

Mass SARS-CoV-2 Testing in a Dormitory-Style Correctional Facility in Arkansas

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 See also Macmadu and Brinkley-Rubinstein, p. 776.

Objectives. To assess SARS-CoV-2 transmission within a correctional facility and recommend mitigation strategies.

Methods. From April 29 to May 15, 2020, we established the point prevalence of COVID-19 among incarcerated persons and staff within a correctional facility in Arkansas. Participants provided respiratory specimens for SARS-CoV-2 testing and completed questionnaires on symptoms and factors associated with transmission.

Results. Of 1647 incarcerated persons and 128 staff tested, 30.5% of incarcerated persons (range by housing unit = 0.0%–58.2%) and 2.3% of staff tested positive for SARS-CoV-2. Among those who tested positive and responded to symptom questions (431 incarcerated persons, 3 staff), 81.2% and 33.3% were asymptomatic, respectively. Most incarcerated persons (58.0%) reported wearing cloth face coverings 8 hours or less per day, and 63.3% reported close contact with someone other than their bunkmate.

Conclusions. If testing remained limited to symptomatic individuals, fewer cases would have been detected or detection would have been delayed, allowing transmission to continue. Rapid implementation of mass testing and strict enforcement of infection prevention and control measures may be needed to mitigate spread of SARS-CoV-2 in this setting. (*Am J Public Health*. 2021;111:907–916. <https://doi.org/10.2105/AJPH.2020.306117>)

In the United States, nearly 2.2 million people are incarcerated in jails and federal or state prisons at any given time.¹ Similar to other congregate settings,^{2,3} correctional facilities have emerged as high-risk environments for transmission of SARS-CoV-2, the virus that causes COVID-19.^{4,5} Controlling the spread of COVID-19 in correctional facilities, particularly those with dormitory-style housing, is challenging because of densely populated housing units with

shared living areas.^{6,7} Open floorplans, the lack of floor-to-ceiling walls or doors dividing bunk areas, and shared bathrooms make social distancing in dormitory-style correctional facilities difficult. The traditional method to quarantine individuals exposed to SARS-CoV-2 (i.e., separation from other individuals) is often not feasible in correctional settings because of space limitations. Transfers of incarcerated persons both within and between

facilities, movement of staff within the facility, and movement of staff between the facility and the community, even when minimized as much as possible, further complicate mitigation efforts and put incarcerated persons, staff, and the surrounding communities at risk for acquiring COVID-19.^{4,7,8} In addition, incarcerated populations have a high prevalence of chronic medical conditions, including those associated with severe illness from SARS-CoV-2

infection.^{9,10} As of December 14, 2020, 1299 correctional and detention facilities in the United States reported 316 732 cases of COVID-19 among incarcerated persons and staff, with 1685 deaths.¹¹

In March 2020, an Arkansas prison complex implemented infection prevention and control measures to prevent the introduction of SARS-CoV-2 to the incarcerated population. Initial efforts included suspending visitation, implementing staff temperature and symptom screenings upon entry, and quarantining incoming incarcerated persons for 14 days upon arrival. On March 28, Facility A, a low-security, dormitory-style correctional facility that is part of the prison complex, detected its first case of COVID-19 in an incarcerated person. Three Facility A staff members subsequently tested positive for SARS-CoV-2 on April 1. One of these staff members had close contact with the first case and the other 2 worked in the building where the initial case was housed. Within 1 week of the initial case, 9 incarcerated persons across 5 housing units developed symptoms and tested positive. Following the detection of the first case of COVID-19 in Facility A, additional infection prevention and control measures were implemented to reduce transmission in the facility. Incarcerated persons and staff were given face coverings, and efforts were made to promote social distancing and prevent interactions among incarcerated persons from different housing units, including closing dining areas, discontinuing all work service except for laundry, and ending multi-housing unit recreation time. Incarcerated persons who exhibited COVID-19 signs and symptoms were isolated and tested for SARS-CoV-2.

