Results of a Shortened Quarantine Protocol on a Midwestern College Campus

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Abstract

A shortened quarantine protocol following SARS-CoV-2 exposure was implemented on a college campus. We assessed data on exposures, symptoms and tests on 1,152 individuals released from quarantine on Day 7. A shortened quarantine period for asymptomatic individuals with negative tests can be implemented with low risk.

Keywords: COVID-19; quarantine; public health; college campus

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Public health recommendations from CDC call for close contacts of individuals with confirmed SARS-CoV-2 infection to quarantine for 14 days to limit the risk of further transmission (1). The length of the required quarantine has economic, academic, social, and mental health implications (2). In an effort to reduce the time students are excluded from the classroom and other campus commitments, a working group was convened to make recommendations to a midwestern university related to the quarantine of asymptomatic individuals who had been exposed to persons with COVID-19. Comprised of physician and administrative leadership for campus health services (for employees and students) at the university and the local health department, the working group's original intent was to develop a protocol specifically for returning asymptomatic student-athletes to practice following an exposure to a confirmed case of SARS-CoV-2 infection.[1] However, because the intent was to develop a protocol that was effective in identifying individuals at low-risk, from both clinical and public health perspectives, for SARS-CoV-2 infection and transmission, the group determined that it was both equitable and practical to adopt the protocol for all students.

The goal was to define a testing strategy for asymptomatic individuals from which negative results suggested a sufficiently low risk of SARS-CoV-2 infection to support a shortened quarantine period. The median duration to the onset of symptoms is approximately 5 days following exposure (3), however, the optimal timeframe for testing asymptomatic individuals following an exposure has been less clear. The consensus of the group was to implement a two-test strategy, allowing the potential for early detection of infections (and an opportunity to identify and quarantine any additional close contacts), with a follow-up test in a timeframe

[1] The resulting protocol was ultimately not adopted for this purpose, pursuant to guidance from the National Collegiate Athletic Association requiring all student-athletes identified with prolonged close contact with a known case of SARS-CoV-2 to remain in quarantine for a full 14 days from the date of last exposure, irrespective of any subsequent negative tests.

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associated with a decreased likelihood of a false negative test (4,5.6). The Day 4/7 Quarantine Release Protocol (QRP), developed by the Working Group, allows individuals who have never been symptomatic to be released from quarantine following a negative result based on LabCorp's real-time reverse transcription polymerase chain reaction (RT-PCR) (https://www.labcorp.com/coronavirus-disease-covid-19/providers) test on Day 4, and a negative Sofia SARS Antigen Fluorescent Immunoassay rapid antigen test on the Sofia 2 platform (https://www.quidel.com/immunoassays/rapid-sars-tests/sofia-sars-antigen-fia) on Day 7. This paper reports the outcomes of the QRP developed by the working group and implemented in the fall semester of 2020.

Methods

The University maintained data on symptoms and exposures (as reported in the online Daily Health Check platform), as well as data regarding testing, contact tracing, isolation & quarantine, and symptom monitoring (for those in isolation and quarantine) for all students. Students who were identified as close contacts of persons with COVID-19 (within 6 feet for more than 15 minutes) were instructed to quarantine. University staff conducted daily telephone follow-up with individuals in quarantine to assess for symptoms or any physical or psychosocial needs. Individuals who became symptomatic while in quarantine were referred for diagnostic testing and were no longer eligible for the QRP. Specimens were collected by nasal swab at the campus testing site from individuals who remained asymptomatic on Day 4 following their most recent exposure to a confirmed COVID-19 case. Swabs were processed at a local commercial laboratory using LabCorp's RT-PCR test; results were typically returned within 36 hours. Persons with a negative RT-PCR result who remained asymptomatic were tested again on Day 7 with the Sofia SARS Antigen Fluorescent Immunoassay rapid antigen test. Those testing positive were placed in isolation, while those testing negative were released from quarantine and returned to their regular housing and

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normal activities, with on-going follow-up. Individuals released under the QRP received a final call from university staff on Day 8 to assess for symptoms and report any subsequent exposures to persons with COVID-19. QRP-released individuals were also included in the university's sampling protocol for routine screening of the entire university community (5). Administrative and clinical data were aggregated in a Snowflake database (www.snowflake.com), and analyses performed utilizing Snowflake and Tableau platforms (www.tableau.com). The data included in this analysis were restricted to students advised to quarantine during the study period. The analysis was reviewed by the university's Institutional Review Board (IRB) and deemed to fall under a regulatory exception from IRB review as a public health surveillance activity.

