COVID-19 infection among first responders in Broward County, Florida, March–April 2020

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ABSTRACT

Background First responders (FRs) may have a significant risk of coronavirus 19 (COVID-19) infection than the general population due to job-related exposures. We aimed to determine the prevalence and exposure patterns of COVID-19 among FRs.

Methods Between March and April 2020, FRs in Broward County, Florida, were screened for COVID-19 infection by real-time reverse transcription polymerase chain reaction assay using nasopharyngeal swabs. Demographics and COVID-19 positive rate of the FRs were summarized.

Results A total of 3375 FRs were screened for COVID-19 infection. The median age of FRs tested was 42 years (IQR 33–52 years), and 1464 (43.4%) were men. A total of 2902 (85.9%) were asymptomatic, and 473 (14.1%) reported symptoms associated with COVID-19. Overall, 289 (8.6%) were positive, with the highest rates among the age between 25 and 49 years. Of those testing positive, 235 (81.3%) were asymptomatic. Fourteen days after their first positive test, 81 (69.8%) of the 116 asymptomatically infected FRs were negative, and 35 (30.2%) remained positive and asymptomatic.

Conclusions The FRs in Broward County, FL, had an overall infection rate of 8.6% at the time of COVID-19 testing, and asymptomatic FRs accounted for 81.3% of infection. Active surveillance should be focused on the asymptomatic FRs with COVID-19.

Keywords COVID-19, first responders, pandemic, SARS-CoV-2, screening

Introduction

The SARS-CoV-2 is a newly emerging virus that has had spread rapidly around the world, causing the coronavirus disease 2019 (COVID-19), with 5–32% of the infected individuals developing severe illness requiring hospitalization and/or intensive care. Person-to-person transmission via respiratory routes and/or close contact had been documented as the most common mode of transmission. Since the first known person-to-person transmission of COVID-19 was identified in the USA on 23 January 2020, the number of infections has risen dramatically and the USA now has more confirmed cases and deaths than any other country worldwide. There have been reports that persons who were infected with COVID-19 although asymptomatic are probably still an important source of transmission, as the viral load detected in nasopharyngeal swabs of asymptomatic individuals is equal to that of symptomatic patients under active surveillance. Moreover, transmission of COVID-19 by asymptomatic persons has been implicated in crowd and family-clustered outbreaks, suggesting that the infected persons who did not develop COVID-19 symptoms are able to cause viral transmission. However, in general, the focus has been mainly on testing individuals who experienced COVID-19 symptoms such as fever, cough and/or shortness

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of breath, whereas asymptomatic persons who are at risk of continuous exposure to COVID-19, such as first responders (FRs), are not always followed closely and tested by clinician and public health officials. A large number of asymptomatic persons with this contagious infection may remain undetected in communities and contribute to the virus outbreak.

FRs, including respondents from police, fire and emergency medical services, are confronted with multiple exposures to COVID-19 infections and may be at a potentially higher risk of infection than the general population due to frequent and close exposure to others. Active surveillance of FRs exposed to COVID-19 is important for reducing secondary transmission and maintaining health system capacity as they may become an important source of transmission. In the first month of COVID-19 outbreak in the USA, a drive-through testing center for COVID-19 was opened up at C.B. Smith Park in Pembroke Pines, Broward County, one of the counties most affected in Florida, by Memorial Healthcare System together with the National Guard and Florida state governor. The goal of this public health measure was to ensure that FRs can efficiently access needed medical care while working under the safest possible conditions during the coronavirus outbreak. All FRs in Broward County and people who had acute respiratory syndrome or who had contact with a confirmed case were screened for COVID-19 infections. This report summarizes the evidence on the burden of and the epidemiologic features of COVID-19 infections in FRs in Broward County, Florida, from 23 March to 29 April 2020, and the possible implications for transmission mitigation and disease control are discussed from a public health perspective.

