Concise Communication

Impact of weekly asymptomatic testing for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) in inpatients at an academic hospital

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Abstract

We analyzed the impact of a 7-day recurring asymptomatic SARS-CoV-2 testing protocol for all patients hospitalized at a large academic center. Overall, 40 new cases were identified, and 1 of 3 occurred after 14 days of hospitalization. Recurring testing can identify unrecognized infections, especially during periods of elevated community transmission.

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During the coronavirus disease 2019 (COVID-19) pandemic, many hospitals implemented COVID-19 testing protocols including testing of asymptomatic patients at hospital admission.^{1,2} However, patients who are incubating severe acute respiratory coronavirus virus 2 (SARS-CoV-2) may have a negative test at admission and subsequently test positive during their hospital stay. Although, it is uncommon with rigorous infection control protocols,^{3,4} SARS-CoV-2 transmissions have occurred in hospital settings.^{5,6} In this project, we evaluated the impact of a 7-day recurring asymptomatic testing protocol for inpatients who had tested negative for SARS-CoV-2 on admission. The aim of this additional testing was (1) to identify presymptomatic and asymptomatic SARS-CoV-2 infections incubating from the community, and (2) to identify cases of hospital-onset COVID-19.

Methods

This project was conducted between December 17, 2020, and March 17, 2021 at The Johns Hopkins Hospital, a 1,095-bed, academic, tertiary-care center in Baltimore, Maryland. COVID-19 infection prevention protocols in place at that time included the following: (1) use of respirator, face shield, gown, and gloves and negative pressure isolation for interactions with patients known or suspected to have COVID-19; (2) use of respirator, face shield, gown, and gloves for interactions with all patients

undergoing aerosol-generating procedures; and (3) use of a surgical mask and face shield for interactions with all other patients. Patients were encouraged to mask when anyone entered their room. Visitors were required to wear a mask in the facility and encouraged to maintain masking at the bedside.

Patients admitted to the hospital were tested for SARS-CoV-2 with a molecular test. An electronic medical record best-practice alert prompted providers on day 6 of admission to initiate a repeating 7-day asymptomatic testing order. This order prompted collection of a nasal mid-turbinate specimen for a nucleic acid amplification test (NAAT); platforms included NeuMoDx, Hologic Aptima and cobas Roche. Patients with a positive test within previous 90 days were excluded. Independent of 7-day asymptomatic testing, clinicians were encouraged to order a SARS-CoV-2 test if they were concerned about COVID-19. The infectious period was defined as 2 days before symptom onset or 2 days before positive test if asymptomatic. Complex cases were adjudicated by the hospital epidemiology team. Clinical and demographic data were collected for patients who tested positive on 7-day asymptomatic testing. State case rates were determined from the Maryland Department of Health 7-day moving average reports.⁷

COVID-19 cases detected on hospital day 14 or before were considered community acquired, and thereafter they were considered hospital-onset infections based on the incubation period for SARS-CoV-2.

Results

Between December 17, 2020, and March 17, 2021, 4,946 asymptomatic SARS-CoV-2 tests were performed on 2,061 patients

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Fig. 1. Number of COVID-19-positive patients on 7 day inpatient asymptomatic testing.

admitted for >6 days. We identified 40 patients (2%) who had a negative SARS-CoV-2 test on admission, followed by a subsequent positive test captured by the 7-day recurring asymptomatic testing protocol. Of 40 SARS-CoV-2-positive cases, 27 (68%) were considered community-acquired infections (median day of positivity, 8; range, 7–13), and 13 (33%) of 40 were considered hospital-onset cases (median day of positivity, 33; range, 16–115).

Of these 40 positive tests, 20 (50%) were detected during a 3-week period when the average number of daily COVID-19 cases in Maryland was >40 per 100,000 population (Fig. 1). Symptoms possibly consistent with COVID-19 were documented at least once in 28 (70%) of 40 patients at or before the positive test. Symptoms included cough in 22 patients (55%), shortness of breath in 12 patients (30%), fever in 17 patients (43%), and loss of taste and/or smell 1 patient (3%). In many cases, symptoms had been attributed by the clinical team to another cause such as post-operative fever or heart failure exacerbation. Overall, patients had a median of two prior negative tests (range, 1–8), including a negative test at hospital admission. Among those with a community-acquired infection who were symptomatic, appropriate isolation during their infectious period was delayed by a median of 5 days.

Evaluation of the 13 patients meeting criteria for hospital-onset infection revealed that 2 patients had had contact with a person subsequently found to be positive for SARS-CoV-2 prior to their symptom development: 1 HCP and 1 visitor. Also, 2 patients had symptoms consistent with COVID-19 on admission but had repeated negative tests until >14 days after admission, 5 patients remained asymptomatic for the duration of hospital stay, and 4 patients had symptoms consistent with COVID-19, but no positive contact was identified.

Discussion

By testing hospitalized patients every 7 days during admission in addition to admission testing, we detected 40 additional hospital inpatients with COVID-19 among 2,061 patients admitted to the hospital. Approximately half of the patients who tested positive on asymptomatic 7-day testing had fever or cough and, therefore, were not truly asymptomatic. This finding highlights the importance of maintaining a low index of suspicion for symptoms that could be consistent with COVID-19 even for patients who have a negative admission screening test. Notably, previous studies have found low yield of repeated testing in areas with low-community rates of COVID-19. This study supports those other findings; we have demonstrated that the rate of detection of positive cases

during 7-day testing corresponds with the community rates of COVID-19. Thus, particularly during times of high community transmission, despite a negative test on admission, clinical teams need to remain vigilant for possible symptoms and still consider COVID-19 as a differential diagnosis especially in congregate settings.

We identified patients who tested positive after 14 days in the hospital despite multiple negative tests during their admission, suggesting possible transmission from HCP, visitor, or another patient. A root cause analysis of a potential hospital-onset infection may help identify infection prevention gaps and identify practice improvement priorities for the IP team to prevent future transmissions. Themes that emerged in our investigations included incorrect personal protective equipment use by HCP and lack of masking by patients and visitors.

Delayed recognition of patients with COVID-19 may have significant infection control implications. We recognize that some risk reduction occurs when HCP wear a surgical mask and face shield when interacting with known or suspected patients with COVID-19. However, our hospital policy, to further risk reduce is for HCP to use airborne and contact precautions for any interaction with a known or suspected case. Delayed diagnosis may put other patients in the hospital at risk, especially those in shared rooms or group settings such as psychiatry and physical medicine and rehabilitation.

Several challenges associated with routine asymptomatic testing of inpatients include patient and HCP anxiety.⁸ Patients may be moved to COVID-19 isolation units and experience social isolation⁹ with potential delays in imaging and treatment. A positive SARS-CoV-2 test could represent a lingering positive result from a prior infection, although the patient is not currently infectious.

Our project had several limitations. Our standardized definition of community onset, based on positive test <14 days into admission, may have misclassified some patients who were truly hospital-onset cases but were exposed early in their hospital stay as community onset. Our use of routine asymptomatic testing of inpatients at 7-day intervals during high rates of community transmission identified patients with COVID-19, likely reducing onward viral transmission to others. The impact of asymptomatic testing among vaccinated patients warrants evaluation and may depend on circulating variants and durability of vaccine-induced immune response.

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

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