Implementation of an Active Screening Program for SARS-CoV2 – Experience at an Academic Medical Center

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ABSTRACT

Background: This study documents the experience of an academic medical center implementing SARS-CoV2 screening of asymptomatic research personnel to support the "return-to-work" initiative and donor cadavers to support in-person student education.

Methods: Testing was performed on samples received June 1, 2020 (for the cadaver program) and July 20, 2020 (for the personnel screening program) through September 30, 2021. Data were evaluated to document the number of cases and the positivity rate.

Results: Approximately 3000 specimens were tested across both programs, with an overall positivity rate of 2.5% and 3.6% in the personnel and cadaver screening programs, respectively.

Discussion: This screening program serves as an example of institutional investment in the safety of its faculty, staff, and students alike to address specific needs of a global pandemic.

BACKGROUND

The Coronavirus disease 2019 (COVID-19) is an ongoing global pandemic caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV2).[1] In a model proposed by the Centers for Disease Control and Prevention (CDC) in early 2021, it was predicted that 59% of coronavirus transmission would come from people without symptoms, including 35% from people who were presymptomatic and 24% from those who never showed symptoms at all.[2] Data now suggest that about 1 in 5 infected people (~17%) are asymptomatic[3] and can transmit the disease.

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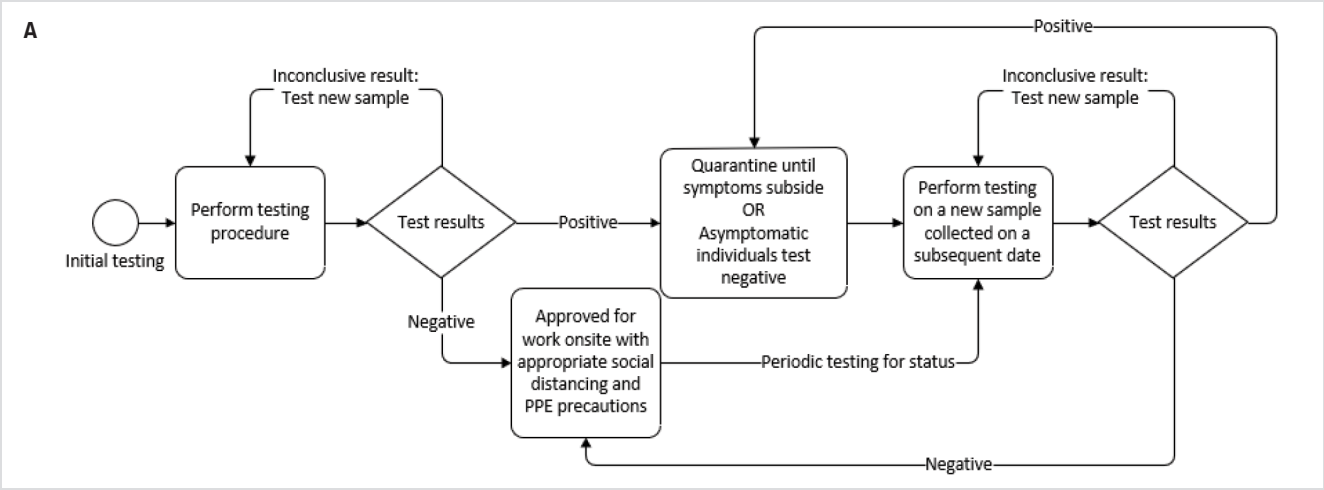
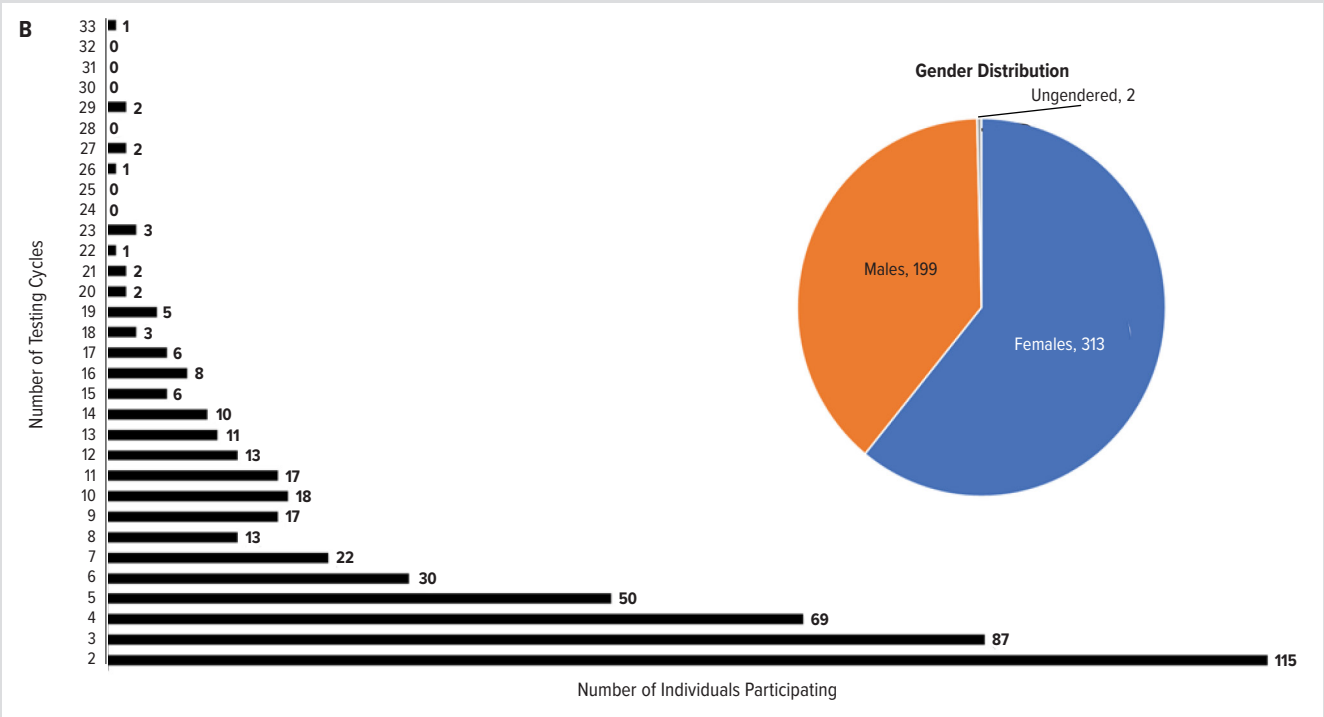
The Medical College of Wisconsin (MCW) is a major national research center and the second-largest research institution in Wisconsin, employing researchers in basic science, clinical, and translational fields. With the onset of the pandemic, the biomedical research workforce was at risk for several reasons. First, most researchers cannot work remotely and need to be onsite to conduct most of their work. Second, biomedical researchers perform experiments in close proximity with others, making physical distancing a challenge. Third, clinical grade personal protective equipment (PPE) was not consistently available to researchers, especially early in the pandemic. With the start of mandated lockdown, enterprise-wide efforts focused on the implementation of processes that would support the "return-to-work" initiative for faculty, staff, and students. MCW is also a private medical education institution that supports the education and training of medical students, graduate students, residents, postgraduate physicians, and other health care professionals. These health care students take anatomy classes utilizing cadaveric material.