Methods

Study participants and setting
FRs who were older than 18 years and tested at the drive-through testing center for COVID-19 at C.B. Smith Park in Pembroke Pines, Broward County, between 23 March and 29 April 2020, were included. Participants entered the park in a vehicle, and the nurses asked them if they met the following three criteria: (i) Are you a FR? (ii) Are you 65 or older, have symptoms such as fever, cough or shortness of breath, and suffer from a chronic condition? (iii) Have you traveled internationally or to an area with high community COVID-19 spread within the last month and have symptoms such as fever, cough or shortness of breath? If the answer to one of these questions was yes, then the participants were permitted to enter the park for testing. National Guard medics, dressed in full PPE, including Tyvek suits and N95 masks, performed a nasopharyngeal swab and then placed the specimen in a bag for Quest to collect. The nasopharyngeal swab samples were then processed and were assayed by a real-time reverse transcription-polymerase chain reaction (RT-PCR) at the Quest Diagnostics lab. As part of this program, asymptomatic FRs who tested positive for COVID-19 infections were informed by test site staff and self-quarantined to limit the spread of the disease.

The study was approved by the institutional review board (IRB) of Memorial Healthcare System (IRB no. MHS.2020.063). Written informed consent was waived as this was performed as a retrospective chart review.

Data collection
Data on demographic characteristics, date of test and PCR test results were obtained from the electronic health record of the test registry. The data included in this report started on 23 March 2020 and ended at 29 April 2020, including accumulative and daily new confirmed cases of COVID-19 infections. The date of the nasopharyngeal specimen collection was used as the date of positive viral nucleic acid test result. A symptomatic case was defined as a case with fever, cough, malaise, body aches, runny nose and/or shortness of breath, while an asymptomatic case was defined as a case with normal body temperature or no discomfort or no symptoms at all.

Statistical analysis
This study included all FRs tested at the drive-through test center from 23 March to 29 April 2020. Continuous variables were expressed as the medians and interquartile range (IQR). Categorical variables were summarized as the counts and percentages in each category. Demographics and COVID-19-positive rates between symptomatic and asymptomatic groups were assessed using chi-squared test, independent t test or Mann–Whitney U test, as appropriate. The positive rates were calculated as the total number of positive cases divided by the total number of cases tested, expressed as a percent.

An epidemic curve that shows the distribution of cases over time was constructed by plotting the date of test on the x-axis versus the numbers of cases on the y-axis. All statistical analyses were performed with SPSS software version 26.0, and P value <0.05 was considered statistically significant.

Results
A total of 3375 FRs were tested at the drive-through test center from 23 March to 29 April 2020 (Table 1). More women
(56.6%) were tested than men (43.4%) ($P < 0.0001$), and the median age of FRs tested was 42 years (IQR 33–52 years). Most patients (85.9%) were asymptomatic, and 473 (14.1%) reported symptoms associated with COVID-19. Overall, 289 (8.6%) of FRs were positive for COVID-19 infections during the review period.

Demographic characteristics were similar between the 289 (8.6%) FRs with positive test results and the 3086 (91.4%) FRs with negative test results (Table 1). The study population breakdown by age shows that 130 (3.9%) were 18–24 years old and 131 (3.9%) were older than 65. COVID-19 test positive was highest at the working age bracket between 25 and 49 years, ∼65.9% for ages between 25 and 49 years and 26.3% for ages between 50 and 65 years, respectively. Among the 289 FRs with positive test results, 54 (18.7%) were symptomatic and 235 (81.3%) were asymptomatic.

As of 29 April 2020, the 116 FRs who were asymptomatic with positive test results on the initial testing were reassessed 14 days after testing. Eighty one (69.8%) cases had the virus cleared, while 35 (30.2%) with positive test results remained asymptomatic.

