



Research Brief

Mass severe acute respiratory coronavirus virus 2 (SARS-CoV-2) testing of asymptomatic healthcare personnel

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Abstract

Mass asymptomatic SARS-CoV-2 nucleic acid amplified testing of healthcare personnel (HCP) was performed at a large tertiary health system. A low period-prevalence of positive HCP was observed. Of those who tested positive, half had mild symptoms in retrospect. HCP with even mild symptoms should be isolated and tested.

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Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19), has led to 81,463 cases and 4,698 deaths in Connecticut as of November 11, 2020.¹ An estimated 40% of SARS-CoV-2 transmission occurs through asymptomatic or presymptomatic spread.² Understanding the extent of this transmission in healthcare settings is paramount to mitigate exposures to patients and healthcare personnel (HCP). We estimated the burden of asymptomatic and presymptomatic SARS-CoV-2 by evaluating the real-time period-prevalence of disease with voluntary mass viral RNA testing of nearly half our healthcare system's HCP.

Methods

All HCP, including clinical and nonclinical staff, at Yale New Haven Health (YNHH) were offered testing for SARS-CoV-2 through electronic communication. YNHH is a healthcare system comprising 5 acute-care hospitals (2,593 beds), a primary care group, and visiting nursing agencies across Connecticut and Rhode Island. YNHH employs 28,641 individuals and has a medical staff of >6,000. Testing was offered from May 15 to July 2, 2020, and performed using the Panther Aptima SARS-CoV-2 assay (Hologic, Marlborough, MA), a nucleic acid amplified test (NAAT) using transcription mediated amplification (TMA). The majority of specimens were observed, self-collected deep (mid-turbinate) swabs collected into Aptima Multitest media. Positive HCP were queried for symptomatology consistent with COVID-19 for the week before and after testing. This quality

improvement project did not meet the definition of human subjects research; institutional review board approval was not required.

Results

Access to voluntary testing was made broadly available to nearly 30,000 HCP. 13,703 tests were performed for 12,680 HCP; 4,727 were nonclinical tests and 8,976 were clinical tests. Moreover, 30 HCP (0.24%) tested positive, for a test positivity rate of (0.22%); 7 (23.3%) of these were nonclinical and 23 (76.7%) were clinical HCP. There was no significant difference between positivity rates of nonclinical (0.15%) and clinical (0.26%) HCP ($P = .199$). Overall, 15 positive HCP were confirmed to be asymptomatic and were instructed to self-isolate. Of the positive HCP, 15 (50%) reported, after repeat query following the positive result, some degree of symptoms around the time of testing; 5 (16.7%) were presymptomatic and developed symptoms a median of 3 days after testing; 3 (10.0%) reported symptoms the day of the test; and 7 (23.3%) noted some symptoms before testing. Of the 7 who reported symptoms before testing and did not seek medical care, 2 had a mild cough, 1 had a headache, 1 had anosmia and a headache, 1 had nasal congestion alone, 1 had nasal congestion and fatigue, and 1 had dyspnea with a sore throat. Overall tests performed and positivity rates comparing HCP tested in this study versus system-wide tests (including all inpatients and community referrals) are shown in Figure 1.

Discussion

Voluntary mass testing of asymptomatic HCP at our healthcare system revealed a very low period-prevalence rate of

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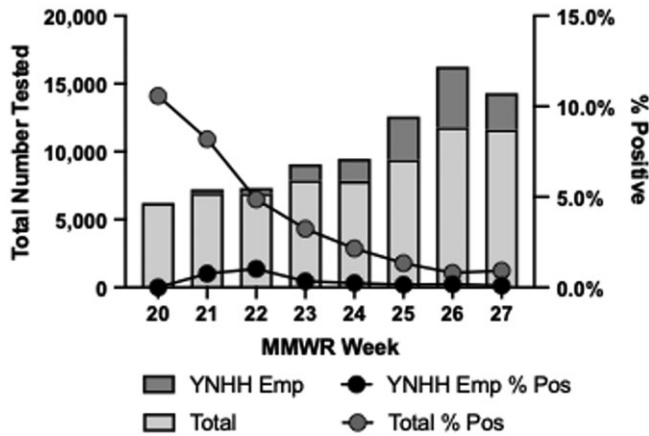


Fig. 1. SARS-CoV-2 testing at YNH over time. Overall total number of SARS-CoV-2 tests, and positivity rates, over time comparing YNH employees (Emp), HCP defined in our study, to all tests performed within our health system. The period shown reflects the duration of the study period by *Morbidity and Mortality Weekly Report* week.

SARS-CoV-2 when community transmission was high and state-wide test positivity rates exceeded 5% for nearly half our study period. HCP prevalence was substantially lower than concurrent rates seen in our community, supporting the effectiveness of protective measures such as personal protective equipment, which included universal face mask use, and respirators with eye protection for all COVID-19 care, and adherence to public health recommendations. HCP were enthusiastic to be tested and over a third of our workforce enrolled.

Interestingly, half of positive HCP reported mild symptomatology after being informed of their positive results, including isolated headaches, fatigue, and nasal congestion. This finding suggests a broad spectrum of symptom severity and type that raise concern subclinical symptoms may be missed or minimized, especially in exposure investigation. Mild symptoms do not exclude a diagnosis of COVID-19, and such guidance should be incorporated in HCP staffing policies. One prior study noted substantial variation in the initial reported symptom(s) from HCP consistent with our data,³ and another showed nearly half of HCP did not suspect prior COVID-19 after positive serology.⁴ Although symptom screening is insensitive, it may, in conjunction with sufficient testing, increase the sense of safety by HCP.

Given our low positivity rates, the utility of mass asymptomatic testing remains uncertain. Asymptomatic mass testing in high-risk congregate living environments (eg, college campuses and skilled nursing facilities) may help identify and limit COVID-19 spread, but the value of such mass testing in healthcare settings, where resources are limited and appropriate infection prevention

practices better mitigate transmission, is less clear. Several modeling studies now support mass testing in healthcare settings to prevent asymptomatic spread.^{5,6} Our experience suggests there could be substantial benefit in encouraging testing of staff with any degree of symptoms, even mild because up to half of positive HCP would be detected by this strategy.

This study has several limitations. We were unaware of an individual's exposures or previous infection. Selection bias may have occurred as a result of convenience sampling and symptom under-reporting. Recall bias may have occurred with positive staff. We were unable to distinguish true from false positives with confirmatory testing. The anticipated specificity of the Aptima SARS-CoV-2 assay is extremely high, but in a low disease-prevalence setting (1%), even a specificity of 99% would be associated with a false-positive rate of 50%. A substantial fraction of our 15 asymptomatic cases may have been false positives. However, we would still anticipate being able to detect all true asymptomatic positives through mass testing.^{7,8} Lastly, NAAT is contingent on viral dynamics and serology may identify additional prior SARS-CoV-2 infections in HCP.

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Conflicts of interest. All authors report no conflicts of interest relevant to this article.

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