On April 9, an investigation team visited Facility A to provide technical

assistance to prison officials in responding to cases of COVID-19. Recommendations following the visit included (1) establishing separate isolation spaces for 4 groups of individuals (laboratory-confirmed COVID-19 cases, symptomatic persons awaiting SARS-CoV-2 testing or results, asymptomatic persons awaiting SARS-CoV-2 testing or results, and symptomatic persons with negative SARS-CoV-2 test results that required medical care) when individual housing options were unavailable, (2) avoiding adding new individuals to a group of quarantined individuals and restarting the 14-day quarantine period for the entire group if it was necessary for an additional individual to join, (3) increasing SARS-CoV-2 testing as additional resources became available, and (4) implementing additional infection prevention and control measures and daily temperature checks for all incarcerated persons in Facility A.

Because of continued spread of SARS-CoV-2 within the facility, Facility A requested further assistance to investigate epidemiological aspects of SARS-CoV-2 transmission within the facility and examine strategies that might be useful in slowing transmission of SARS-CoV-2 in a correctional setting. A second investigation team deployed to Facility A on April 21. The objectives of this deployment were 4-fold: (1) establish point prevalence of COVID-19 among incarcerated persons in Facility A, (2) assess behaviors and other factors that could contribute to transmission among incarcerated persons, (3) establish point prevalence of COVID-19 among staff within the entire correctional complex, and (4) recommend infection prevention and control measures and other strategies that could slow SARS-CoV-2 transmission in this correctional facility

and, more broadly, in other similar settings.

METHODS

Facility A is a low security, dormitory-style, all-male, correctional facility within a larger prison complex (age range of incarcerated persons: 19–82 years). The facility has 12 main housing units, each of which house between 100 and 160 incarcerated persons. Bunk areas within the units are separated by half-wall dividers and lack doors. Bathrooms and living facilities are shared. Incarcerated persons can interact freely with others in the unit. The facility also has a special housing unit (SHU) where incarcerated persons are separated from the general population and housed either alone or with other persons in a separated living quarter. Interaction between persons is limited.

Testing was offered to all incarcerated persons without a previous diagnosis of COVID-19 within Facility A. Because of the mobility of staff between facilities within the complex, testing was offered to all staff within the larger prison complex.

Design

To establish the point prevalence of COVID-19 among incarcerated persons and staff, mass testing events were held from April 29 to May 15. Mass testing approaches for both populations are briefly described in the following paragraphs (for detailed information, see the Appendix, section “Detailed Methods,” available as an online supplement to the article at <http://www.ajph.org>).

Incarcerated persons. From April 29 to May 2, the investigation team and Facility A staff conducted mass testing for SARS-CoV-2 in 4 of the 12 Facility A housing units. Specimens from each housing unit

were collected within a 24-hour period. Based on results, testing was extended to all incarcerated persons in the remaining housing units from May 12 to 15, including 8 standard housing units, the SHU, and a small housing unit occupied by incarcerated persons assigned to laundry work service. (For detailed information on housing units within Facility A, see the Appendix, section "Facility Description.")

All incarcerated persons in the housing unit on the day of the testing event were eligible for testing (total eligible: 1661). Those with a COVID-19 diagnosis had previously been moved to a separate isolation unit. Before testing, incarcerated persons provided written consent, and those within most housing units (excluding Unit A, SHU, and laundry service) were asked to complete a brief questionnaire on (1) symptoms experienced during the preceding 14 days and (2) the number of hours they wore their cloth face covering per day. Incarcerated persons in a subset of housing units (Units B, C, and D) were also asked to respond to questions regarding additional factors associated with SARS-CoV-2 transmission. Questionnaires were self-administered unless assistance from an investigation team member was requested. An extract of electronic medical records was used to obtain information on date of birth, race, ethnicity, and preexisting medical conditions.

Staff. From May 5 to 7, investigation team staff offered SARS-CoV-2 testing on a voluntary basis to staff working at the prison complex. Testing was offered on the complex's property. All staff (n = 542) were eligible to be tested. Before testing, staff provided written consent and completed (1) the Centers for Disease Control and Prevention's (CDC's)

Human Infection With 2019 Novel Coronavirus Person Under Investigation and Case Report Form¹² and (2) a supplemental form about their specific work locations within the complex and participation in previous SARS-CoV-2 testing.

