Treating COVID-19 in the nursing home setting: an integrated approach for a complex and susceptible cohort

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Abstract
Our patient, a nursing home resident, was reviewed by our frailty outreach service in November 2020. She initially was diagnosed with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in September 2020 during an outbreak in her nursing home. On this occasion, she again tested positive for SARS-CoV-2. Our case report describes the resident’s poor immune response indicated by a low IgG level after her initial COVID infection as well as reinfection with a ‘non-variant’ SARS-CoV-2 lineage (B.1.177).

The case describes the importance of integration of community and secondary care. The nursing home received close monitoring and nurse supervision for the detection of potential deterioration of the patient. Exit-seeking behaviour by nursing home residents was limited effectively. The issues of low immune response to COVID-19 in older people and the emergence of variants of concern will continue to pose a threat to this susceptible group.

INTRODUCTION
We present a case referred to our novel community frailty response service. The community frailty response service is composed of an emergency medicine or medicine for older person’s physician and occupational therapist. Between them, they have the ability to carry out medical, functional and cognitive assessments and perform near patient blood testing, portable electrocardiogram, point-of-care ultrasound and administer intravenous medications [1]. The service encompasses a catchment area of almost 320,000 people [1].

CASE DESCRIPTION
A nursing home resident, who had a 1-day history of shortness of breath and pyrexia, was referred to the community frailty response service in November 2020. She was also considered by the nursing home staff to be more confused than usual. She had previously tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on the 9 September 2021 during an outbreak in the same nursing home, and the virus was confirmed on polymerase chain reaction with a cycle threshold (CT) value of 19.7 on the IDEXX OptiSARS assay.

Initial assessment by the response service noted the resident to be short of breath on exertion and to have a dry cough. Eliciting a detailed history from the resident was limited by her cognition but she denied any other symptoms of focal infection. On examination, her vitals were stable, and she maintained a SpO2 of 96% or higher. There was an audible wheeze throughout both lungs on auscultation. Further examination revealed that the patient had developed delirium. Combined oropharyngeal and nasopharyngeal swab testing was positive for SARS-CoV-2 with a CT value of 17.9 on the Roche Cobas platform on 25 November 2021. This was 11 weeks after her previous positive SARS-CoV-2 test. IgG antibody to SARS-CoV-2 was negative on 30 November 2021 with a value of 0.06 (reference range for negative results < 1.4).

She was treated in the nursing home setting and prescribed medications for symptomatic control only (i.e. paracetamol). An advance care plan was put in place, which prioritized comfort measures. The community frailty response service reviewed her regularly and was available to provide supplemental oxygen, medications and palliative treatment if necessary. Fortunately, her condition began to improve on Day 5 after the onset of her symptoms.

Subsequent whole-genome sequencing demonstrated that the second episode of SARS-CoV-2 was characterized by the B.1.177 lineage. The first swab sample was not typable; however, variants of concern, such as B.1.177...
(the alpha variant), had not been detected in surveillance samples in September in Ireland, and we can therefore deduce that the resident had become infected on two occasions with the B.1.177 lineage. A repeat IgG was positive with a value of 9.4 on 22 December 2021, demonstrating some level of immunogenicity after her second infection. The patient was vaccinated with the Pfizer–BioNTech COVID-19 vaccine on 19 January 2021 and 15 February 2021 in her nursing home. There have been no further outbreaks after this point.

Of the 51 residents in the nursing home, 39 were diagnosed with SARS-CoV-2 during this second outbreak. Four residents were transferred to the acute hospital as their condition deteriorated. Four residents died throughout the course of the outbreak. The remaining residents remained either asymptomatic or had mild symptoms during their clinical course. A number of residents were independently mobile, which posed a threat of further viral transmission due to the presence of increased activity and the presence of exit-seeking behaviours. This risk was mitigated by isolation in single rooms, patient supervision and adherence to infection protection and control guidelines.

DISCUSSION
Throughout the COVID-19 pandemic in Ireland, 87% of deaths were in people 65 years and older, though only 13% of infections were in this age group [2]. In Ireland, at all stages of the national COVID-19 restrictions, older people were required to avoid public transport, to only shop during designated hours and to avoid leaving the house unless necessary in order to limit unnecessary exposure to SARS-CoV-2 [3]. A 10% decrease in Emergency Department (ED) attendances by older patients was noted in the acute hospital at this time as patients declined transfer from their homes to attend hospital care [1]. As a result, the existing community frailty response service was expanded to operate 7 days a week to provide emergency assessment and treatment in the patient’s home and when appropriate facilitated access to secondary care [1].

This case highlights the additional complexities involved in caring for frail patients with COVID-19 and the importance of the multidisciplinary approach to care. Close clinical monitoring and nurse supervision allowed for the early detection of potential deterioration of the patients and helped reduce viral transmission by limiting exit-seeking behaviour. Input from the public health and COVID response team incorporating registered advanced nurse practitioner and Consultant Geriatrician support provided expert advice on a range of clinical matters and infection prevention and control measures. The integration of services is in line with and emphasizes the advantages of the Irish health service’s objective of integration of primary, community and hospital care around the needs and choices of the patients while supporting them to remain in their communities (as detailed in the Slaintecare report) and adheres to COVID-19 Nursing Homes Expert Panel Examination of Measures to 2021 Report to the Minister for Health [4, 5].

Current data demonstrate that SARS-CoV-2 reinfection is rare within 5–8 months. Data on healthcare workers (HCWs) demonstrate an 83% reduction in risk, with median protective effect observed 5 months following primary infection. [6] Data in HCWs demonstrate that anti-Spike IgG remains elevated for 6 months post-infection. [7] Although IgG levels may be present for months and may be correlated with neutralizing antibody activity, [8] the data are not, however, conclusive that antibody positivity protects from reinfection. A significant limiting factor in these studies is the focus on HCWs, who are overwhelmingly under 65 years of age.

There are concerns that older persons may not retain immunity to COVID-19 after disease or vaccination given immunosenescence (via proliferative exhaustion and naïve T-cell depletion among many causes) [9]; however, data are lacking due to the short-term immunogenicity studies to date. Furthermore, novel variants of concern raise the issues of likely decreased immunity, as SARS-CoV-2 may not confer cross-immunity to other viral lineages [10].

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CONFLICT OF INTEREST STATEMENT
None declared.

ETHICAL APPROVAL
Not obtained.

PATIENT CONSENT
Proxy consent was obtained from the patient’s next of kin.

GUARANTOR
Dr Warren Connolly and Dr Diarmuid O’Shea.

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