

Early Results from Severe Acute Respiratory Syndrome Coronavirus 2 Polymerase Chain Reaction Testing of Healthcare Workers at an Academic Medical Center in New York City

Arielle R. Nagler,¹ Eric R. Goldberg,² Maria E. Agüero-Rosenfeld,³ Joan Cangiarella,³ Gary Kalkut,² Carolyn Rooke Monahan,⁴ and Robert J. Cerfolio⁵

¹Ronald O. Perelman Department of Dermatology, New York University Grossman School of Medicine, New York, New York, USA, ²Department of Medicine, New York University Grossman School of Medicine, New York, New York, USA, ³Department of Pathology, New York University Grossman School of Medicine, New York, New York, USA, ⁴Department of Network Integration, New York University Grossman School of Medicine, New York, New York, USA, and ⁵Department of Cardiothoracic Surgery, New York University Grossman School of Medicine, New York, New York, USA

Coronavirus disease 2019 (COVID-19) reverse-transcription polymerase chain reaction employee testing was implemented across New York University Langone Health. Over 8 weeks, 14 764 employees were tested; 33% of symptomatic employees, 8% of asymptomatic employees reporting COVID-19 exposure, and 3% of employees returning to work were positive. Positivity rates declined over time, possibly reflecting the importance of community transmission and efficacy of personal protective equipment.

Keywords. COVID-19; occupational health; diagnostic testing; virology; public health.

A novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was identified in late 2019 in Wuhan, China, and rapidly became a pandemic. New York quickly became the American epicenter [1]. Healthcare workers (HCWs) are at the frontline in the fight against coronavirus disease 2019 (COVID-19) and are at increased risk for infection. In an early review of 139 hospitalized COVID-19 patients in China, 41% had nosocomial COVID-19 [2].

As a group at high risk for exposure, widespread testing for HCWs has been proposed in the literature [3]. Although specifically designed for symptomatic testing, reverse-transcription polymerase chain reaction (RT-PCR) can be used to detect COVID-19 infection in both symptomatic and asymptomatic

individuals. Identifying both asymptomatic and symptomatic HCWs can promote a safe environment within the healthcare system as asymptomatic carriers can transmit COVID-19 [4, 5].

New York University Langone Health (NYULH) is an academic medical center encompassing 4 hospital campuses in Manhattan, Brooklyn, and Long Island and >250 ambulatory sites, with approximately 43 000 employees. At the center of the hardest-hit region in the United States, from 14 March to 18 May 2020, 5767 COVID-19 patients were admitted to NYULH. Herein we describe the widespread employee COVID-19 testing program that was initiated at NYULH to promote a safe and informed environment for employees and patients.

METHODS

On 25 March 2020, NYULH began a dedicated, on-demand COVID diagnostic program for employees. Over the following 8 weeks, 3 groups were tested: (1) symptomatic staff with fever or respiratory illness; (2) asymptomatic employees with self-reported exposure to COVID-19, which included any degree or duration of contact with an individual who had a documented COVID-19 infection in the workplace or in the community; and (3) all employees who were returning to work in services that had been suspended during the epidemic's peak. This study was exempt from institutional review board review.

Ordering Workflow

Employees meeting criteria for testing contacted a call center that screened employees for testing eligibility. The request for testing was forwarded through Epic to a pool of physicians and nurse practitioners who ordered the COVID-19 RT-PCR. Using MyChart, the NYULH patient portal, the employee then scheduled the test at one of NYULH's testing centers.

Testing Procedures/Infrastructure

NYULH developed 3 testing centers in former conference rooms, building testing cubicles for specimen collection that were under negative pressure. Samples were obtained by nurses in personal protective equipment (PPE; ie, N95 respirators, face shields, and impermeable gowns). Nasopharyngeal samples were obtained by inserting a swab into the anterior nares until reaching the nasopharynx and rotating the swab for several seconds. Samples were placed in tubes containing viral transport medium and submitted to the hospital laboratory.

Detection of SARS-CoV-2 RNA using real time RT-PCR was performed on the Roche fully automated Cobas 6800 system under Emergency Use Authorization. Results were reported as detected (positive) or not detected (negative).

