



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.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Home-Based Primary Care Led-Outbreak Mitigation in Assisted Living Facilities in the First 100 Days of Coronavirus Disease 2019



William R. Mills MD*, Janet M. Buccola MD, Susan Sender BSN, RN,
Joseph Lichtefeld BA, Nicholas Romano BS, Karen Reynolds BS, Melissa Price BS,
Jennifer Phipps MS, Leigh White MBA, Shauen Howard DHA, MSN, RN, COS-C

BrightSpring Health Services, Louisville, KY

ABSTRACT

Residents of congregate care settings have been severely impacted by the current Coronavirus disease 2019 (COVID-19) pandemic. In this report, we describe the methods our home-based primary care practice has developed to mitigate the spread of COVID-19 in assisted living facilities (ALFs) and we present an initial evaluation of this innovation. Shortly after the first COVID-19 case was reported in the United States, our organization assembled an outbreak committee, designed to support the 1794 ALF residents and the 101 communities in which they reside. The committee led the development and deployment of a comprehensive COVID-19 prevention and suppression strategy. The average age of the cohort was 83 ± 11 years, and 74% were female. Seven individuals (0.4% of census) tested positive for SARS-CoV-2. The positive individuals were located in 3 ALFs, representing 3% of our total number of ALFs. There has been 1 death. Home-based primary care-led outbreak mitigation may be an enabler to suppress COVID-19 in ALFs.

© 2020 The Authors. Published by Elsevier Inc. on behalf of AMDA – The Society for Post-Acute and Long-Term Care Medicine. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: COVID-19, home-based primary care, assisted living, outbreak, Coronavirus

The novel Coronavirus SARS-CoV-2, which causes the acute respiratory disease Coronavirus disease 2019 (COVID-19), first identified in late 2019 in Wuhan, China,¹ has spread rapidly and has caused over 7 million infections and over 400,000 deaths.² Residents of congregate care settings have been severely impacted by the current COVID-19 pandemic.³ It is unknown how the virus may affect residents of assisted living facilities (ALFs) served by a home-based primary care (HBPC) medical group. Our HBPC group provides visiting medical care to 1794 residents of 101 ALFs in Ohio. To address the threat posed by COVID-19, we developed a comprehensive outbreak preparedness and suppression strategy, with a primary objective of protecting our patients and the communities in which they live. In this report, we describe the methods our organization has developed to mitigate the spread of COVID-19 in ALFs and we present an initial evaluation of this innovation.

Implementation

The ALFs in which our group provided care are owned by a variety of entities, including sole or family owners of a single home, local chains, regional operators, and national ALF organizations. Of the approximately 5000 residents in these 101 facilities, our group's average penetrance rate (practice census/total census) is 60% in mature facilities (ALFs where we have had a presence for 1 year or greater). However, in facilities where we more recently started serving the ALF, we

only provided care for a few patients at the time of this study. The ALF residents in all facilities maintained provider choice, and each ALF typically has a mix of providers who provide medical care for its residents. Some residents go out to office-based practitioners, and some are served by our group, as well as by other visiting practitioners. In buildings where we have a significant percentage of the census, the ALF leadership typically utilizes our group for assistance with care policies, staff education, seminars, and medical oversight. Our practice model is to provide on-site access to care for ALF residents by having a practitioner visit once or twice per week, depending on census.

Shortly after the first case of COVID-19 was confirmed in the United States, we assembled a cross functional team of leaders and formed an Outbreak Preparedness and Action Committee. The mission of the committee was to prepare for outbreaks and to act when necessary to protect, support, and serve our patients and employees. The committee developed a comprehensive preparedness plan and served as a means of consolidating internal and external communications regarding COVID-19 questions, planning, and response. Our primary outbreak monitoring source was the Johns Hopkins Coronavirus Resource Center,² in addition to the Centers for Disease Control and Prevention (CDC) and the World Health Organization COVID-19 situation rooms.