Given the statistics for asymptomatic transmission of SARS-CoV2[2,3] and for enhanced researcher safety, MCW offered testing of asymptomatic individuals to allow for early detection of infection in asymptomatic carriers (reducing risk to others in the workplace and serving as a potential early warning system should a surge of infection affect the researcher workforce). Additionally, as the relative risks of transmission from cadavers were not yet understood,[4] SARS-CoV2 testing of donor cadavers received through the Anatomical Gift Registry (Registry) was also implemented, to ensure student, staff, and faculty safety. The institution's Precision Medicine Laboratory (PML) developed and validated the SARS-CoV2 nucleic acid amplification test (NAAT), a quantitative reverse transcription polymerase chain reaction (qRT-PCR) assay

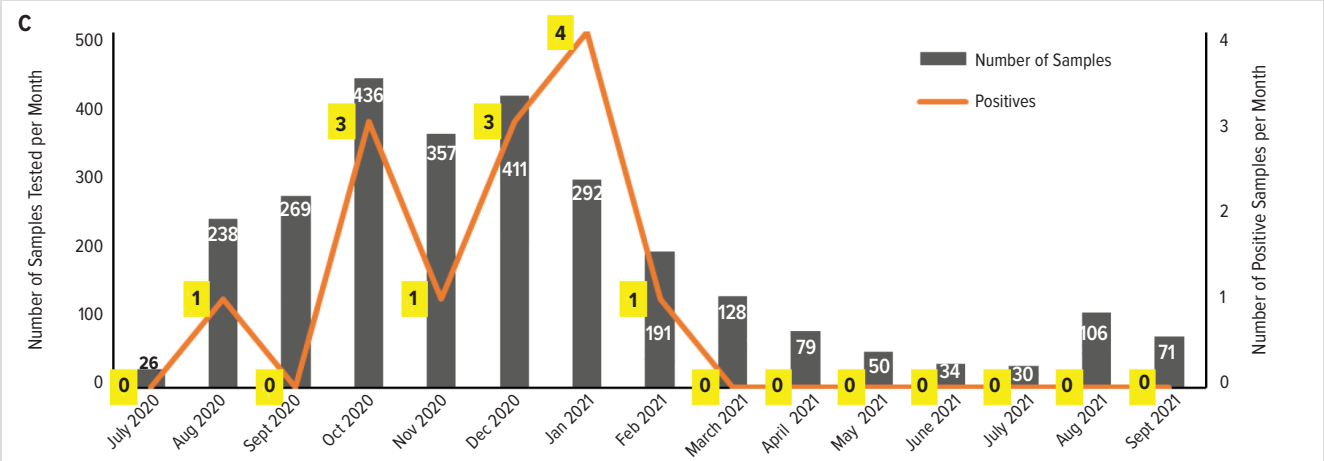
Figure 1. SARS-CoV-2 Testing of Asymptomatic Research Personnel



A. Outline of protocol followed based on positive or negative test results.



B. Testing asymptomatic individuals for COVID-19 occurred from July 2020 through September 2021. Those who participated the longest had at least 33 testing cycles.



C. In the 15 months of implementation, a total of 2718 tests were performed across 514 individuals, with 13 individuals testing positive for SARS-CoV2.

with increased specificity and sensitivity for viral detection[5] in both nasopharyngeal and anterior nasal swabs, for screening of personnel and donor cadavers. This study documents the implementation of both screening programs.

METHODS

Screening of Asymptomatic Laboratory Research Personnel Returning On-site for Work

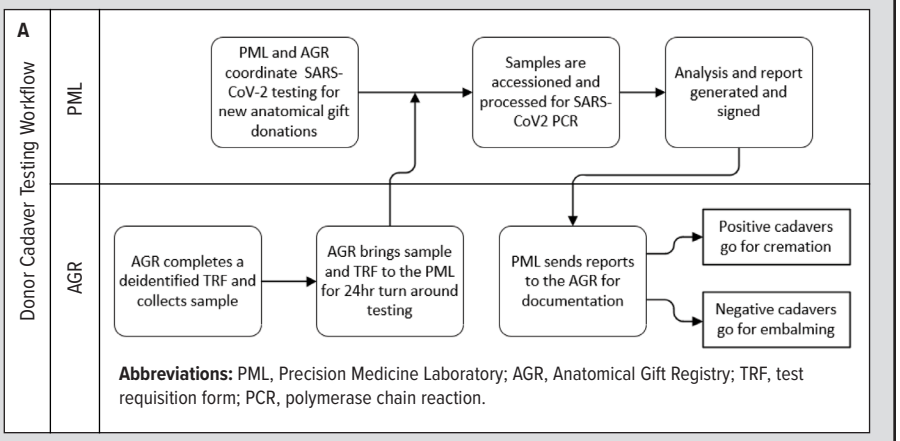
The Office of Research launched the SARS-CoV2 testing program for asymptomatic laboratory research personnel, including faculty, staff, graduate students, and post-doctoral fellows, returning to work on-site on July 20, 2020, as an employee benefit. Participation was voluntary. Specimens were collected at the Adult Translational Research Unit (ATRU) and tested in the PML. Human Resources provided a list of 1128 personnel eligible to participate in the program. An online appointment system informed the ATRU email system. Asymptomatic employees who volunteered for testing were provided with an employee test requisition form, a wellness screening form that included consent for testing, and were directed to report to the ATRU for specimen collection at the appointment time.