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Correspondence: A. R. Nagler, New York University Grossman School of Medicine, 240 E 38th St, 12th Floor, New York, NY 10016 (arielle.nagler@nyulangone.org).

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Result Reporting and Management

The SARS-CoV-2 results interfaced into Epic and were automatically released to employees through MyChart. Simultaneously, employee RT-PCR results returned to the ordering-provider pool. Employees with a negative test received a MyChart message reviewing the importance of social distancing and return-to-work recommendations. Employees testing positive were called by a member of the provider pool and asked about the onset and severity of their symptoms and risk factors for severe COVID-19. These employees were given guidance on return-to-work protocols and indications for seeking additional care if necessary.

RESULTS

From 25 March to 18 May 2020, 14764 RT-PCR tests were performed. Testing was performed on 4150 symptomatic employees, 4362 asymptomatic employees with self-reported exposures, and 6234 asymptomatic employees for the return-to-work protocol. The number of daily tests peaked at 661 on 7 April, including both symptomatic employees and asymptomatic employees with self-reported exposures. Since this peak, the number of daily tests performed in symptomatic employees and asymptomatic employees self-reporting exposure has declined steadily. In the last week of testing starting on 13 May, on average, only 41 tests each day were performed on symptomatic employees and asymptomatic employees with a self-reported exposure.

Positivity rates among all groups of employees being tested including symptomatic employees, asymptomatic employees with self-reported exposure to COVID-19, and employees being screened for returning work declined over time

(Figure 1). Overall, for symptomatic employees, the positivity rate was 33%, but the positivity rate declined from 51% in the first week of testing (25–31 March) to 3% in the most recent week of testing starting 13 May. The overall positivity rate of asymptomatic employees with self-reported exposures was 8%, dropping from 12% in the first week of testing (1–7 April) to 0% during the most recent week of testing starting 13 May. All asymptomatic staff who were returning to work in reopening services were tested starting on 20 April, with a mean positivity rate of 3% (Figure 1). In the first week of testing 5% of these employees were positive, but in the most recent week of testing 0% were positive.

DISCUSSION

Healthcare workers are at increased risk for exposure to persons with COVID-19. NYULH began a dedicated, on-demand COVID-19 diagnostic program for employees in late March 2020. Over the following 8 weeks, nearly 15 000 symptomatic and asymptomatic employees were tested. Testing results were used to guide treatment and self-isolation and to reinforce the rigorous PPE standards used during care of COVID patients.

This comprehensive testing program helped to maintain and manage the workforce. Even among the symptomatic employees, >67% of those tested were COVID-19 negative, enabling these workers to go back to work after being fever-free for 72 hours rather than being isolated for a minimum of 7–10 days. Similarly, in a British study, 87% of 1654 symptomatic HCWs tested were negative and were able to return to work more quickly [6]. Thus, in addition to providing comfort and reassurance to employees who test negative, broad testing programs help to maintain the workforce.