Specimen Collection and Laboratory Testing

Detailed specimen collection and laboratory testing methods are provided in the Appendix, section "Specimen Collection and Laboratory Testing." In brief, the investigation team and Facility A medical staff collected respiratory specimens from incarcerated persons, and the investigation team collected respiratory specimens from staff. All were collected in accordance with CDC guidelines.¹³ The majority (65.9%; n = 1086) of incarcerated persons' specimens and all staff specimens were analyzed by CDC's COVID-19 surge diagnostic testing laboratory using reverse transcriptase polymerase chain reaction (RT-PCR). Facility A sent approximately one quarter (23.1%; n = 381) of incarcerated persons' specimens to a commercial laboratory that used RT-PCR for analysis, and 10.9% (n = 180) were analyzed using the facility's onsite Abbott ID NOW (Abbott Diagnostics Scarborough, Scarborough, ME) instrument for rapid molecular testing. All specimens submitted to CDC and the commercial laboratory were nasopharyngeal specimens. Nasopharyngeal and oropharyngeal specimens were collected for onsite analysis using the ID NOW instrument.

Results (positive, negative, or inconclusive) were reported for all specimens analyzed. In addition, CDC's COVID-19 surge diagnostic testing laboratory reported cycle threshold (Ct) values for the

N1 and N2 viral nucleocapsid protein gene regions, 2 genetic markers used to determine the presence of viral RNA, for all positive test results processed in their laboratory (390 of 1086 specimens). In the case of SARS-CoV-2 testing, Ct values represent the number of cycles during RT-PCR testing needed before detection of viral RNA occurs. These values are inversely correlated with the amount of viral RNA present in a specimen. Values below 40 indicate a positive SARS-CoV-2 test result, with lower values indicating a larger amount of viral RNA. Because N1 and N2 Ct values did not significantly differ, N1 Ct values are reported in this article.

An additional specimen was collected from incarcerated persons with inconclusive test results, when possible. These specimens were analyzed onsite using the Abbott ID NOW instrument. The results of these retests are reported as the final test result.

Statistical Analyses

We used the Pearson χ^2 and Fisher exact tests to examine associations between SARS-CoV-2 test results and dichotomous or categorical demographic, symptom, and questionnaire variables. Statistical significance was set at a *P* level of less than .05 for all analyses. Significance testing was not conducted with staff data because of the limited number of staff who tested positive. We analyzed data with SAS software version 9.4 (SAS Institute, Cary, NC).

RESULTS

Of the 1661 incarcerated persons eligible for the mass testing events in Facility A, 1647 (99.2%) provided consent and a specimen. Among those, 502 (30.5%) tested positive for SARS-CoV-2.

Demographic characteristics and most preexisting medical conditions among those tested did not significantly differ by test result, although preexisting chronic lung disease was more common among those with positive results (Table 1).

Among the 431 incarcerated persons who tested positive and responded to symptom questions, 81.2% (n = 350) did not report experiencing symptoms (Table 1). The symptoms most frequently reported by those with a positive result were headache, runny nose, chills, and cough, all of which were reported by less than or equal to 6% of incarcerated persons. Feeling feverish and experiencing chills, loss of taste, and loss of smell were significantly more frequently reported by those with positive test results. Symptom status differed by age group (Table A, available as a supplement to the online version of this article at <https://www.ajph.org>).

Percent positivity varied by housing unit (range = 0.0%–58.2%; Table 2). In one third of the 12 main housing units (i.e., excluding the SHU and the laundry service unit), more than half of incarcerated persons tested positive. Housing units tested within 20 days of their first confirmed case had greater-than-50% positivity; those tested 40 or more days from their first case had a less-than-25% positivity rate (Table B, available as a supplement to the online version of this article at <http://www.ajph.org>). Housing units tested within 12 days of their first case had the lowest average Ct values (Units B and J; 25.3 and 26.5, respectively), indicating larger amounts of viral RNA in the specimen; those tested 20 or more days since their first case had average Ct values that ranged from 32.5 to 35.0.

