Title:

COVID-19 outbreak at a large homeless shelter in Boston: Implications for universal testing

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Abstract

The circumstances of homelessness create the potential for rapid transmission of SARS-CoV-2
in this vulnerable population. Upon observing a cluster of COVID-19 cases from a single large
homeless shelter in Boston, Boston Health Care for the Homeless Program conducted symptom
assessments and polymerase chain reaction (PCR) testing for SARS-CoV-2 among all guests
residing at the shelter over a 2-day period. Of 408 participants, 147 (36.0%) were PCR-positive
for SARS-CoV-2. COVID-positive individuals were more likely to be male (p<0.001) but did not
differ significantly from COVID-negative individuals with respect to other demographic and
clinical characteristics. Cough (7.5%), shortness of breath (1.4%), and fever (0.7%) were all
uncommon among COVID-positive individuals. Our findings illustrate the rapidity with which
COVID-19 can be widely transmitted in a homeless shelter setting and suggest that universal
PCR testing, rather than a symptom triggered approach, may be a better strategy for identifying
and mitigating COVID-19 among people experiencing homelessness.

Introduction

In the US, an estimated 2.3-3.5 million people experience homelessness annually,[1] and about
500,000 individuals sleep in homeless shelters each night.[2] The congregate nature and hygienic
challenges of shelter life create the potential for rapid transmission of SARS-CoV-2 in this
vulnerable population.

In mid-March, 2020, Boston Health Care for the Homeless Program (BHCHP), in partnership
with city and state public health agencies and community partners, created a COVID-19
response strategy that included front-door symptom screening at area shelters, expedited
referrals for SARS-CoV-2 testing and isolation for those with respiratory symptoms, dedicated
treatment settings for COVID-positive individuals, and detailed contact tracing of confirmed
cases.

During the last week in March, BHCHP observed an evolving cluster of COVID-19 cases
emerging from a single large homeless shelter in Boston. With support from the Massachusetts
Department of Public Health (MDPH), BHCHP rapidly conducted polymerase chain reaction
(PCR) testing for SARS-CoV-2 along with focused symptom assessments among all guests
residing at the shelter over a 2-day period. In this report, we describe the proportion of tests
returning positive and the symptom profile of confirmed cases.

Methods

Participants were adults ≥18 years old residing in a large homeless shelter in Boston during the
onset of the COVID-19 case cluster described above. The original cases (N=15) were identified
sequentially over a 5-day period, and each was expeditiously removed from the shelter
population at the time of symptom recognition. These individuals predated the implementation of
universal testing procedures and are excluded from this study.

Among all remaining shelter guests, BHCHP staff assessed self-reported age, gender, race,
and ethnicity. Participants were asked about cough and shortness of breath and given the
option to report other symptoms. Body temperature measurements were obtained using oral
thermometers. Nasopharyngeal specimens were collected by BHCHP clinical staff using a
polyester swab and sent to the MDPH State Public Health Laboratory for SARS-CoV-2 PCR
testing.

We used descriptive statistics to characterize the study sample, the proportion of positive PCR
tests, and the symptom profile of confirmed cases. We used t tests and Fisher exact tests to
compare the characteristics of COVID-positive and COVID-negative individuals.

This study was exempted by the Partners HealthCare Human Research Committee with a waiver of informed consent.

Results

A total of 408 individuals underwent symptom assessment and COVID-19 PCR testing. The mean age was 51.6 years, 71.6% were male, 33.1% were Black or African American, and 18.6% were Hispanic or Latino (Table). Among all participants, 8.1% reported cough, 0.7% reported shortness of breath, and 5.9% reported other symptoms, including 1.2% with diarrhea. Mean body temperature was 98.4□.

One hundred forty-seven participants (36.0%) were PCR-positive for SARS-CoV-2. COVID-positive individuals were more likely to be male (p<0.001) but did not differ significantly from COVID-negative individuals with respect to other demographic or clinical characteristics. Cough (7.5%), shortness of breath (1.4%), and fever (0.7%) were all uncommon among COVID-positive individuals.

Discussion

Universal SARS-CoV-2 PCR testing of an adult homeless shelter population in Boston shortly after the identification of a COVID-19 case cluster yielded an alarming 36% positivity rate. The vast majority of newly identified cases had no symptoms and no fever on a single point-in-time assessment. Our findings illustrate the rapidity with which COVID-19 can be widely transmitted within a homeless shelter setting, even when infection control vigilance is high. Although recommended by the Centers for Disease Control and Prevention[3] and widely implemented in Boston and elsewhere, front-door symptom screening in homeless shelter settings will likely miss a substantial number of COVID-19 cases in this high-risk population. These results support

a universal PCR testing approach for identifying COVID-19 among people experiencing homelessness.

References

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Table. Characteristics of the study sample, overall and by SARS-CoV-2 PCR result.

		SARS-CoV-2 PCR result		
	All, N=408	**Positive, N=147**	**Negative, N=261**	**P value**
Demographic				
Age, years, mean (SD)	51.6 (12.8)	53.1 (12.8)	50.8 (12.7)	0.08
Age group, N (%)				0.16
18-34 years	44 (10.8)	11 (7.5)	33 (12.6)	
35-49 years	119 (29.2)	40 (27.2)	79 (30.3)	
≥50 years	245 (60.1)	96 (65.3)	149 (57.1)	
Male, N (%)	292 (71.6)	124 (84.4)	168 (64.4)	<0.001
Race, N (%)				0.90
White	184 (46.5)	68 (47.2)	116 (46.0)	
Black/African American	131 (33.1)	46 (31.9)	85 (33.7)	
Asian	8 (2.0)	4 (2.8)	4 (1.6)	
American Indian/Alaskan Native	4 (1.0)	2 (1.4)	2 (0.8)	
Other	58 (14.7)	21 (14.6)	37 (14.7)	
Multiple	11 (2.8)	3 (2.1)	8 (3.2)	
Hispanic/Latino ethnicity, N (%)	71 (18.6)	22 (16.1)	49 (20.0)	0.41
Clinical				
Temperature, °F, mean (SD)	98.4 (2.2)	98.2 (3.4)	98.5 (0.9)	0.46
T ≥ 100 °F, N (%)	4 (1.0)	1 (0.7)	3 (1.2)	1.00
Symptoms				
Cough, N (%)	33 (8.1)	11 (7.5)	22 (8.4)	0.85
Shortness of breath, N (%)	3 (0.7)	2 (1.4)	1 (0.4)	0.30
Other, N (%)	24 (5.9)	10 (6.8)	14 (5.4)	0.66
Diarrhea	5 (1.2)	2 (1.4)	3 (1.2)	1.00