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# Asymptomatic COVID-19 cases among older patients despite BNT162b2 vaccination: a case series in a geriatric rehabilitation ward during an outbreak.

Cristiano Donadio, MD <sup>1</sup>

Antonio Rainone, MD <sup>1</sup>

Adéline Gouronnec <sup>2</sup>

Joël Belmin, MD, PhD <sup>1,3</sup>

Carmelo Lafuente-Lafuente, MD, PhD <sup>1,4</sup>

1. Service de gériatrie à orientation cardiologique et neurologique, AP-HP, Sorbonne Université, Hôpitaux universitaires Pitié-Salpêtrière-Charles Foix, F-94205 Ivry-sur-Seine, France.
2. Service de de Soins de Suite et de Réadaptation Gériatrique, AP-HP, Sorbonne Université, Hôpitaux universitaires Pitié-Salpêtrière-Charles Foix, F-94205 Ivry-sur-Seine, France.
3. LIMICS, Sorbonne Université, F-75005 Paris, France.
4. Université Paris Est Créteil, IMSERM, IMRB, CEpiA Team (Clinical Epidemiology and Ageing), F-94010 Créteil, France.

## CORRESPONDING AUTHOR:

Dr. Carmelo LAFUENTE-LAFUENTE

Service de Gériatrie à orientation Cardiologique et Neurologique,  
Hôpital Charles Foix,  
7 avenue de la République,  
94205 Ivry-sur-Seine, France.

Telephone : + 33 1 49 59 43 56 / 45 65

Fax : + 33 1 49 59 43 83

E-mail: [carmelo.lafuente@aphp.fr](mailto:carmelo.lafuente@aphp.fr)

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## Highlights

- In this small cohort of 40 frail older patients, full two-dose SARS-CoV-2 vaccination with BNT162b2 did not substantially reduce the proportion of patients infected during an in-hospital outbreak.
- However, most cases in vaccinated patients were completely asymptomatic; only one patient, immunocompromised, developed moderate pneumonia.
- These findings suggest that, in vaccinated frail older patients, asymptomatic SARS-CoV-2 infection may be frequent and could contribute to spread the disease.

## To the editor:

We read with great interest the work of Tré-Hardy et al [1] in your pages, studying antibody response in healthcare workers after one and two doses of SARS-CoV-2 mRNA-1273 vaccine. As with other mRNA vaccines [2], they found high antibody titers following vaccination, which has been associated with effectiveness in preventing symptomatic disease in clinical trials [3, 4].

The SARS-CoV-19 pandemic is having a dramatic impact [5], particularly on the elderly, and there is great hope that vaccination against SARS-CoV-2 will reduce mortality and ease the burden of the disease [6]. However, the impact of vaccination on the spreading of the disease is still not well known [7]. In particular, the effectiveness of vaccines for reducing asymptomatic SARS-CoV-2 infection is unknown. This aspect is important, because asymptomatic infection is a major contributor to viral transmission.

In this regard, we observed four patients who developed asymptomatic SARS-CoV-2 infection despite previous complete vaccination with BNT161b2, an mRNA vaccine. All were inpatients in a 40-bed geriatric rehabilitation ward, where a cluster of B.1.1.7 (VOC-202012/1) variant COVID-19 cases occurred. Over a period of 7 days, eight symptomatic cases happened among patients on this ward (Table 1), one of them in a vaccinated patient. In addition, seven cases occurred among ward staff. In

an effort to limit the spread of the infection, all inpatients underwent nasal swabbing for reverse transcriptase polymerase chain reaction (RT-PCR) testing for SARS-CoV-2, immediately and 7 and 14 days afterwards. Of the 32 patients without clinical signs, eight had a positive SARS-CoV-2RT-PCT. Four of them had previously completed two doses of BNT161b2 vaccine (Table 1). The characteristics of previously vaccinated patient, four asymptomatic and one with symptoms, are shown in Table 2. None of the asymptomatic patients developed any symptom of COVID-19 during the follow-up or had negative outcomes. The patient with symptomatic COVID-19 infection despite previous BNT161b2 vaccination was immunocompromised due to a hematological condition (chronic lymphoid leukemia) and developed a moderate COVID-19 related pneumonia, from which he recovered.