Factors associated with SARS-CoV-2 transmission, including cloth face

covering use, handwashing behaviors, and close contact with others, did not significantly differ by test result (Table 3; results by housing unit in Tables C and D, available as supplements to the online version of this article at <http://www.ajph.org>). However, more than 50% of all incarcerated persons tested reported wearing a cloth face covering for 8 hours or less daily, and close contact (within 2 feet) with someone other than a bunkmate or someone who slept nearby was reported by 63.3% of all incarcerated persons, irrespective of test result.

Of 542 prison staff, 128 (23.6%) provided consent and a specimen. Fifty (39.1%) reported working in Facility A; the remainder reported working in other facilities within the complex (Table E, available as a supplement to the online version of this article at <http://www.ajph.org>). One third (n = 43) reported working in housing units, 19.5% (n = 25) in administrative offices, and 12.6% (n = 16) in medical units. Among those who worked in housing units, 28 of 43 (65.1%) reported working in multiple housing units, ranging from 2 to 13.

Three (2.3%) staff tested positive. All 3 reported working in housing units (2 worked in Facility A housing units). One worked in only 1 housing unit while 2 reported working within multiple units. Two of the 3 reported experiencing symptoms associated with COVID-19. One reported fever, sore throat, headache, diarrhea, and runny nose; the other reported runny nose.

DISCUSSION

The point prevalence of COVID-19 was high among incarcerated persons within Facility A (30.5%) and varied significantly by housing unit. Available data on the number of cases within each housing unit before mass testing, dates of

detection, and average Ct values of positive results suggest that units with the highest percent positivity (i.e., Units B and J) were experiencing active or more recent transmission at the time of testing, while housing units with lower percent positivity (e.g., Units D and K) had less recent transmission. Therefore, the cumulative incidence of COVID-19 in this setting may have been greater than 30.5%.

Active transmission of SARS-CoV-2 among incarcerated persons within this facility was noted despite implementation of daily symptom screenings and several infection prevention and control strategies, including isolating people who tested positive in a separate housing area, limiting interactions between housing units, promoting social distancing, and providing cloth face coverings. While most incarcerated persons reported using cloth face coverings, more than 50% reported wearing them 8 hours a day or less, despite residing in a congregate setting 24 hours a day. Education on the utility of wearing a cloth face covering within congregate settings and reminders to use them properly and as much as possible may be needed.

Furthermore, many incarcerated persons indicated that they do not wash their hands before eating, after coughing or sneezing, or after having physical contact with other individuals within the unit. Encouraging frequent hand washing, ensuring sufficient quantities of hand hygiene supplies, and intensifying cleaning and disinfection practices can help to prevent transmission of SARS-CoV-2.⁷ These prevention practices are particularly important in dormitory-style housing units, where open floorplans, the lack of floor-to-ceiling walls or doors dividing bunk areas, shared living and bathroom areas, and often dense

TABLE 1— Demographics and Reported Symptoms for Incarcerated Persons From Facility A by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Test Result: Arkansas, April 29–May 15, 2020

