Investigation of a COVID-19 Outbreak among Workers at a Horse Racetrack in California, USA, October 2020–January 2021.

This work was a collaboration of the City of Berkeley Public Health Officer Unit and the California Department of Public Health, Occupational Health Branch and Viral and Rickettsial Disease Laboratory.

Summary

A horse racetrack in Berkeley, California, experienced a coronavirus disease 2019 (COVID-19) outbreak among staff from October 25, 2020, to January 10, 2021, which was investigated by the City of Berkeley Public Health Officer Unit and California Department of Public Health (CDPH). Several rounds of mass real-time reverse transcription polymerase chain reaction (rRT-PCR) testing were performed for all staff who had not yet tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) during the outbreak up to that point. Whole genome sequencing (WGS) was performed on a convenience sample of staff who tested positive at different times and who worked and lived in different locations. Demographic and occupational information was collected from staff laboratory testing registration forms, employee rosters provided by employers, contact tracing interviews of infected staff, and a telephone survey of all staff regardless of infection status. During the outbreak, 62.3% (351/563) of racetrack staff had a positive rRT-PCR test result. WGS provided evidence that the outbreak resulted from workplace transmission. Unadjusted analyses showed that staff who tested SARS-CoV-2 positive during the outbreak had higher odds of working in the backstretch area of the racetrack where there was closer contact among staff (OR = 3.35, 95% CI = 2.22 – 5.07), living in employer-provided onsite housing (OR = 5.06, 95% CI = 3.42 – 7.57), and being Hispanic (OR = 5.31, 95% CI = 3.48–8.18). Our results suggest that employers and health and

safety professionals should pay particular attention to implementing effective prevention and control measures in workplaces with job tasks that bring employees into close contact with each other, offer employer-provided housing, and employ workers from demographic groups that have been demonstrated throughout the pandemic to be at higher risk for contracting COVID-19.

Background

Investigations of workplace COVID-19 outbreaks have identified occupational characteristics that increase the risk of SARS-CoV-2 transmission, such as densely populated work areas where social distancing cannot be practiced, exposure to infectious aerosols, and a lack of appropriate personal protective equipment (PPE) and infection control precautions (*1*). Employer-provided housing in some industries, such as agriculture, has also been implicated in facilitating SARS-CoV-2 transmission (*2, 3*). Underlying the above workplace and housing risks are structural, social, and economic inequities that likely contribute to increased COVID-19 incidence in certain worker populations (*4*).

Outbreak Scenario and Initial Response

In October 2020, a cluster of COVID-19 cases among staff at a horse racetrack in Berkeley, California, prompted the local health jurisdiction (LHJ), the City of Berkeley Public Health Officer Unit, to investigate a possible outbreak. Early contact tracing and testing revealed a high infection rate among tested staff, suggesting that transmission was already widespread and would not be contained with a focused testing and isolation approach. The LHJ declared that all staff were at high risk for exposure and mandated that they quarantine. Half of all staff members lived in employer-provided housing onsite at the racetrack, which consisted mostly of units containing around eight single-occupancy rooms each. Staff who lived onsite were provided hotel rooms to quarantine offsite. Staff who lived offsite quarantined at home. Quarantined staff deemed essential for care of the horses were permitted to return onsite for work but were required to wear an N95 filtering facepiece respirator. To facilitate the mass testing of employees for outbreak management and collect data to learn about workplace transmission risks, the LHJ invited the CDPH Occupational Health Branch (OHB) and Viral and Rickettsial Disease Laboratory (VRDL) to assist with the investigation.

Methods

SARS-CoV-2 test results were compiled from several sources. We collected rRT-PCR test results from initial LHJ testing and contact tracing efforts. During November 14—December 22, 2020, VRDL performed eight rounds of mass rRT-PCR testing of all staff who had not yet tested positive during the outbreak up to that round of testing; paired antigen tests were also collected for a separate study comparing these methods (*5*). After this timeframe, mass rRT-PCR testing of staff was performed by a private lab and reported to the LHJ. Since similarity in viral whole genome sequences derived from a group of infected individuals suggests that they are part of a common transmission event, WGS was performed on a convenience sample of staff who tested positive at different times and who worked and lived in different locations, to determine how similar their SARS-CoV-2 strains were. Demographic and occupational information was collected from staff laboratory testing registration forms, employee rosters provided by employers, contact tracing interviews of infected staff, and a telephone survey of all staff regardless of infection status. The telephone survey of all staff was offered in English and Spanish, and contact attempts were made for all staff. We performed statistical analyses using R version 4.0.1 (R Foundation for Statistical Computing, https://www.r-project.org).

