Supplemental Online Content

McGarry BE, SteelFisher GK, Grabowski DC, Barnett ML. COVID-19 test result turnaround time for residents and staff in US nursing homes. *JAMA Intern Med*. Published online October 30, 2020. doi:10.1001/jamainternmed.2020.7330

eAppendix. Supplementary Detail on Data and Methods

eReferences

This supplemental material has been provided by the authors to give readers additional information about their work.

eAppendix 1- Supplementary Detail on Data and Methods

Data

The primary data source for this study was the Centers for Medicare and Medicaid Services (CMS) COVID-19 Nursing Home Data database. These publicly available data provide information submitted, on a weekly basis, by skilled nursing facilities (SNFs) to the CDC's National Healthcare Safety Network Long-term Care Facility COVID-19 Module. testing.[1] Questions included in the module cover a number of topics, including the burden of COVID-19 cases among staff and residents, shortages of staff and PPE, and the presence of on-site COVID-19 testing capacity. Response rates to this survey are high. In the most recent week of data available, 14,846 of the 15,355 (96.7%) U.S. nursing homes submitted responses to at least some of the survey questions. This dataset, although new, has previously been used to examine PPE and staff shortages facing nursing homes.[2,3]

Beginning the week of 8/10/20, new questions were added to the COVID-19 module about facilities' testing capacity. Specifically, facilities were asked about their ability to test all staff and residents within the next seven days, reasons for not being able to meet this benchmark, testing performed in the past week, and, importantly for the present study, the average amount of time needed to get test results back over the prior 2 weeks. Facilities were asked separately about turnaround times for residents and the staff. The exact question wording is *"During the past two weeks, on average how long did it take your long-term care facility to receive COVID-19 viral (nucleic acid or antigen) test results of residents [staff and/or facility personnel]"*.[4]

Sample Construction

Our study sample included all Medicare- and Medicaid-certified nursing homes that submitted responses to the testing turnaround questions during at least one of the relevant weekly reporting periods. Seven weeks of survey responses to questions about testing turnaround time were available at the time of this study, which we divided into two time periods. The first included the weeks ending on 8/16/2020-9/6/2020; the second included the weeks ending on 9/13/2020-9/27/2020. To limit potential bias from non-response to these new survey questions, we used the most recently available response from each facility across these survey weeks within each time period to construct the final study sample. In time period one, 14,910 (97.1%) responses were available in the latest survey window (the week ending 9/06/20). Responses for 64 (0.4%), 14 (0.1%), and 14 (0.1%d) facilities were obtained from the week ending on 8/30/20, 8/23/20, and 8/16/20, respectively. An additional 356 (2.3%) facilities did not have turnaround time data across any of the survey weeks in time period 1. In time period two, 14,603 (95.1%) responses were available in the latest survey window (the week ending 9/27/20). Responses for 415 (2.7%) and 47 (0.3%) facilities were obtained from the weeks ending on 9/20/20 and 9/13/20, respectively. An additional 290 (1.9%) facilities did not have turnaround time data across any of the survey weeks in time period 2.

In an effort to improve SNF's testing capacity, CMS and the Office of the Assistant Secretary for Health (OASH) began distributing rapid (i.e., results within 15 minutes) point of care testing kits in mid-July.[5] The distribution of these kits is occurring in two waves. Wave 1 was scheduled to deliver testing kits to about 2,400 facilities at

some point between July 20 and August 14, 2020. Wave 2 is slated to deliver kits to an additional 11,800 SNFs between August 17 and September 30, 2020. Wave 1 SNFs were prioritized based on two criteria: 1) being located in a "hotspot" county as identified by CMS (Table S1) or 2) nursing homes with either 3 or more confirmed or suspected cases of COVID-19 in the last week; at least 1 new COVID-19 case in the last week after having 0 previous cases; inadequate access to testing in the last week; or at least one new resident death due to COVID-19 in the last week.[6]

Identification of nursing homes in hot spot counties (see below) is straightforward to reproduce, and this approach identifies the majority of SNFs slated to receive test kits in wave 1 (n=1,568 SNFs). As a result, we also construct a subset of nursing homes that are located in these counties and should have received one of the rapid point of care testing kits by the start of our study window.