Specimens were collected by trained nurses wearing appropriate PPE using collection kits provided by the PML. Nasopharyngeal or anterior nasal swabs were placed in sample collection tubes containing universal transport medium and stored at 4°C until picked up by PML staff the same day for testing, with a turnaround time of 24 hours from specimen collection to result report. Based on CDC recommendations,[6] individuals with negative results were scheduled for repeat testing on a 2-week cycle, with an option to cancel if they preferred not to get tested. Individuals who tested positive for SARS-CoV2 were reported to Human Resources to ensure appropriate follow-up, including mandatory self-isolation, contact tracing, and repeat testing postisolation[7] (Figure 1A).

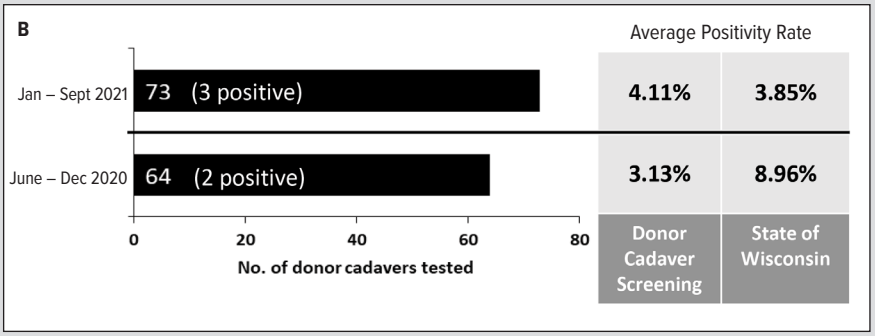
Screening of Donor Cadavers

To ensure the safety of individuals interacting with body donors, all donor cadavers were screened for SARS-CoV2 prior to embalming (Figure 2A). PML-provided collection kits were used to collect specimens from donor bodies temporarily stored in isolation. Nasopharyngeal swabs were collected by the Registry team donning proper PPE prior to approaching quarantined body donors. Collected samples were submitted to the PML for testing. Postprocessing, reports were sent to the Registry director. Donor cadavers with negative SARS-CoV2 test results were removed from isolation and embalmed, and those with positive results were sent for cremation.

Figure 2. SARS-CoV-2 Testing of Nasopharyngeal Swab Samples Obtained From Anatomical Gift Registry Body Donors



A. Prior to collecting nasopharyngeal (NP) swab samples from body donors, the PML and AGR collaborated to create a protocol for obtaining and testing donor samples. NP sample swabs were collected through each nostril by the AGR, and samples were submitted to the PML for SARS-CoV2 PCR analysis.



B. Testing body donors for SARS-CoV2 began in June 2020. From June through December, 2020, 64 body donors were evaluated with 2 testing positive, an average positivity rate of 3.13% vs 8.96%, the average positivity rate in Wisconsin during the same period. Between January and September 2021, 73 body donors were evaluated with 3 testing positive, an average positivity rate of 4.11% vs 3.85%, the average positivity rate in Wisconsin during the same period.