Results

Contact tracers surveyed 67.5% (237/351) of SARS-CoV-2 positive staff members. Telephone surveys were completed by 43.3% (244/563) of all staff, 130 of whom had a positive SARS-CoV-2 test.

Staff were mostly male (76.4%) and Hispanic (72.6%) with a mean age of 47 years. During the outbreak, 62.3% (351/563) of racetrack staff had a positive rRT-PCR test result (Table 1). The outbreak spanned from October 25, 2020, to January 10, 2021, as tracked by date of positive test collection, or reported date of first symptom onset if earlier (Figure 1). Spikes in positive test results occurred on the dates of the first three mass testing events (November 14–15, November 25–28, December 4). During the outbreak, six SARS-CoV-2 positive staff were hospitalized, one of whom died. WGS results showed that 98% (81/83) of sequenced samples were closely related, providing evidence that transmission occurred at the workplace.

Staff reported at least ten different employment arrangements (Table 2). Staff most commonly reported being employees of trainers (61.6%); self-employed independent contractors, which includes trainers (12.8%); or employees of the racetrack (10.1%). At least twenty job titles were reported, which we broadly characterized into two groups given perceived risk of close contact (being within six feet for at least 15 minutes total throughout the day) with other staff based on staff descriptions of job tasks and our observations during a site visit. The "backstretch" group included job titles that require staff to be in an area of the racetrack called the backstretch where direct care for the horses potentially brings staff into close contact with each other. The "non-backstretch" group included job titles that do not require staff to be in the backstretch area of the racetrack and therefore were considered at lower risk of close contact with other staff. Among staff that reported job title, 66% were in the backstretch group (Table 1).

Univariable analyses showed that staff who tested SARS-CoV-2 positive during the outbreak were younger (-5.29 years, 95% CI = -2.71–-7.86) and had higher odds of being male (OR = 1.51, 95% CI = 0.99–2.28), Hispanic (OR = 5.31, 95% CI = 3.48–8.18), working in the backstretch (OR = 3.35, 95% CI = 2.22–5.07), and living onsite (OR = 5.06, 95% CI = 3.42–7.57).

Discussion

This investigation revealed several characteristics of the workplace and staff that may have contributed to the magnitude of the outbreak. One relevant workplace characteristic may have been the number of different employers at the racetrack. This multi-employer arrangement complicated early efforts by the LHJ to identify and manage the outbreak since many different employers had to be contacted to provide their employee rosters. Also, some self-employed independent contractors, like trainers, each had only a few employees, which may have contributed to a lack of knowledge about occupational health best practices, possibly resulting in inadequate training on COVID-19 prevention provided to their employees.

Hispanic ethnicity was the variable most strongly associated with SARS-CoV-2 positivity. Hispanic ethnicity, especially in this workforce with many Latin American immigrants, may be associated with several downstream risk factors for SARS-CoV-2 infection, including lower socioeconomic status, lower levels of formal education, and barriers to accessing resources like testing *(6,7)*. The effect of Hispanic ethnicity on SARS-CoV-2 positivity may also be mediated through several factors related to the workplace, such as living location and job type, both of which were also associated with increased odds of SARS-CoV-2 positivity.

Whole genome sequencing provided evidence that this outbreak occurred through transmission between racetrack staff, rather than multiple contemporaneous independent community transmission events. This outbreak strain was also sufficiently distinct from community strains to suggest that it was not seeded into the wider community. Although the large spike in detected cases from the first round of mass testing indicates that the outbreak may have been too widespread to stop transmission among the racetrack staff at the time of public health intervention, mandated isolation and quarantine may have contributed to preventing transmission into the surrounding community.

The results of this investigation were subject to several limitations. First, not every staff member completed the contact tracing or telephone surveys so we do not have complete demographic and occupational information, and those willing to participate may not be representative of the entire staff. Second, since such a high percentage of this population tested positive and half also lived onsite, it was difficult to determine which occupational characteristics increased risk of SARS-CoV-2 transmission. Third, our categorization of job tasks as backstretch or non-backstretch was based mostly on staff descriptions of their job duties, so it is possible that the risk of close contact between staff in some job tasks was not accurately classified.