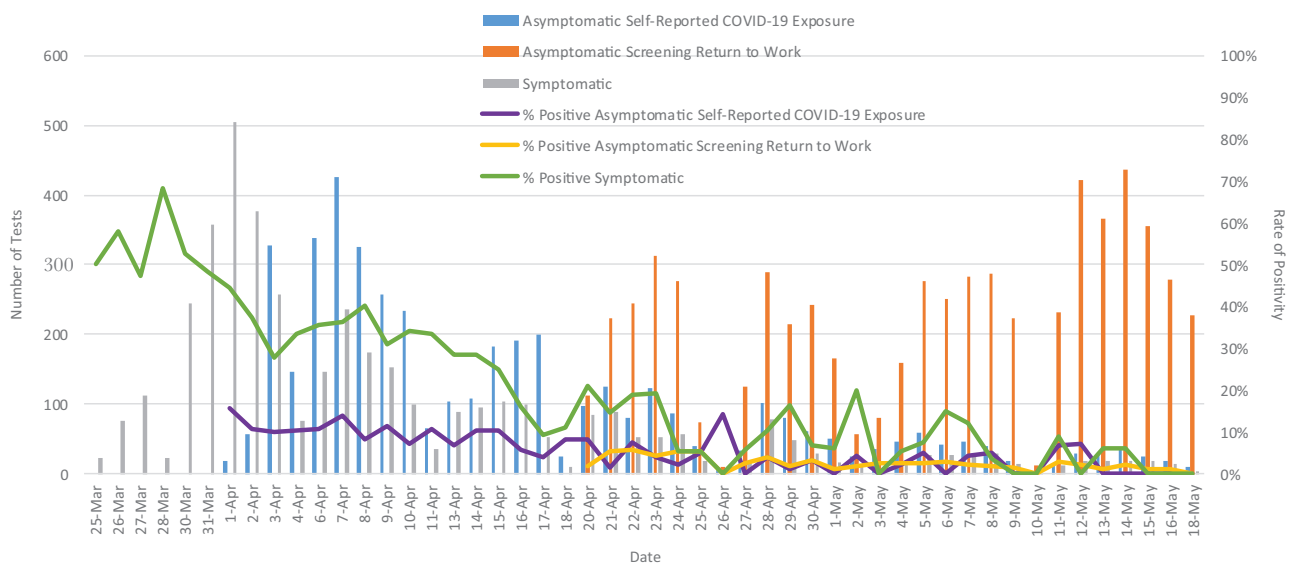


Figure 1. Number of reverse-transcription polymerase chain reaction tests for severe acute respiratory syndrome coronavirus 2 performed daily, and daily rate of positivity by employee group. Abbreviation: COVID-19, coronavirus disease 2019.

Testing of employees and patients is also a critical step to safely reopen essential non-COVID clinical services. Staff and patients want reassurance that healthcare systems are taking all possible steps to exclude persons with active infection from the healthcare environment. While COVID-free environments simply cannot be guaranteed, our goal is to use all current tools, including diagnostic COVID-19 testing for patients and staff, daily symptomatic checks, and mandatory use of PPE in all clinical settings, to minimize exposure to COVID for staff and patients. Although we expect that COVID antibody testing will be utilized within the healthcare workforce in the future, antibody testing is not currently being employed at NYULH as antibody status does not influence or change our policy for patients or staff.

Widespread community transmission existed in metropolitan New York starting in mid-March. Although the NYULH COVID-19 patient census peaked in early April, throughout the duration of the NYULH employee testing program, the COVID patient census remained consistently >500 and the vast majority of the care delivered at NYULH was direct COVID-19 patient care. Thus, during this testing program, most NYULH employees had continued exposure to COVID patients, yet employees still demonstrated sharp declines in COVID infection rates. PPE and infection control standards and procedures are unlikely to account for this decline as they remained comprehensive, stringent, and largely unchanged since the onset of the pandemic in early March. Notably, however, the reduction in employee COVID-positive rates is coincident with the decline in New York City cases that began after peaking on 6 April [7]. The temporal correlation between the reduction in community cases and HCW COVID infections despite continued COVID workplace exposures may suggest the impact of community transmission on the HCW COVID infection rate and the effectiveness of properly donned PPE. The importance of PPE in effectively preventing HCW infections was further evidenced in the New York State testing data released by Governor Cuomo showing that 12.2% of HCWs tested positive for COVID antibodies as compared to 19.9% of the approximately 3000

randomly tested individuals from the general New York City population [8]. Additional studies are needed to better understand the relative impact of community and workplace exposures to COVID-19 in HCWs.

CONCLUSIONS

We have shown that widespread testing can be developed and operationalized in a large academic hospital that simultaneously has large patient demands for testing. Employee testing is critical for workforce planning since COVID-19-positive employees require home isolation for 10 days. Testing, combined with conventional infection control measures, supports the culture of safety for patients and workers. Importantly, widespread testing of HCWs offers valuable information for hospital workflow and workforce amid an epidemic that has threatened to overwhelm the healthcare system.

Note

Potential conflicts of interest. The authors: No reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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