Characteristic	SARS-CoV-2 Test Result ^a			P
	Positive, No. (%) ^b	Negative, No. (%) ^b	Total, No. (%) ^b	
Overall	502 (100)	1144 (100)	1646 (100)	
Age, y				.58
< 35	100 (19.9)	237 (20.7)	337 (20.5)	
35–44	171 (34.1)	414 (36.2)	585 (35.5)	
45–54	125 (24.9)	291 (25.4)	416 (25.3)	
55–64	86 (17.1)	162 (14.2)	248 (15.1)	
≥ 65	20 (4.0)	40 (3.5)	60 (3.7)	
Race				.5
Black/African American	200 (39.8)	498 (43.5)	698 (42.4)	
White/Caucasian	294 (58.6)	624 (54.6)	918 (55.8)	
Asian	3 (0.6)	10 (0.9)	13 (0.8)	
Native American	5 (1.0)	12 (1.1)	17 (1.0)	
Ethnicity				.06
Hispanic	46 (9.2)	75 (6.6)	121 (7.4)	
Non-Hispanic	456 (90.8)	1069 (93.4)	1525 (92.7)	
Preexisting medical condition(s)				
Any	252 (50.2)	558 (48.8)	810 (49.2)	.6
Chronic lung disease	64 (12.8)	105 (9.2)	169 (10.3)	.028
Hypertension	195 (38.8)	431 (37.7)	626 (38.0)	.65
Diabetes	89 (17.7)	168 (14.7)	257 (15.6)	.12
Cardiovascular disease	20 (4.0)	54 (4.7)	74 (4.5)	.51
Chronic kidney disease	9 (1.8)	13 (1.1)	22 (1.3)	.29
Chronic liver disease	199 (39.6)	417 (36.5)	616 (37.4)	.22
Overall—with information on symptoms ^c	431 (100)	995 (100)	1426 (100)	
New symptoms in last 14 d ^a				.004
Asymptomatic	350 (81.2)	867 (87.1)	1217 (85.3)	
Symptomatic	81 (18.8)	128 (12.9)	209 (14.7)	
Specific symptoms ^a				
Felt feverish	11 (2.6)	5 (0.5)	16 (1.1)	.002
Chills	21 (4.9)	9 (0.9)	30 (2.1)	< .001
Loss of taste	17 (3.9)	16 (1.6)	33 (2.3)	.007
Loss of smell	19 (4.4)	22 (2.2)	41 (2.9)	.023
Muscle aches	14 (3.3)	17 (1.7)	31 (2.2)	.07
Cough (or worsening cough)	21 (4.9)	32 (3.2)	53 (3.7)	.13
Runny nose	22 (5.1)	34 (3.4)	56 (3.9)	.13
Nasal congestion	20 (4.6)	33 (3.3)	53 (3.7)	.22
Sore throat	7 (1.6)	15 (1.5)	22 (1.5)	.87
Headache	26 (6.0)	43 (4.3)	69 (4.8)	.17
Shortness of breath	8 (1.9)	17 (1.7)	25 (1.8)	.85
Nausea	4 (0.9)	2 (0.2)	6 (0.4)	.07
Vomiting	2 (0.5)	0 (0.0)	2 (0.1)	.09

Continued

TABLE 1— Continued

Characteristic	SARS-CoV-2 Test Result ^a			P
	Positive, No. (%) ^b	Negative, No. (%) ^b	Total, No. (%) ^b	
Diarrhea	6 (1.4)	17 (1.7)	23 (1.6)	.66
Abdominal pain	4 (0.9)	6 (0.6)	10 (0.7)	.5

^aInformation on incarcerated person with inconclusive test result (n = 1) is not reported.

^bColumn percent.

^cSymptom information was not collected from incarcerated persons in 1 of the 12 standard housing units (Unit A), special housing unit, or laundry (n = 220).

populations make practicing adequate social distancing difficult. Our investigation highlighted this by finding that 63.3% of incarcerated persons reported close contact with someone other than their bunkmate or someone who slept nearby, despite the facility's attempts to promote social distancing.

Among incarcerated persons who tested positive in this investigation, 81.2% reported no symptoms. This is consistent with other reports that

indicate high rates of asymptomatic or presymptomatic SARS-CoV-2 infections.^{3,14-16} The large proportion of asymptomatic cases detected among incarcerated persons in this setting indicates that, if testing remained limited to symptomatic individuals, fewer cases would be detected, or detection would be delayed. Following the identification of 1 case of COVID-19 in a dormitory-style correctional setting, rapid implementation of mass testing of incarcerated

persons within the housing unit may identify presymptomatic or asymptomatic cases and help interrupt transmission of SARS-CoV-2. Implementing routine screening procedures may also identify cases earlier than testing based on symptoms.