eTable 1- List of CMS Defined Hot Spot Counties

Hot Spot Counties	
Jefferson, AL	Volusia, FL
Lee, AL	Fulton, GA
Montgomery, AL	Ada, ID
Washington, AR	E. Baton Rouge, LA
Maricopa, AZ	Hinds, MS
Pima, AZ	Hinds, MS
Los Angeles, CA	Mecklenburg, NC
San Francisco, CA	Wake, NC
San Mateo, CA	Clark, NV
Baker, FL	Anderson, SC
Broward, FL	Calhoun, SC
Clay, FL	Fairfield, SC
Duval, FL	Georgetown, SC
Flagler, FL	Greenville, SC
Hardee, FL	Horry, SC
Hernando, FL	Kershaw, SC
Hillsborough, FL	Laurens, SC
Lake, FL	Lexington, SC
Martin, FL	Pickens, SC
Miami-Dade, FL	Richland, SC
Monroe, FL	Saluda, SC
Nassau, FL	Spartanburg, SC
Orange, FL	Davidson, TN
Osceola, FL	Knox, TN
Palm Beach, FL	Shelby, TN
Pasco, FL	Bexar, TX
Pinellas, FL	Dallas, TX
Polk, FL	Harris, TX
Seminole, FL	Hidalgo, TX
St. Johns, FL	Travis, TX
St. Lucie, FL	Salt Lake, UT
Sumter, FL	

Variable Construction

Outcomes

We examined categorical responses to the resident and staff turnaround time questions. For residents, facilities could select one of five options: 1) less than one day, 2) 1-2 days, 3) 3-7 days, 4) greater than 7 days, and 5) no resident testing within the past two weeks. The no testing option was not available as a response for the staff testing question.

We also dichotomized facilities into those that did and did not report receiving test results in 2 days or less. Ideally, survey questions would have distinguished between facilities experiencing 1 and 2 day turnaround times as epidemiologic models indicate that test results within 24 hours are critical for effective infection control. This was not possible given survey response options. Instead, we used two categorization schemes to characterize average turnaround times: 1) the percent of facilities receiving test results in 2 days or less and 2) the percent of facilities receiving test results in less than a day. We focus on the more conservative threshold in the manuscript. For resident testing, facilities that did not test within the past two weeks were excluded from this outcome.

Statistical Analysis

We estimated the national percentage of nursing homes that reported each category of turnaround times, weighted by facility bed size to reflect the number of residents subject to these times, within our two study periods. We repeated these

analyses within the subset of nursing homes located in hot spot counties described in eTable 1.

Multivariate regressions were used to examine the characteristics of facilities that had long turnaround times (defined as getting results on average in more than two days) for resident and staff testing relative to those with short (i.e., <=2 days) turnaround times during the second more recent study window. Specifically, we used linear probability models that included the facility and county level variables listed in Table, state fixed effects, and standard errors clustered at the county level.

eReferences

1. COVID-19 Nursing Home Data. 2020. (Accessed June 18, 2020, at https://data.cms.gov/stories/s/COVID-19-Nursing-Home-Data/bkwz-xpvg/.)
2. McGarry BE, Grabowski DC, Barnett ML. Severe Staffing And Personal Protective Equipment Shortages Faced By Nursing Homes During The COVID-19 Pandemic: Study examines staffing and personal protective equipment shortages faced by nursing homes during the COVID-19 pandemic. Health Affairs 2020:10.1377/hlthaff. 2020.01269.
3. Xu H, Intrator O, Bowblis JR. Shortages of Staff in Nursing Homes During COVID-19 Pandemic: What Are the Driving Factors? Journal of the American Medical Directors Association 2020.
4. Long-Term Care Facility: Resident Impact and Facility Capacity. 2020. (Accessed September 1, 2020, at https://www.cdc.gov/nhsn/pdfs/covid19/ltcf/57.144-res-blank-p.pdf.)
5. Department of Health and Human Services. Trump Administration Announces Initiative for More and Faster COVID-19 Testing in Nursing Homes. Washington, DC2020.
6. Point of Care Device Allocation. 2020. (Accessed September 16, 2020, at https://data.cms.gov/download/jbvf-tb74/application%2Fzip.)