Results

From September 1 – November 11, 2020, 1,355 students were identified as close contacts of persons with COVID-19 and instructed to quarantine (Figure 1). A total of 45 individuals (3.3%) became symptomatic while in quarantine or otherwise tested positive (e.g., on required screening tests for athletes) and were thus ineligible for the QRP. Ultimately, 1,310 students were eligible for the QRP; of these, 143 (10.9%) tested positive by RT-PCR on Day 4 following exposure to a person with COVID-19. Of 1,167 persons tested by rapid antigen test on Day 7, 15 (1.3%) tested positive. Of 1,152 individuals released from quarantine on Day 7, 74 (6.4%) subsequently tested positive during the study period; of these, 56 (76%) were beyond the initial 14-day quarantine period following exposure, and 18 (24%) were within 14 days of their initial exposure. Nine of 18 persons with positive tests (50%) were detected on routine screening tests, five of whom reported new exposures following release from quarantine. Nine (50%) sought testing either for symptom onset (5), new exposure (1), or both (3). Conversely, of 176 individuals testing positive within 14 days of the initiation of quarantine, 9 (5.1%) tested positive in the week following release from quarantine under the QRP without additional known exposures to SARS-CoV-2. Of 1,152 students released from

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quarantine on Day 7, 1,048 (91%) were tested for any reason between their Day 7 release and the end of the semester.

Discussion

A shortened quarantine period, predicated on remaining asymptomatic and testing negative for SARS-CoV-2 at Days 4 and 7 following last exposure, was successfully implemented with no evidence of additional transmission of SARS-CoV-2 attributed to individuals released on Day 7 (that is, these individuals were not identified as probable sources of exposure based on contact tracing interviews). In this study, only 4 (0.3%) of 1,152 persons tested positive within 14 days of their exposure without either identifying new exposures or developing symptoms after being released from quarantine on Day 7 according to the QRP. Given that symptoms are likely to develop within a week of exposure (3) and modeling studies suggest a decreased risk of transmission after seven days of quarantine with negative tests (2,9), findings from the current study are consistent with these expectations. Additionally, there was no evidence of clusters arising attributable to individuals released under the QRP based on the university's contact tracing interviews.

This report is subject to several limitations. First, not all persons released from the QRP following a negative test at Day 7 were subject to follow-up testing; subsequent testing was only conducted based on development of symptoms, subsequent exposure, or being called for a routine screening test. Although mandatory screening tests were required of all students, the cadence of screening testing varied as testing capacity increased. Thus, not all students released from quarantine were called for screening within a standard interval (such as within 7 days of release). However, all eligible students (i.e., those with a laboratory-confirmed diagnosis within the preceding 90 days or currently in quarantine) were subject to mandatory screening in the week prior to the end of the observation period for this report.

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Second, symptoms were self-reported and may have gone unrecognized or underreported. Third, the combination and sequence of testing may warrant re-consideration. The original rationale for a high-sensitivity test on Day 4 was to allow early identification of positives to move additional close contacts into quarantine; in practice, this yielded relatively few additional close contacts. Instead the tangible benefit realized was the opportunity to start the clock earlier than day 7 for the 10-day isolation period recommended following a positive test in asymptomatic individuals (10). Further, the majority of positives were detected at Day 4, though this may be a function of the lower sensitivity of the antigen test compared to RT-PCR, which may have missed detecting asymptomatic infections as part of Day 7 testing. Finally, these findings relate to a midwestern university campus with a residential community consisting predominantly of undergraduate students, and thus may not be generalizable to the general population. While the university provided isolation and quarantine facilities and meal delivery, it is unclear how strictly or effectively further exposures were limited in this context. Adherence to quarantine expectations may also be challenging in a community context without such institutional supports. Finally, as molecular sequencing was not readily available to the campus community in the fall semester, transmission inference is based solely on exposure history and contact tracing interviews; additionally, because the predominant genomic variant was not identified on campus, it is unclear to what extent this shortened quarantine protocol can be applied generally for use in the setting of SARS-CoV-2 variants.

The duration of quarantine recommended following an exposure to a confirmed case of COVID-19 poses financial, academic, social and mental health challenges, any of which can threaten adherence to quarantine guidance (2). This report provides evidence to suggest that releasing asymptomatic individuals from quarantine, based on negative tests at Day 4 and Day 7 following exposure, carries a low-risk of the individual either testing positive or infecting other individuals with SARS-CoV-2. Ensuring close follow-up, symptom monitoring, and access to care further enhance the ability to safely implement a shortened quarantine

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protocol, as does on-going surveillance or screening testing. A shortened quarantine could have significant impact for residential campuses, as well as other community settings and workplaces, and may contribute to enhanced adherence to quarantine guidance.

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NOTES

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Potential Conflicts of Interest

All authors have submitted the ICMJE Form for the Disclosure of Potential Conflicts of Interest and have no conflicts to report.

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Figure Legend

Figure 1. Results of the Quarantine Release Protocol (QRP): September 1 – November 11, 2020.