Evaluation of Data From Both Cohorts

Data from testing across both programs – the personnel screening (July 27, 2020 – September 30, 2021) and donor cadaver screening program (June 1, 2020 – September 30, 2021)–were evaluated to document case numbers and positivity rates. For the personnel screening program, we also reviewed sex of individuals in the cohort as well as the number of continuous testing cycles various individuals participated in during the evaluation period. This study was reviewed and approved by the MCW Institutional Review Board.

RESULTS

Laboratory Research Personnel Screening Program

At the end of 14 months of implementation (September 30, 2021), the program had screened 514 individuals for a total of 2718 tests;

spanning an age range of 22 to 81 years; with 313 females, 199 males, and 2 ungendered individuals (Figure 1B inset). One individual with the longest participation record completed 33 testing cycles (Figure 1B), with 472 individuals participating in 2 to 10 testing cycles. Thirteen individuals in the cohort tested positive, resulting in a positivity rate of 2.5% (13 of 514) or 0.5% (13 of 2718) if calculated across the number of specimens evaluated (Figure 1C). Vaccines were made available to research personnel in early March 2021, at which time the screening program participation numbers started to decrease (Figure 1C). It is expected that the program will continue to be offered to personnel until the institution is able to introduce a phased relaxation of COVID-19 protective measures that remain in place, in line with CDC recommendations.

Anatomical Gift Registry Donor Screening Program

Sixteen months after implementation (September 30, 2021), the Registry had received 137 body donations for which a total of 174 specimens were evaluated, with 2 or more samples being evaluated in some cases. Of all incoming donors, 5 tested positive for SARS-CoV2, a 3.6% (5 of 137) positivity rate (Figure 2B). Interestingly none of the positive cases in this cohort were documented as COVID-related deaths on donor death certificates, which would have precluded acceptance into the program.

DISCUSSION

Our study describes the successful implementation of a screening program for SARS-CoV2 in asymptomatic personnel and donor cadavers by our institution. Approximately 3000 specimens were tested across both programs, with an overall positivity rate of 2.5% in asymptomatic personnel and 3.6% in donor cadavers. This is in contrast to the high positivity rate observed in the state of Wisconsin during the study period (average 6.07%; minimum 0.72%, maximum 17.53%).[8]

The low positivity rate in the personnel screening program reflects the excellent overall adherence of research personnel to safety measures instituted, including the use of PPE and physical distancing. One might presume that removal of individuals with asymptomatic disease from MCW assisted in maintaining an environment free of workplace-associated infections. It is important to note that in the research personnel screening program, of the 1128 individuals who were eligible to participate, 514 availed this benefit—a 45% participation rate. While we have not directly investigated the reasons behind the lack of participation by certain individuals, we speculate that it may be due to the nature of their job, such as a limited need for them to be on-site for work or their confidence in the protective measures mandated by the organization to be on-site (including wellness screening prior to arrival, CDC recommended-distancing, and mandated face masks as PPE). A review of the demographics of those who did not participate in the program did not reveal any differences across gender, age, or position in the organization.

Early implementation of the donor cadaver screening program allowed for resumed acceptance of body donations within 3 months of disruption of research and educational operations on campus. Given that the donor certificates did not document death as being COVID related, the observed positives in this cohort could be due to asymptomatic, early stages of infection or likely because infection was undiagnosed, validating the need for the program to ensure safety for students and faculty. The latter is plausible given the advanced age and comorbidities in our donors. Cadaver donations are paramount to educational programs,[9] and proactive testing supported anatomy education, ensuring safe interactions with donated cadavers. Additionally, the subsequent follow-up measures with positive cases lowered risk of exposure for students.

CONCLUSIONS

This screening program serves as an example of institutional investment in the safety of its faculty, staff, and students alike. It also highlights the swift action and collaborative efforts taken to address specific needs brought on by a global pandemic, including restrictions on in-person interactions that disrupted research and educational operations.

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