020-February 2021. MMWR Recomm Rep 2021;70:396–401.
4. Cavanaugh AM, Fortier S, Lewis P, et al. COVID-19 outbreak associated with a SARS-CoV-2 R.1 lineage variant in a skilled nursing facility after vaccination program—Kentucky, March 2021. MMWR Morb Mortal Wkly Rep 2021;70:639–643.
5. Domi M, Leitson M, Gifford D, et al. The BNT162b2 vaccine is associated with lower new COVID-19 cases in nursing home residents and staff. J Am Geriatr Soc 2021:1–32 [Epub ahead of print].
6. Mor V, Gutman R, Yang X, et al. Short-term impact of nursing home SARS-CoV-2 vaccinations on new infections, hospitalizations, and deaths. J Am Geriatr Soc 2021:1–7 [Epub ahead of print].
7. Rudolph JL, Hartronft S, McConeghy K, et al. Proportion of SARS-CoV–2 positive tests and vaccination in VA Community Living Centers. J Am Geriatr Soc 2021:1–6 [Epub ahead of print].
8. De Salazar PM, Link N, Lamarca K, Santillana M. High coverage COVID-19 mRNA vaccination rapidly controls SARS-CoV-2 transmission in long-term care facilities. Medrxiv 2021:1–16 [Epub ahead of print].
9. Westhölter D, Taube C. SARS-CoV-2 outbreak in a long-term care facility after vaccination with BNT162b2. Clin Infect Dis 2021:1–6 [Epub ahead of print].
10. Teran RA, Walblay KA, Shane EL, et al. Postvaccination SARS-CoV-2 infections among skilled nursing facility residents and staff members—Chicago, Illinois, December 2020–March 2021. MMWR Morb Mortal Wkly Rep 2021;70:632–638.
11. McConaghy M, Sartaj M, Conway BR, Aldeyab MA. An assessment of the impact of the vaccination program on coronavirus disease 2019 (COVID-19) outbreaks in care homes in Northern Ireland—A pilot study. Infect Control Hosp Epidemiol 2021:1–2 [Epub ahead of print].
12. McEllistrem MC, Clancy CJ, Buehrle DJ, et al. Single dose of a mRNA SARS-CoV-2 vaccine is associated with lower nasopharyngeal viral load among nursing home residents with asymptomatic COVID-19. Clin Infect Dis 2021:1–12 [Epub ahead of print].
13. Blain H, Tuaillon E, Gamon L, et al. Spike antibody levels of nursing home residents with or without prior COVID-19 3 weeks after a single BNT162b2 vaccine dose. JAMA 2021;325:1898–1899.
14. Van Praet JT, Vandecasteele S, De Roo A, et al. Humoral and cellular immunogenicity of the BNT162b2 mRNA Covid-19 Vaccine in nursing home residents. Clin Infect Dis 2021:1–7 [Epub ahead of print].
15. Brockman MA, Mwimanzi F, Sang Y, et al. Weak humoral immune reactivity among residents of long-term care facilities following one dose of the BNT162b2 mRNA COVID-19 vaccine. medRxiv 2021:1–10 [Epub ahead of print].
16. Canaday DH, Carias L, Oyebanji O, et al. Reduced BNT162b2 mRNA vaccine response in SARS-CoV-2-naive nursing home residents. medRxiv 2021:1–4 [Epub ahead of print].
17. Salmerón Ríos S, Mas Romero M, Cortés Zamora EB, et al. Immunogenicity of the BNT162b2 vaccine in frail or disabled nursing home residents: COVID-A study. J Am Geriatr Soc 2021:1–7 [Epub ahead of print].
18. Helfand BKI, Webb M, Gartaganis SL, et al. The exclusion of older persons from vaccine and treatment trials for coronavirus disease 2019—Missing the target. JAMA Intern. Med 2020;180:1546–1549.



Maximilian Salcher-Konrad, BSc, MSc*, Siân Smith, BA, Adelina Comas-Herrera, BSc, MSc
*Care Policy and Evaluation Centre, Department of Health Policy, London School of Economics and Political Science, London, United Kingdom*
* Address correspondence to Maximilian Salcher-Konrad, BSc, MSc, London School of Economics and Political Science, Houghton Street, London WC2A 2AE, United Kingdom
*E-mail address:* m.salcher@lse.ac.uk


https://doi.org/10.1016/j.jamda.2021.05.017

# Was Hospital Care Refused to Belgian Nursing Home Residents During COVID-19?

The COVID-19 pandemic exposed many imperfections in older care. Worldwide, health care workers in nursing homes

The authors declare no conflicts of interest.