To streamline our internal COVID-19 case and exposure triage and reporting, we built a secure, cloud-based web application. The application leverages a QuickBase (QuickBase, Inc, Cambridge, MA) data structure to quickly capture confirmed cases as well as potential exposures. A person under investigation (PUI) for COVID-19 was defined as an individual with a fever and lower respiratory symptoms, or person with a potential exposure to a confirmed or suspected case. A COVID-19 case was defined as a positive nucleic acid test for SARS-CoV-2 RNA. Entry of new patient cases auto-notified our clinical

This research did not receive any funding from agencies in the public, commercial, or not-for-profit sectors.

The authors declare no conflicts of interest.

* Address correspondence to William R. Mills MD, BrightSpring Health Services, 805 N Whittington Parkway, Louisville, KY 40222.

E-mail address: William.Mills@brightspringhealth.com (W.R. Mills).

team, who worked with the ALF's nursing and administrative teams to plan and train staff on necessary isolation and infection control procedures. To optimize our ability to visualize COVID-19 positive individuals, we also developed a business intelligence application, leveraging Power BI (Microsoft Corp, Redmond, WA). The team used the visualization tool throughout the day as a "practice situation room" that enabled us to deploy specific mitigation tactics as cases emerged.

The infection control measures were adapted from the US Centers for Disease Control and Prevention,⁴ and the educational training enabling appropriate implementation of these measures was developed by our nursing quality team through a variety of live and recorded web meetings and slide presentations, videos, and written policy and instructional documents. These resources are available at: <https://www.brightspringhealth.com/covid19/>. We made all COVID-19 materials available to all ALF partners, and we provided both formal and informal education and ongoing COVID-19 mitigation guidance throughout the study period. No specific ALF approval was needed for our group to provide the freely accessible resources.

To prevent employees from coming to work sick, we developed a cloud-based, mobile-enabled, symptom-screening application. For self-screening, all employees were asked to record their temperature daily and answer simple screening questions using the mobile app. Symptomatic employees were isolated at home and tested for COVID-19 where testing was available. We isolated the employee at home until they met the Centers for Disease Control and Prevention return to work criteria for healthcare workers.⁵

To enable employees to have access to the most current information, policies, and training materials, we developed and deployed over 120 COVID-19 prevention and action resource materials. This resource library (the same material provided in the link above) was posted to our organizational intranet, and updates were also communicated by email to the organization 3 times per week.

Evaluation

All HBPC practitioners and support staff reviewed the resource library documents and participated in the educational sessions that the outbreak committee and practice medical director developed. In the 100-day period between January 20, 2020 and April 30, 2020, we provided HBPC to 1794 ALF residents in 101 ALFs in Ohio. The average age of the cohort was 83 ± 11 years and 74% were female. Thirty-five ALF residents were classified as PUIs for COVID-19. Seven individuals in our facilities (0.4% of census) tested positive for SARS-CoV-2 by nucleic acid test (Table 1), with an average age of 82 years. The positive individuals were located in 3 ALFs, representing 3% of our total number of ALFs. Of the 7 cases, 4 were from 1 ALF, 2 were from another, and 1 ALF has had a single case. For each positive case, the ALF notified the health department, and any additional guidance was implemented in collaboration with our group.

Three COVID-19 positive individuals were hospitalized. As of April 30, 2 of the individuals hospitalized have been discharged and are recovering. There has been 1 death. The patient who died was a 77 year-old woman with a history of Parkinson disease, dementia, atrial fibrillation, hypertension, hypothyroidism, and morbid obesity. She presented to the ALF nurse with change in mental status and sore throat, and upon evaluation, was found to have fever and hypoxemia. Our on-call practitioner admitted her to the hospital where she tested positive for COVID-19. For several days, she maintained clinical stability on 4 liters of oxygen by nasal cannula. Ten days into the hospitalization, she acutely desaturated and was placed on a 100%