This small case series shows that frail older patients vaccinated with BNT161b2 can develop asymptomatic SARS-CoV-2 infection and thus participate to viral transmission. In fact, it is striking to note that the attack rate was the same between vaccinated and unvaccinated patients (Table 1), the main difference being that the proportion of asymptomatic cases was much higher between vaccinated patients. This observation, however, was obtained in the context of a COVID-19 outbreak in a geriatric rehabilitation ward. The four patients described here had received a full vaccination with the BNT161b2 vaccine and the delay between their first dose and the outbreak was sufficient to allow a complete immunization. All four were fully asymptomatic at all times, despite being very old, having several comorbidities and being infected by the B.1.1.7 variant, which is associated with a higher risk of severe disease and mortality [8]. Three of them were tested again 12 days after and SARS-CoV-2 was detected in only one patient by RT-PCR in the nasal swabs.

Asymptomatic infection is a matter of concern from the point of view of epidemic control, as they can transmit the virus without being aware [9, 10]. Recently, Tande et al analyzed the results of pre-procedural or pre-surgical SARS-CoV-2 screening testing realized in 3 US hospitals as function of the patients' vaccination status for the SARS-CoV-2 [11]. They observed asymptomatic SARS-CoV-2 in

1.4% of the individuals who had received SARS-CoV-2 vaccination, mainly the BNT161b2 vaccine. Even if this rate was significantly lower than the rate observed among unvaccinated persons (3.2%), their findings show that asymptomatic SARS-CoV-2 infection may occur in vaccinated persons, even out of the context of an outbreak, like in our case series. In contrast, Benenson et al. have found a dramatic decrease of new SARS-CoV-2 infections in healthcare workers after vaccination, to less than 1 case per 1000 workers tested [12].

The number of patients we report is very small and they occurred in a specific setting, so it is not possible to draw any generalizable conclusion. However, these findings suggest that asymptomatic SARS-CoV-2 infection may be frequent in vaccinated frail older patients, and that the main effect of vaccination in this population might be a decrease of the severity of the disease rather than completely avoiding it. That has implications when designing measures for limiting the spread of SARS-CoV-2. Further studies are needed to determine the importance of asymptomatic SARS-CoV-2 infection among vaccinated persons in the transmission of the disease.

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J.B. received personal fees from Pfizer and Novartis.

C.D., A.R., A.G. and C.L.L. have no competing interest to declare.

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Table 1: Cases of symptomatic and asymptomatic COVID-19 among patients during an outbreak in a geriatric rehabilitation ward, according to their BNT161b2 vaccination status.

	All patients n = 40 n (%)	Unvaccinated n = 28 n (%)	Vaccinated n = 12 n (%)
Symptomatic COVID-19	8 (20)	7 (25)	1 (8.3)
Asymptomatic COVID-19	8 (20)	4 (14.3)	4 (33.3)
Total COVID-19 patients	16 (40)	11 (39.3)	5 (41.7)

Table 2: Characteristics of the five patients with asymptomatic (cases 1-4) or symptomatic (case 5) SARS-CoV-2 infection and previous vaccination with the BNT161b2 vaccine.

	Case 1	Case 2	Case 3	Case 4	Case 5
Age (years)	86	84	81	92	93
Gender	M	F	M	F	M
Main medical conditions	Distal arterial occlusion, heart failure	Gastric cancer	Heart failure	Urothelial metastatic cancer	Chronic lymphoid leukemia
COVID-19 clinical signs	-	-	-	-	Moderate, non-fatal pneumonia
Days between 1 <sup>st</sup> and 2 <sup>nd</sup> vaccine doses	29	27	21	21	28
Days between 2 <sup>nd</sup> vaccine dose and 1 <sup>st</sup> positive RT-PCR	8	15	29	21	16
Follow-up RT-PCR tests	not tested again	negative (J12)	positive (J12)	negative (J12)	negative (J12)