Because testing may not detect viral material in specimens collected early in the course of infection and given potential delays in receiving testing results, during which time an individual may be

TABLE 2— Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Testing Results for Incarcerated Persons From Facility A by Housing Unit: Arkansas, April 29–May 15, 2020

Housing Unit	Positive, No. (%) ^a	Negative, No. (%) ^a	Inconclusive, No. (%) ^a	N1 Ct Value for Positive Results, Mean (SD) ^b
Unit A	66 (51.6)	62 (48.4)	0 (0.0)	...
Unit B	61 (52.1)	56 (47.9)	0 (0.0)	25.3 (5.6)
Unit C	79 (51.6)	74 (48.4)	0 (0.0)	32.5 (3.4)
Unit D	25 (18.7)	109 (81.3)	0 (0.0)	33.4 (3.3)
Unit E	20 (21.3)	74 (78.7)	0 (0.0)	33.4 (2.8)
Unit F	62 (43.7)	80 (56.3)	0 (0.0)	33.5 (2.7)
Unit G	36 (27.3)	95 (72.0)	1 ^c (0.7)	34.4 (3.1)
Unit H	30 (23.6)	97 (76.4)	0 (0.0)	34.6 (2.1)
Unit I	11 (9.1)	110 (90.9)	0 (0.0)	...
Unit J	82 (58.2)	59 (41.8)	0 (0.0)	26.5 (5.5)
Unit K	25 (19.7)	102 (80.3)	0 (0.0)	35.0 (2.4)
Unit L	0 (0.0)	139 (100.0)	0 (0.0)	...
Special housing unit	0 (0.0)	76 (100.0)	0 (0.0)	...
Laundry service unit	5 (31.3)	11 (68.8)	0 (0.0)	...
Total	502 (30.5)	1144 (69.5)	1 (0.1)	...

Note. Ct = cycle threshold.

^aRow percent.

^bCt values are only available for specimens processed in the Centers for Disease Control and Prevention's COVID-19 surge diagnostic testing laboratory.

^cIndividual with inconclusive results was unable to be retested.

TABLE 3— Factors Associated With Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Transmission Among a Subset of Incarcerated Persons From Facility A by Test Result: Arkansas, April 29–May 15, 2020

Characteristic	SARS-CoV-2 Test Result ^a			P
	Positive, No. (%) ^b	Negative, No. (%) ^b	Total, No. (%) ^b	
Overall—cloth face covering use ^c	431 (100)	995 (100)	1426 (100)	
Hours per day cloth face covering was worn				.96
0–3	107 (25.1)	257 (26.1)	364 (25.8)	
4–8	137 (32.2)	317 (32.2)	454 (32.2)	
9–12	75 (17.6)	175 (17.8)	250 (17.7)	
> 12	107 (25.1)	236 (24.0)	343 (24.3)	
Overall—all other behaviors ^d	165 (100)	239 (100)	404 (100)	
Times per day hands are washed				.59
0–9	33 (20.4)	56 (23.7)	89 (22.4)	
10–19	74 (45.7)	110 (46.6)	184 (46.2)	
> 19	55 (34.0)	70 (29.7)	125 (31.4)	
Specific times when hands are washed				
Before eating	92 (55.8)	134 (56.1)	226 (55.9)	.95
Before touching face	78 (47.3)	103 (43.1)	181 (44.8)	.41
After touching a common phone	136 (82.4)	193 (80.8)	329 (81.4)	.67
After touching a computer	134 (81.2)	191 (79.9)	325 (80.5)	.75
After coughing or sneezing	109 (66.1)	169 (70.7)	278 (68.8)	.32
After touching another person	94 (57.0)	127 (53.1)	221 (54.7)	.45
After using the bathroom	162 (98.2)	235 (98.3)	397 (98.3)	> .99
After touching dirty laundry	101 (61.2)	158 (66.1)	259 (64.1)	.31
After working	98 (59.4)	128 (53.6)	226 (55.9)	.25
Never	1 (0.6)	1 (0.4)	2 (0.5)	> .99
Near anyone in the last 2 weeks who had a fever, cough, trouble breathing, or appeared sick				.82
Yes	46 (27.9)	63 (26.4)	109 (27.0)	
No	76 (46.1)	107 (44.8)	183 (45.3)	
Unsure	43 (26.1)	69 (28.9)	112 (27.7)	
Spent time closer than 2 feet from anyone other than bunkmate or someone that sleeps nearby				.59
Yes	99 (60.4)	156 (65.3)	255 (63.3)	
No	51 (31.1)	64 (26.8)	115 (28.5)	
Unsure	14 (8.5)	19 (8.0)	33 (8.2)	

^aInformation on incarcerated person with inconclusive test result (n = 1) is not reported.