Figure 1 shows the total number of FRs tested daily and the total number of positive cases daily from 23 March to 29 April 2020 in Broward County, Florida. The number of tests performed in the FRs and the number of positive cases of the FRs were highest in two major time points of the first week of April 2020, which is consistent with the peak number of cases with COVID-19 in Broward County, Florida.13

### Discussion

#### Main findings of this study

In the first surge of COVID-19 in Broward County, Florida, we identified 289 (8.6%) FRs with positive test results for COVID-19, which is consistent with the overall prevalence of infection in the USA.8 More than 80% of FRs with positive test results did not have any symptoms at the time of testing. Approximately 30% of the FRs remained asymptomatic and positive for COVID-19 after 14 days of the initial testing. This study highlights that a large number of asymptomatic FRs who were not recognized as having COVID-19 infection and therefore not isolated might have contributed to further spread. It is important to monitor their health for signs and symptoms of COVID-19 resolution to be able to discontinue isolation and be allowed to go back to work, especially in this very important time where FRs are mostly needed to help the community with COVID-19 response.

#### What is already known on this topic

Although the infected individuals developing COVID-19 symptoms such as fever, cough and/or shortness of breath are thought to be most contagious,9,10 unrecognized asymptomatic infections might also have similar potential for viral transmission and contribute to the ongoing pandemic of COVID-19.11,12,14,15 However, in general, the focus has been mainly on testing individuals who experienced COVID-19 symptoms such as fever, cough and/or shortness of breath, whereas asymptomatic persons who are at risk of continuous
exposure to COVID-19, such as FRs, are not always followed closely and tested by clinician and public health officials. The unrecognized asymptomatic FRs with COVID-19 infection might have contributed to rapid spread of COVID-19 in the community if they were working the calls and going into the communities without wearing masks. Therefore, identifying asymptomatic FRs with COVID-19 infection is vital in reducing COVID-19 infections spreading between peers and/or in the community if routine surveillance is implemented. To our knowledge, no study exists on COVID-19 infection rate among FRs in South Florida during the first surge.

What this study adds
In this study, the COVID-19 infection rate among FRs in Broward County, Florida, was 8.6% between March and April 2020. This analysis provides evidence that symptom screening could initially fail to identify ~80% of FRs with COVID-19 infection, suggesting that a testing strategy tailored for the FRs is needed. As 30.2% of those FRs who were positive at the time of testing remained asymptomatic and positive for COVID-19 after 14 days of initial testing, it is important to monitor their health for signs and symptoms of COVID-19 resolution to be able to discontinue isolation and be allowed to go back to work, especially in this very important time where FRs are mostly needed to help the community with COVID-19 response. We additionally found a significantly lower willingness to receive COVID-19 test among male FRs (male versus female, 43.4 versus 56.6%, \( P < 0.0001 \)). Since FRs are male-dominated and men face in accessing services with more exposure to public and less in preventive public health measures such as mask wearing, handwashing and/or delayed healthcare seeking, strategies for extended screening for COVID-19 in male FRs may provide a reliable picture of the infection in this population; also, they are more at risk for worse outcomes. \(^{16}\) Taken together, this study provides a supplementary resource for policymakers and public health professionals to understand COVID-19 exposure among FRs in South Florida.

Limitations
The findings in this report had some limitations. The study sample was not fully representative of the national FRs in the USA, because we screened FRs from Broward County, Florida, and the distributions of age and gender may be unequal at different counties. Information bias is possible because exposure and symptom status were identified by self-report. In addition, pre-existing medical conditions in FRs were insufficient to assess association between health status and infection rates, so we did not perform a relevant analysis. Despite the limitations of this study, our findings provide information regarding COVID-19 infection among FRs,
which is important because FRs are vulnerable to occupational infections and have been neglected in academic research in this area.

Conclusions
The results showed an overall infection rate of 8.6% in FRs at the time of COVID-19 testing and asymptomatic FRs accounted for 81.3% of COVID-19 infection, and most were among the working age of 25–49 years. Approximately 30% of the asymptotically infected FRs continue to test positive after 14 days of the initial test and remained asymptomatic. This analysis provides supplementary resource to understand the prevalence and exposure patterns of COVID-19 among FRs and may help assess public health measures to ensure the safety of FRs.

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Conflict of interest
The authors have no conflicts of interest.

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