


Letter to the Editor

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

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To the Editor—The emergence of the coronavirus disease 2019 (COVID-19) pandemic has had significant impact on people living and working in care homes.^{1,2} Care-home residents are more vulnerable to infection because they have an increased likelihood of risk factors including age, frailty, disability, and multiple long-term conditions.^{3,4} Vaccines have become the hope for a better life after the COVID-19 pandemic.^{5,6} Successful implementation of a vaccine program is dependent on adequate levels of uptake. Across Northern Ireland, vaccination of care-home residents and staff began on December 8, 2020. The Pfizer vaccine (Pfizer, New York, NY) was deployed, and the dose interval was 21 days, except in cases in which the vaccination team could not visit due to an outbreak. COVID-19 outbreaks in closed settings, such as care homes, provide an opportunity to assess vaccine impact on the scale and magnitude of the outbreaks.

In this pilot study, we evaluated the impact of the vaccination program on current COVID-19 outbreaks in care homes with at least 2 test confirmed cases that have occurred since the vaccination program commenced. A convenience sample of 4 care homes was selected for this evaluation by the Public Health Agency (PHA) on the basis of outbreak notification date. We conducted this evaluation with the following specific objectives: (1) to determine the vaccine uptake rate and reasons for nonvaccination in care homes among residents and staff for the first and second doses and (2) to describe the vaccination status of residents and staff at the outbreak and severe acute respiratory coronavirus virus 2 (SARS-CoV-2) test results. Data collection instruments included a facility questionnaire and staff and resident questionnaires. Care homes were screened to identify those in which an outbreak had been declared >9 days since the date of first COVID-19 vaccination in the facility. This period was selected so that individuals identified with potential vaccine failure would have had sufficient time for the vaccine to take effect.⁷ Descriptive statistics were used for analysis of data.

In total, 4 care homes participated in this study; the average number of residents was 39 (range, 21–54), and the average number of staff (care and support) was 64 (range, 54–91).

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For residents, the overall vaccine uptake was 84.6% for the first dose. The following reasons were reported for declining vaccination: resident unwell, history of allergies or allergic reaction, resident positive for SARS-CoV-2 (or within 28 days of symptom onset and/or positive test), refused, and new admission to home. For residents, data for the second dose showed a slightly lower vaccine uptake percentage of 80.8%. The following reasons were reported for declining vaccination: no longer in home or died, allergies, and refusal of second dose. Vaccine uptake rates among staff were generally lower. For the first dose, the average was 68.3%. The following reasons were given for declining vaccination: did not wish to receive vaccine, allergic reactions, pregnancy, and symptomatic or unwell. Uptake for second dose, among staff, was 65.9%. The reasons for declining vaccination were similar to those reported for the first dose.

Data were collected at the individual resident level from each of the 4 care homes. This covered all 157 residents (100%) identified in the facilities at the time of outbreak. Overall, 76 (48.4%) of 157 residents had received a second dose >7 days before the outbreak and SARS-CoV-2 testing, and for 21 (13.4%) of these 157 residents, there was no indication of a vaccine having been received (Table 1). The overall proportion that tested positive was 22.3% (35 of 157). Of the latter proportion, 23 (65.7%) were symptomatic and 12 (34.3%) were asymptomatic. The following outcomes were recorded for residents who tested positive for SARS-CoV-2: 23 (65.7%) made a full recovery without hospitalization, 7 (20%) required hospitalization of whom 2 (5.7%) died, and 5 (14.3%) died in the care facility. Analysis of the risk factors determined for each resident showed that the largest proportion had incontinence (86.6%, 136 of 57) and dementia (69.4%, 109 of 157). Of those who tested positive, higher proportions were associated with neurological conditions (62.8%, 22 of 35) and dementia (91.4%, 32 of 35).

Data were also collected at the individual staff level from each of the 4 care homes. These data included 210 (82.0%) staff identified in the facilities at the time of outbreak. Overall, 58 (27.6%) of 210 staff had received a second dose >7 days before the COVID-19 outbreak and testing, and for 60 (28.6%) of these 210 staff, there was no indication of a vaccine having been received (Table 1). The overall proportion who tested positive was 12.4% (26 of 210). Of these, 14 (53.8%) were symptomatic and 12 (46.2%) were asymptomatic. Where reported, all members of staff made a full recovery (n = 25).