Table 1

ALF Residents Cared for by a HBPC Practice and COVID-19 Cases in First 100 Days of the COVID-19 Pandemic (January 20, 2020–April 30, 2020)

	n	Female n (%)	Age, y Mean (SD); Min-Max
ALF residents served	1794	1328 (74%)	82.9 (10.6); 49–106
Persons under investigation	35	27 (77%)	85.0 (9.2); 60–99
COVID-19 positive	7	5 (71%)	81.9 (11); 60–92
Not hospitalized	4	3 (75%)	86.5 (5); 82–92
Hospitalized*	3	2 (67%)	75.7 (15); 60–90

SD, standard deviation.

*One hospitalized patient died as described in the Evaluation section.

nonbreather mask in the intensive care unit. She was initially treated with hydroxychloroquine and azithromycin, but she did not improve and her family honored her wishes to avoid intubation and mechanical ventilation. She elected the hospice benefit, and she died 2 weeks into the hospitalization.

Comments

In the United States, at least 5700 (12.8%) of the approximately 44,500 nursing homes and ALFs have reported a COVID-19 case.⁶ To date, 3% of ALFs where our group provides HBPC have had at least 1 COVID-19 positive case. We report 7 positive cases in the first 100 days of the US COVID-19 outbreak across our ALF population of 1794, for a prevalence of 0.4% of census. COVID-19 positive ALF residents who did not require hospitalization were able to isolate in their room, and recover with symptomatic support.

A highly coordinated and frequently communicated approach to infection control, employee screening and visitor management may enable suppression of COVID-19 in ALFs. We have also begun regular diagnostic testing of all visiting practitioners, using a "2-pronged" approach that includes nasopharyngeal swab for SARS-CoV-2 nucleic acid to diagnose acute infection for those who are acutely symptomatic and a rapid POC test for asymptomatic employees for IgM and IgG antibodies against SARS-CoV-2 to determine recent or past infection. At the time of this report, all visiting practitioners have tested negative, and we have begun a regular monthly antibody testing cadence.

In the first 100 days of the COVID-19 outbreak in the United States, we observed that HBPC-led outbreak mitigation may be an enabler to suppress COVID-19 infection rates in ALF residents. All congregate living settings pose challenges for infection control COVID-19, however, vigilant infection control procedures, case and exposure documentation, and real-time data analysis can be enablers of an optimal response.

Acknowledgments

The authors express their most sincere gratitude to the caregivers, nurses, and administrative leadership of our country's assisted living and nursing facilities, who continue to do their very best as they courageously face the COVID-19 pandemic.

References

- Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N. Engl J Med* 2020;382:727–733.

2. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis* 2020;20:533–534.
3. Zimmerman S, Sloane PD, Katz PR, et al. The need to include assisted living in responding to the COVID-19 pandemic. *J Am Med Dir Assoc* 2020;21:572–575.
4. Centers for Disease Control and Prevention. Infection Control Guidance for Healthcare Professionals about Coronavirus (COVID-19). Available at: <https://www.cdc.gov/coronavirus/2019-nCoV/hcp/infection-control.html>. Accessed May 10, 2020.
5. Centers for Disease Control and Prevention. Criteria for Return to Work for Healthcare Personnel with Suspected or Confirmed COVID-19. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/return-to-work.html>. Accessed May 11, 2020.
6. Nadolny T, Kwiatkowski M. 'Our patients are dropping like flies' USA Today. published online May 1. Available at: <https://www.usatoday.com/story/news/investigations/2020/05/01/coronavirus-nursing-homes-more-states-pressured-name-facilities/3062537001/>. Accessed May 5, 2020.

The pragmatic innovation described in this article may need to be modified for use by others; in addition, strong evidence does not yet exist regarding efficacy or effectiveness. Therefore, successful implementation and outcomes cannot be assured. When necessary, administrative and legal review conducted with due diligence may be appropriate before implementing a pragmatic innovation.