^bColumn percent.

^cInformation on cloth face covering use was not collected from incarcerated persons in Unit A, special housing unit, or laundry (n = 220). Fifteen incarcerated persons did not report hours per day that the cloth face covering was worn.

^dAll other behavior questions were only asked during mass testing in 3 housing units: Units B, C, and D (n = 404). The following questions had missing responses: times per day hands were washed (n = 6); spent time closer than 2 feet from anyone other than bunkmate or someone that sleeps nearby (n = 1).

exposed or expose others, facilities should consider retesting those who initially test negative for SARS-CoV-2 to interrupt transmission.¹⁷ This strategy

has been used to increase detection of SARS-CoV-2 infections in correctional and detention facilities¹⁶ and other congregate settings.^{3,15,18} Repeat viral

testing of previously negative incarcerated persons may be considered every 3 to 7 days until no new SARS-CoV-2 infections are detected for at least

14 days.^{17,19} In addition, continual testing on intake and quarantining those who test negative before release into the general incarcerated population is needed to prevent introduction of SARS-CoV-2 into the facility.⁷ Likewise, allowing individuals to go through a 14-day release quarantine and testing before release into the general public can help to prevent spread from the correctional facility to the general public.⁷

Only 23.6% of staff volunteered to be tested during the mass testing events described here. Anecdotal evidence provided by staff at the facility indicated that participation in testing may have been low because testing positive for SARS-CoV-2 would have excluded a staff member from work. This likely resulted in self-selection bias among staff. While prevalence among staff tested was low (2.3%), only 39.1% of staff who participated reported working in Facility A where the outbreak was detected. Staff working within correctional facilities are estimated to have the second-highest risk of occupational exposure to infection and disease in the country, preceded only by health care workers.²⁰ Had more Facility A staff participated in testing, particularly those with work duties that put them in closer proximity to incarcerated persons for longer periods of time, including staff working within housing and medical units, prevalence may have been higher.

Despite low prevalence among the limited number of staff tested, all staff who tested positive in this investigation worked inside correctional housing units (2 worked in multiple units). Thus, the risk of transmission within the facility and between the facility and the community through staff remains a concern. In this investigation, more than half of staff who participated and reported working in housing units responded that

they had worked in multiple housing units over the past 5 days. Facilities should consider designating staff to work in specific housing units to prevent transmission between units.⁷ In addition, prevention practices, including conducting daily temperature and symptom screenings, encouraging the proper use of and making readily available appropriate personal protective equipment,⁷ ensuring access to soap and encouraging frequent hand washing, providing disinfectants, and encouraging social distancing as work duties allow are needed to mitigate the spread of SARS-CoV-2 between the surrounding communities and correctional facilities. While some employers cannot legally mandate SARS-CoV-2 testing for staff, employers may encourage staff testing (beyond testing only close contacts) as part of a broad testing strategy if there is concern for widespread transmission, or to reduce the chance of a large outbreak, following identification of a confirmed case.¹⁷

Limitations

This investigation had several limitations. First, staggered testing among incarcerated persons in different housing units makes establishing an overall point prevalence difficult. Point prevalence within each housing unit is likely more accurate than the overall point prevalence within the facility. Second, because we did not test for SARS-CoV-2 antibodies, it is unknown if housing units that identified cases earlier and had a lower point prevalence during viral testing had previously experienced high rates of infection. Future investigations should include both viral and antibody tests to obtain a better understanding of how SARS-CoV-2 moves through congregate settings. Third, questionnaires

could not be distributed during testing in all housing units; thus, symptom data are missing for some incarcerated persons tested. This may have led to an over- or underestimate of asymptomatic cases.

