

Mitigation of a COVID-19 Outbreak in a Nursing Home Through Serial Testing of Residents and Staff

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Abstract

Nursing homes and long-term care facilities represent highly vulnerable environments for respiratory disease outbreaks, such as COVID-19. We describe a COVID-19 outbreak in a nursing home that was rapidly contained by using a universal testing strategy of all residents and nursing home staff.

Keywords: Nursing home, COVID-19, outbreak response, universal testing, long term care

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Introduction

In the United States, over 15,000 nursing homes (NHs) and long-term care facilities (LTCFs) care for the oldest and most chronically ill adults [1]. NHs have long been recognized as at-risk environments to respiratory infectious disease outbreaks [1]. With the emergence of the SARS-CoV-2 pandemic, NH residents have been identified as a highly vulnerable population to the SARS-CoV-2 virus, with one nursing home in Washington State reporting a case fatality rate of 34% [2]. The combination of inadequate testing capacity and the recent discovery that asymptomatic and presymptomatic viral shedding lead to viral transmission creates a high risk for outbreaks with potentially significant mortality rates in NHs [1],[3]. The Centers for Medicare and Medicaid Services (CMS) surveyed 54% of NHs nationally and identified 60,439 NH resident cases, with over 25,000 COVID-19 related deaths [4]. Testing of NH staff and residents is likely to play an important role in management of a COVID-19 outbreak, but the optimal breath and frequency of testing have not been delineated. We describe the management of a COVID-19 outbreak in a NH and describe a strategy involving serial testing of residents and staff that led to its successful, rapid containment.

Case Report

This NH in eastern Pennsylvania has 135 beds on two floors and provides care for residents with functional impairment, chronic stable conditions, short term rehabilitation needs, and hospice. The first floor of the nursing home focuses on post-acute care, while the second floor houses long-term residents. In April 2020, 84 residents lived in the NH, 83 of whom were male. The average age of the residents was 74 years. Comorbid conditions were common among the residents (Supplemental Table 1). The NH is connected to a non-academic medical center with

infection control experts, infectious diseases physicians, quality management staff, employee occupational health (EOH) services, and onsite laboratory services. The NH had access to two SARS-CoV-2 PCR testing platforms with turnaround times of 3-24 hours.

On March 5th, the NH issued a no-visitor policy due to concern for an influenza outbreak. At that time, no COVID-19 cases had been identified regionally. On March 9th, universal symptoms screening at the NH entrance was implemented and anyone with symptoms was excluded from the facility. Residential common areas, including the gym and the cafeteria, were closed on March 17th. The NH was closed to new admissions on March 20th. To minimize the potential for viral aerosolization, on March 30th, nebulizer use was transitioned to metered dose inhalers. Between March 20th and April 6th, 13 residents were tested for SARS-CoV-2 based on symptoms. All thirteen residents tested negative.

The NH implemented a universal masking policy for employees on April 1st. Between April 1st and April 8th, four staff members tested positive for SARS-CoV-2 after self-referral for testing based on symptoms; these employees were kept out of work. On April 10th, a fifth employee tested positive for SARS-CoV-2 after developing symptoms. This healthcare worker, while asymptomatic, had been assigned 1:1 with a NH resident (index resident) in a second-floor unit, and had not worked with other NH residents. The index resident, though asymptomatic, was tested for SARS-CoV-2, and tested positive. On April 11th, the remaining residents (16 total) who lived in the same hallway as the index resident were tested, and all tested negative. However, that evening, one resident in an adjacent hallway had a temperature of 100.2 °F and tested positive for SARS-CoV-2. This resident was isolated. Identification of the second resident from a different unit raised concern for an outbreak. On April 12th, the remaining residents who lived on the second floor (38 total), were tested for SARS-CoV-2, marking the initiation of

universal, serial testing (Figure 1). Two residents from the second unit tested positive, confirming a widespread outbreak. All residents on the first floor tested negative.

On April 14th, a dedicated SARS-CoV-2 isolation unit was opened in the NH for SARS-CoV-2-positive residents (Figure 1). All routine care was provided in the resident rooms. Residents were not allowed to travel between units. Universal masking of all residents was implemented, and the residents were encouraged to quarantine in their rooms. Concurrently, use of eye shields for clinical staff was made mandatory and efforts were made to cohort the staff to work on specific units.

Given the widespread outbreak in the NH, on April 12th, EOH implemented SARS-CoV-2 screening of all staff who were either stationed at the NH or moved back and forth between the NH and the medical facility. By April 30th, 212 asymptomatic staff were screened and 67 were tested due to symptoms. Twenty-six symptomatic and six asymptomatic staff members tested positive. All SARS-CoV-2 positive employees were kept off site and returned to work based on the CDC symptom-based strategy [5].

Due to concern for asymptomatic transmission, serial testing of NH residents occurred approximately every 3-5 days, to capture as many early asymptomatic cases as possible while balancing resident uptake of the procedure. Each resident was tested an average of 4.4 times. By April 20th, 21 residents tested positive and a second dedicated SARS-CoV-2 unit was opened. On April 21st, a team of dedicated observers was deployed to identify opportunities to improve infection control practices. The last positive resident was identified on April 23rd (Figure 1). In total, 27 residents tested positive, with an attack rate of 37%. Twenty-six of the positive residents were from the second floor. Among the positive residents, 14 were asymptomatic at the time of identification, and 13 developed symptoms after diagnosis. As of July 1, no new cases have been identified among the NH residents. The NH has maintained universal masking precautions for

residents and staff, as well as the no-visitor policy. Some common areas, such as the gym and the courtyard, have reopened for limited use. To date, all newly hired staff of the NH are tested for SARS-CoV-2, and three new hires have tested positive and have been kept out of work.