Table 1. Vaccination Status of Residents and Staff and COVID-19 Test Result in Care Homes at Outbreak

Terms	Positive, No. (%)	Negative, No. (%)	Unknown, No. (%)	Total, No.
Residents				
All residents sampled	35 (22.3)	119 (75.8)	3 (1.9)	157
Dose 1 >21 d and dose 2 ≥7 d	20 (26.3) ^a	56 (73.7)	0	76
Dose 1 received >21 d and dose 2 <7 d	5 (83.3) ^b	1 (16.7)	0	6
Dose 1 received >9 d	5 (10.2)	44 (89.8)	0	49
Dose 1 received ≤9 d	0	0	0	0
No vaccine recorded as given	4 (19.0)	16 (76.2)	1 (4.8)	21
Missing resident vaccination history	1 (20.0)	2 (40.0)	2 (40.0)	5
Staff				
All staff sampled	26 (12.4)	166 (79.0)	18 (8.6)	210
Dose 1 >21 d and dose 2 ≥7 d ^a	1 (1.7)	57 (98.3)	0	58
Dose 1 received >21 d and dose 2 <7 d ^b	8 (26.7)	22 (73.3)	0	30
Dose 1 received >9 d	2 (4.2)	46 (95.8)	0	48
Dose 1 received ≤9 d	2 (40.0)	3 (60.0)	0	5
No vaccine recorded as given	13 (21.7)	35 (58.3)	12 (20.0)	60
Missing staff vaccination history	0	3 (33.3)	6 (66.7)	9

^aEquates to probable post vaccine infection, ie, a laboratory-confirmed diagnosis of COVID-19 in an individual >7 d following the receipt of the second dose of COVID-19 vaccine. ^bPossible postvaccine infection, ie, an individual who died >21 d after the receipt of the first dose of COVID-19 vaccine for whom COVID-19 was mentioned on the death certificate (either as a confirmed or suspected cause of death), either had not received a second dose or within 7 d of the second dose, but had not had a confirmatory SARS-CoV-2 test.

The results of this pilot study provide insight regarding vaccination programs in care homes followed by a subsequent COVID-19 outbreak. The proportion of residents who had received a second dose >7 days before outbreak and SARS-CoV-2 testing, and who tested negative in the outbreak, was 73.7%. The comparable figure for staff was 98.3%. These percentages equate to a clinical success in protecting vulnerable residents and staff against COVID-19 in this environment. The findings of this pilot study show variations in vaccine uptake for dose 1 and dose 2 among residents and staff, with different reasons for non-vaccination at each dose. The study would have benefited from a larger sample size and adjustment for patient-level risk factors (eg, comorbidities) and organizational factors (eg, infection control practices), and we intend to include these in future studies. Understanding the barriers related to lower levels of vaccination uptake is important to inform current and future COVID-19 vaccination programs policies in care homes in Northern Ireland.

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Conflict of interest. All authors report no conflicts of interest relevant to this article.

References

- Comas-Herrera A, Zalakaín J, Lemmon E, *et al*. Mortality associated with COVID-19 in care homes: international evidence. LTCcovid.org website. <https://lffcovid.org/wp-content/uploads/2020/04/Mortality-associated-with-COVID-26-April-1.pdf>. Published February 1, 2021. Accessed March 25, 2021.
- Gordon AL, Goodman C, Achterberg W, *et al*. Commentary: COVID in care homes—challenges and dilemmas in healthcare delivery. *Age Ageing* 2020;49:701–705.
- Gordon AL, Franklin M, Bradshaw L, *et al*. Health status of UK care home residents: a cohort study. *Age Ageing* 2014;43:97–103.
- Atkins JL, Masoli JAH, Delgado J, *et al*. Preexisting comorbidities predicting COVID-19 and mortality in the UK biobank community cohort. *J Gerontol A Biol Sci Med Sci* 2020;75:2224–2230.
- Polack FP, Thomas SJ, Kitchin N, *et al*. Safety and efficacy of the BNT162b2 mRNA COVID-19 vaccine. *N Engl J Med* 2020;383:2603–2615.
- Voysey M, Costa Clemens SA, Madhi SA, *et al*. Single-dose administration and the influence of the timing of the booster dose on immunogenicity and efficacy of ChAdOx1 nCoV-19 (AZD1222) vaccine: a pooled analysis of four randomised trials. *Lancet* 2021;397:881–891.
- Reporting to the enhancing surveillance of COVID-19 cases in vaccinated individuals. Public Health England website. <https://www.gov.uk/government/publications/covid-19-enhanced-surveillance-of-cases-in-vaccinated-individuals/reporting-to-the-enhanced-surveillance-of-covid-19-cases-in-vaccinated-individuals#collection-of-patient-data>. Updated January 27, 2021. Accessed March 25, 2021.