

Letters

RESEARCH LETTER

Outcomes of Universal COVID-19 Testing Following Detection of Incident Cases in 11 Long-term Care Facilities

Residents in long-term care facilities are at particularly high risk of infection and poor outcomes associated with coronavirus disease 2019 (COVID-19).^{1,2} Early in the course of the pandemic, testing recommendations by the Centers for Disease Control advised testing residents and staff solely based on the presence of typical symptoms. Despite these efforts, there have been widespread outbreaks across long-term care facilities in the US, with high mortality rates.

Methods | We performed universal testing of untested residents across 11 Maryland long-term care facilities that (1) had previously undergone targeted testing through the local health department based on individual residents' symptoms and (2) had known positive cases. Nasopharyngeal swab samples were collected, and reverse transcriptase-polymerase chain reaction analysis was used to detect severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA. Symptom status (any fever >99 °F, cough, diarrhea, respiratory decompensation, or other acute clinical status changes) at the time of universal test-

ing was recorded based on discussion with facility staff. We used descriptive statistics to report the prevalence of positive test results and symptom status at the time of testing. Two-week telephone follow-up was conducted at 7 facilities following point-prevalence testing to obtain information regarding hospitalization and mortality status of all tested residents. This study was reviewed by the Johns Hopkins institutional review board and deemed exempt as public health surveillance activity.

Results | Targeted symptom-based testing identified 153 cases prior to point-prevalence surveys at 11 facilities within 20 days of detection of the index case. Among the remaining 893 residents who were universally tested, 354 (39.6%) tested positive for SARS-CoV-2 RNA. Thus, universal screening increased the total number of detected COVID-19 cases across all sites from 153 to 507; of these, 281 (55.4%) were asymptomatic (Table 1).

There was 2-week follow-up available for 426 of the residents tested at 7 facilities (177 positive for COVID-19, 249 negative). Among the 177 cases who were identified with universal testing, 154 (87.0%) were asymptomatic. Among those who tested positive and were asymptomatic at testing, 20 (13.0%) were hospitalized, and 7 (4.6%) died within 14 days of test-

Table 1. Results, Known Case Burden, and Timing of Testing by Facility

Facility	NH/ALF	Days between index case and testing	No. positive/No. tested (% positive)	Known resident cases prior to testing	Total No. of cases	No. (%) of asymptomatic cases
A	NH	5	114/151 (79.1)	26	140	65 (46.4)
B	NH	3	42/58 (72.4)	22	64	25 (39.1)
C	NH	12	29/39 (74.4)	34	63	29 (46.0)
D	NH	6	6/51 (11.8)	2	8	5 (62.5)
E	NH	10	53/104 (51.0)	34	87	53 (60.9)
F	NH	4	15/135 (11.1)	4	19	15 (78.9)
G	NH	4	16/105 (15.2)	13	29	16 (55.2)
H	NH	19	42/76 (55.3)	11	53	39 (73.6)
I	NH	9	14/143 (9.8)	3	17	14 (82.4)
J	ALF	7	6/12 (50.0)	2	8	4 (50.0)
K	ALF	7	17/19 (89.5)	2	19	16 (84.2)
Overall	81.8% NH		354/893 (39.6)	153	507	281 (55.4)

Abbreviations: ALF, assisted living facility; NH, nursing home.

Table 2. Two-Week Cumulative Hospitalization or Mortality Among Long-term Care Residents With Follow-up Data^a

Characteristic	Overall	Test result		
		Negative	Positive at testing	
		Asymptomatic	Symptomatic	
Total, No.	426	249	154	23
Hospitalized	33 (7.7)	9 (3.6)	20 (13.0)	4 (17.4)
Death	14 (3.3)	5 (2.0)	7 (4.6)	2 (8.7)

^a Unless otherwise noted, data are number (percentage) of residents.

ing. Among the 23 residents who tested positive and were symptomatic at testing, 4 (17.4%) were hospitalized, and 2 (8.7%) died within 14 days of testing (Table 2).

Discussion | In this study of 11 Maryland long-term care facilities, an additional 354 cases (39.6% of those tested) were identified with universal testing, despite initial targeted, symptom-based testing. These results underscore the importance of universal testing because symptom-based approaches may miss a substantial number of cases.^{2,3} Unrecognized asymptomatic cases among residents could perpetuate transmission within facilities.

According to data from the Center for Medicare & Medicaid Services, the overall case fatality among residents of long-term care facilities is about 33%.⁴ The short-term mortality rate found in the present study among residents who underwent universal testing was much lower, suggesting that true COVID-associated mortality rates in long-term care facilities may be lowered by increased testing and case detection.

This study has limitations. Symptom status was only available at the time of testing and based on reports from facility staff. Follow-up data were only available for 7 of the 11 universally tested sites. Finally, there may be false negatives associated with nasopharyngeal swab samples.⁵

Long-term care facilities have emerged as “hot spots” for SARS-CoV-2 infection and mortality globally. Using symptom-based testing alone to identify positive residents is not adequate to assess case burden and inform outbreak-control efforts in these settings. Additional testing resources are urgently needed to identify the true burden of COVID-19 and curb transmission in long-term care settings.

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1. Wang L, He W, Yu X, et al. Coronavirus disease 2019 in elderly patients: characteristics and prognostic factors based on 4-week follow-up. *J Infect*. 2020;80(6):639-645. doi:10.1016/j.jinf.2020.03.019
2. Kimball A, Hatfield KM, Arons M, et al; Public Health—Seattle & King County; CDC COVID-19 Investigation Team. Asymptomatic and presymptomatic SARS-CoV-2 infections in residents of a long-term care skilled nursing facility—King County, Washington, March 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(13):377-381. doi:10.15585/mmwr.mm6913e1
3. Arons MM, Hatfield KM, Reddy SC, et al; Public Health—Seattle and King County and CDC COVID-19 Investigation Team. Presymptomatic SARS-CoV-2 infections and transmission in a skilled nursing facility. *N Engl J Med*. 2020;382(22):2081-2090. doi:10.1056/NEJMoa2008457
4. Centers for Medicare & Medicaid Services. Long Term Care Facility Reporting on COVID-19. Published 2020. Accessed June 5, 2020. <https://www.cms.gov/files/document/covid-nursing-home-reporting-numbers-5-31-20.pdf>
5. Wang W, Xu Y, Gao R, et al. Detection of SARS-CoV-2 in different types of clinical specimens. *JAMA*. 2020;323(18):1843-1844. doi:10.1001/jama.2020.3786