Discussion

Delineating strategies to mitigate disease outbreaks in NHs is increasingly important as the number of Americans living in NHs is expected to double by 2050 [6]. Nursing home residents are generally at higher risk for transmissible infections due to host risk factors (chronic comorbidities, age-associated functional immune deficiency), inherent risk from grouped living quarters, and contact with healthcare staff [6]. With COVID-19, the intrinsic challenges of disease outbreak in a NH are augmented by the virus's high transmissibility in the asymptomatic phase [7][8]. These studies support modifying infection control measures to account for probable asymptomatic and presymptomatic transmission.

This case report highlights strategies used to rapidly control a COVID-19 outbreak in a NH. First, the implementation of serial SARS-CoV-2 testing with rapid turnaround, allowed for the identification, isolation, and cohorting of likely infectious but asymptomatic residents. Second, NH leadership developed a comprehensive plan for a SARS-CoV-2 isolation ward in advance of the outbreak, allowing for rapid cohorting and obviating the need to transfer to the affiliated acute care hospital. Third, a multidisciplinary team of physicians, nurses, and administrators with expertise in infection prevention, quality improvement, and geriatrics, met daily to round in the NH. Fourth, EOH quickly implemented universal testing of employees, identifying and isolating several asymptomatic staff members, including staff with simultaneous duties at both the NH and the affiliated acute care hospital. Fifth, quality management staff were engaged during the outbreak as dedicated observers to prevent lapses in infection control

practices, with education reinforcement and maintenance of appropriate personal protective equipment. After implementing these interventions, we observed a reduction in transmission of SARS-CoV-2 in NH residents, with the last case in a resident detected less than two weeks after the first case.

The cornerstone of the highlighted interventions was serial testing of all residents and employees, regardless of symptomatology. The U.S CDC guidelines for LTCFs to prepare for COVID-19 outbreaks support point prevalence surveys of all residents and staff, if testing capacity is available [5]. This case report provides support for serial testing of residents and staff in short time intervals (testing residents every 3-5 days); a higher frequency compared to prior studies [3,6,9]. This testing strategy led to early isolation and cohorting, likely preventing additional transmission. Universal testing of staff allowed for identification of positive presymptomatic staff members. A similar testing strategy was recently utilized in a COVID-19 outbreak in a Veteran's Affairs NH in Los Angeles, with comparable results [9]. There are limitations to this approach that may restrict its generalizability to other NHs. These challenges include lack of access to rapid testing, inadequate staffing, including infection control experts, and lack of an affiliation with a medical center. Given the likely added value of these components, building partnerships between NHs and medical centers may be key to improving responses to future outbreaks. Collectively, we provide a compelling blueprint for NHs to rapidly interrupt transmission of COVID-19.

Notes

None of the authors have any financial disclosures to declare.

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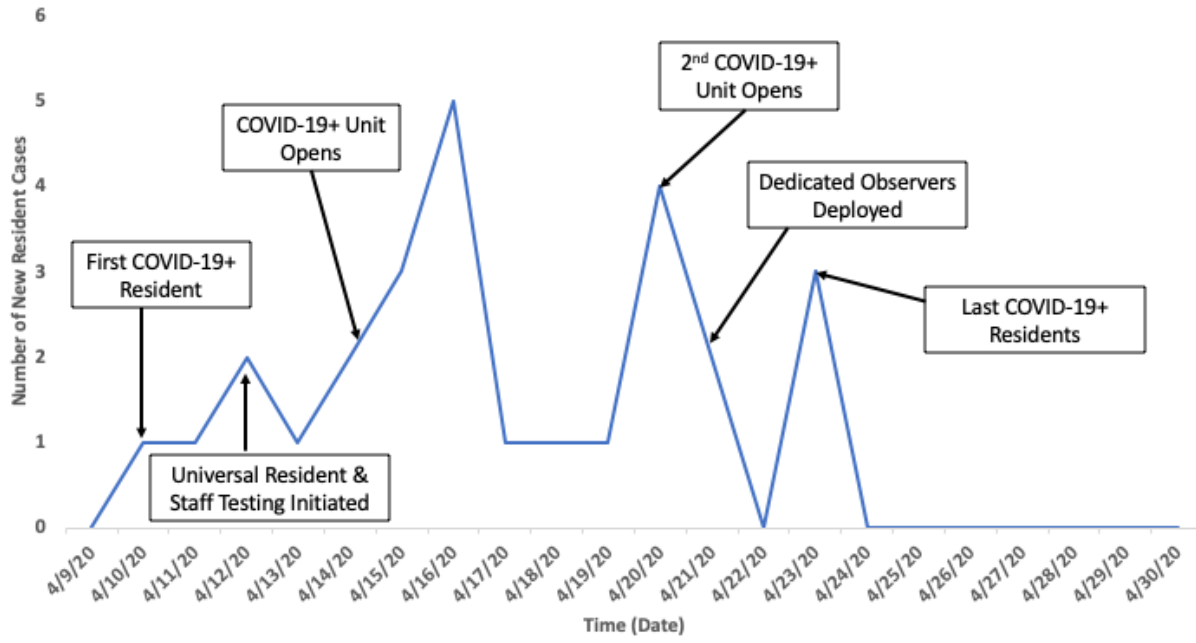
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Figure 1: Total number of new daily SARS-CoV-2 cases in the nursing home. Key interventions in the nursing home are correlated with the date of implementation during the outbreak.

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Figure 1



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