Fourth, symptom status was not reevaluated following testing, which prevented us from distinguishing between asymptomatic or presymptomatic infection. Fifth, because testing was voluntary, selection bias likely occurred among staff who participated; this prevented us from assessing prevalence among all staff. Sixth, because the initial data were collected as part of a public health response, different testing modalities were utilized to obtain results as efficiently as possible. Current literature indicates the sensitivity and specificity of each test is thought to be relatively high²¹⁻²⁵; therefore, the different testing modalities were not thought to have had a significant effect on the results. Despite these limitations, lessons learned from this investigation can inform testing and infection prevention and control strategies in other dormitory-style correctional facilities and potentially other congregate settings, such as college dormitories and military barracks.

Public Health Implications

SARS-CoV-2 can spread rapidly after introduction into dormitory-style correctional facilities. In our investigation, housing units tested within 20 days of their first confirmed case had greater than 50% positivity and units tested within 12 days of their first case had the lowest average Ct values (25.3 and 26.5). In addition, the large proportion of asymptomatic cases identified in this investigation provides evidence for expanding testing beyond symptomatic individuals in this type of setting. After the identification of at least 1 COVID-19

case in a dormitory-style correctional facility housing unit, rapid implementation of mass testing of incarcerated persons and staff may identify additional cases and help interrupt transmission of SARS-CoV-2.

We also discuss infection prevention and control measures and other strategies that could slow SARS-CoV-2 transmission in this correctional facility and, more broadly, in other similar settings. Retesting of those who initially tested negative may be considered, and infection prevention and control measures should continue to be strictly enforced throughout the facility, regardless of whether there have been recent known cases in a housing unit, to interrupt transmission of SARS-CoV-2 in this setting.

The findings of this investigation can be used by correctional and detention facility officials, public health officials, and other key stakeholders to prepare for potential SARS-CoV-2 transmission and, if introduced, to prevent the spread of SARS-CoV-2 within correctional and detention facilities or other similar settings. *AJPH*

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CONTRIBUTORS

L. K. Tompkins and J. K. L. Gunn contributed equally to this article. L. K. Tompkins and J. K. L. Gunn conceptualized the study design, oversaw the data collection, and led data analysis and article drafts and revisions. D. A. Rose, L. Cooley, M. A. Honein, and K. Benson supervised all aspects of the study and article preparation. B. Cherney, J. E. Ham, R. Horth, and M. B. Crist contributed to the study design. B. Cherney, J. E. Ham, R. Horth, R. Rossetti, W. A. Bower, M. B. Crist, S. L. Mettee Zarecki, M. G. Dixon, A. E. Newton, N. Logan, A. J. Schuh, S. Trimble, H. Pfeiffer, A. E. James, N. Tian, J. R. Jacobs, F. Ruiz, K. McDonald, and M. Thompson assisted with data collection and drafting and revising the article. J. A. Dillaha, N. Patil, H. S. Matthews, and K. Garner served as local capacity subject matter experts (SMEs) and assisted with the study design, conceptualization of the article, and article revisions. L. M. Hagan, C. Dusseau, and T. Ross served as correctional facility SMEs, assisted in the conceptualization of the study, and contributed to article drafts and revisions. A. M. Starks, Z. Weiner, M. D. Bowen, B. Bankamp, and CDC's COVID-19 Surge Diagnostic Testing Laboratory served as laboratory SMEs and assisted in laboratory-related analysis and interpretation of laboratory data; A. M. Starks, Z. Weiner, M. D. Bowen, and B. Bankamp also contributed to article revisions. B. Cherney, R. Rossetti, and J. R. Jacobs also served as a laboratory SMEs.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

HUMAN PARTICIPANT PROTECTION

The investigation was reviewed by the CDC and was determined to be public health surveillance in accordance with US Department of Health and Human Services, Title 45 Code of Federal Regulations 46, Protection of Human Subjects.

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