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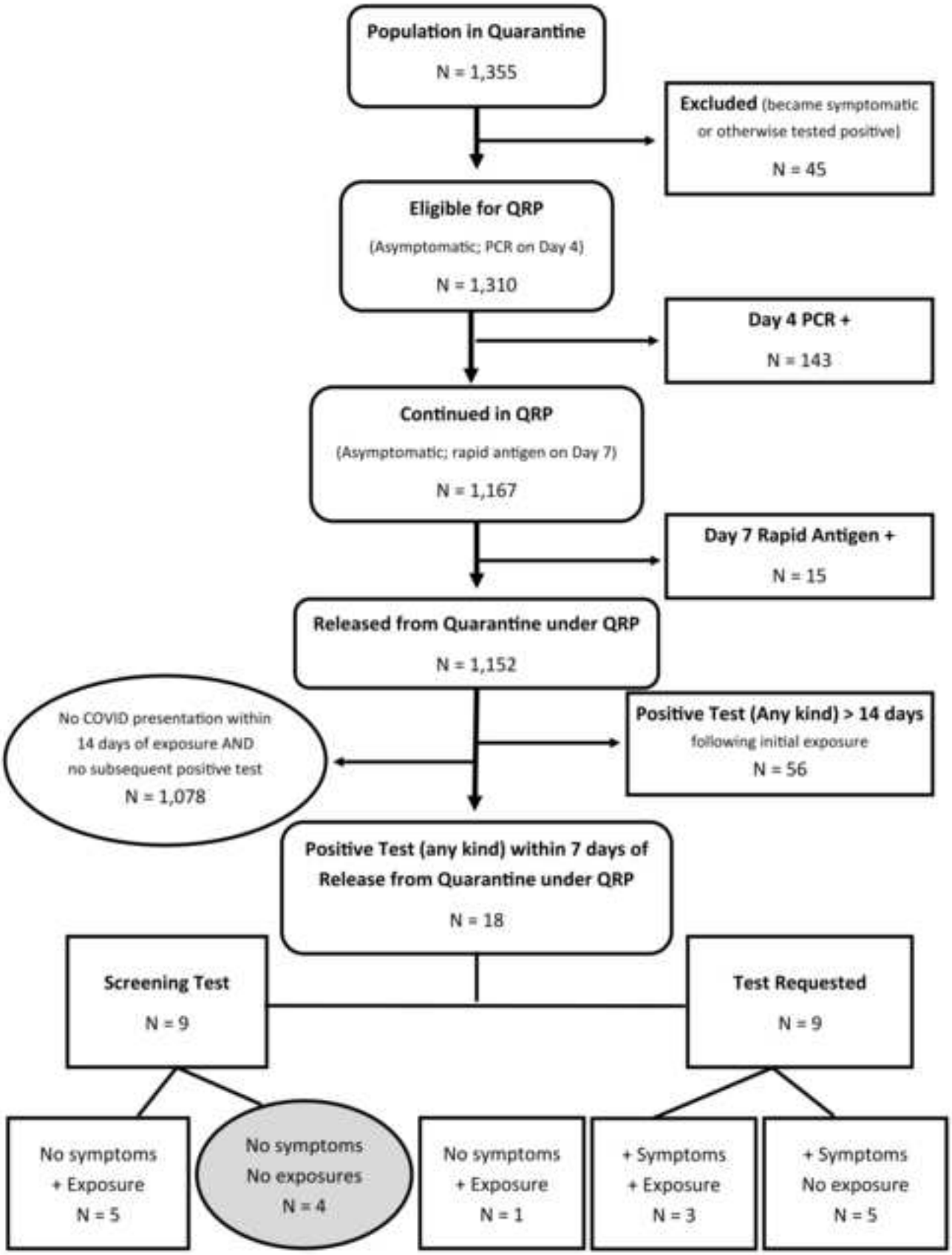
Population in Quarantine
N = 1,355
Excluded (became symptomatic or otherwise tested positive)
N = 45
Eligible for QRP
(Asymptomatic; PCR on Day 4)
N = 1,310
Day 4 PCR +
N = 143
Continued in QRP
(Asymptomatic; rapid antigen on Day 7)
N = 1,167
Day 7 Rapid Antigen +
N = 15
Released from Quarantine under QRP
N = 1,152
No COVID presentation within 14 days of exposure AND no subsequent positive test
N = 1,078
Positive Test (Any kind) > 14 days following initial exposure
N = 56
Positive Test (any kind) within 7 days of Release from Quarantine under QRP
N = 18
Screening Test
N = 9
Test Requested
N = 9
No symptoms + Exposure
N = 5
No symptoms No exposures
N = 4
No symptoms + Exposure
N = 1
+ Symptoms + Exposure
N = 3
+ Symptoms No exposure
N = 5