This workplace outbreak provides further evidence that workplace conditions can create a high-risk setting for SARS-CoV-2 transmission. Our results suggest that employers and health and safety professionals should pay particular attention to implementing effective prevention and control measures in workplaces with job tasks that bring employees into close contact with each other, offer employer-provided housing, and employ workers from demographic groups that have been demonstrated throughout the pandemic to be at higher risk for contracting COVID-19. Workplace infection prevention measures that could be considered include implementing a respiratory protection program and mandating the use of appropriate respirators for workers in close contact with one another, improving ventilation in onsite congregate living facilities, routine staff SARS-CoV-2 testing and isolation and quarantine protocols, and facilitation of SARS-CoV-2 vaccination of all eligible staff (an intervention that was not feasible at the time of this outbreak due to the recency of the rollout of SARS-CoV-2 vaccines).

Figure 1. Epidemic curve of sample collection date of positive SARS-CoV-2 tests connected with the COVID-19 outbreak at a racetrack in Berkeley, California, October 2020—January 2021.

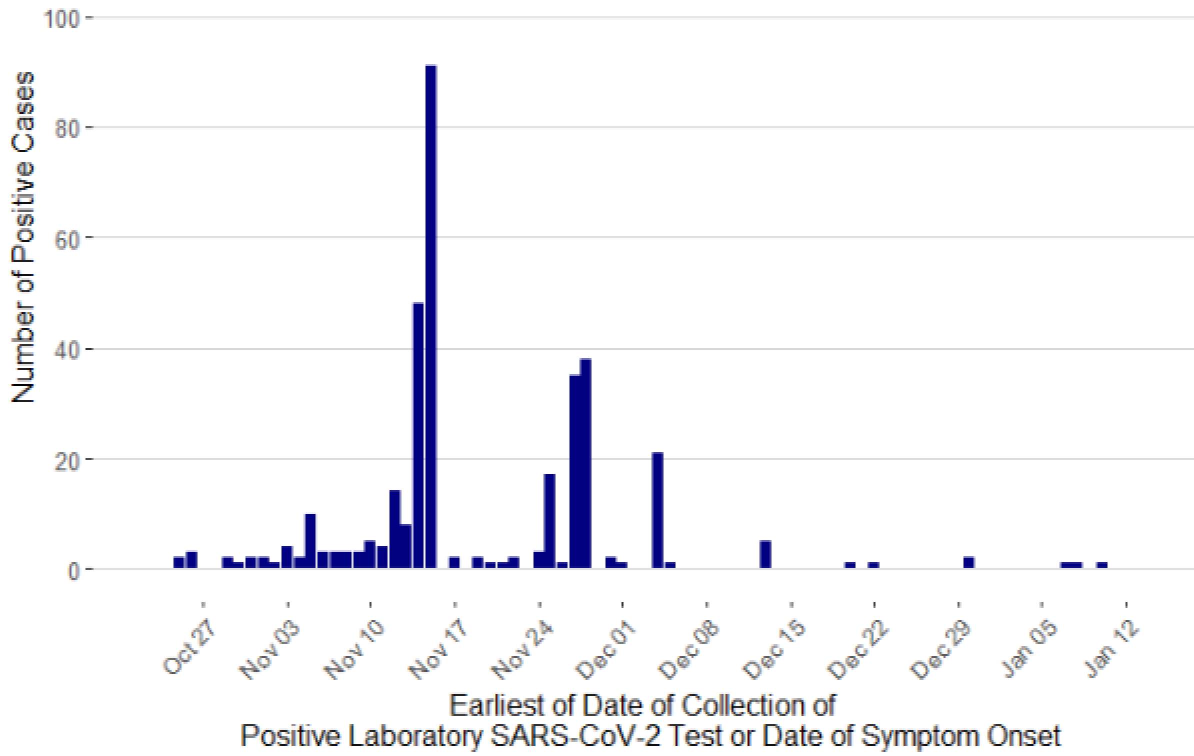

Table 1. Comparison of staff members with positive SARS-CoV-2 rRT-PCR test results to staff without a positive result during the outbreak.

Category	Total n = 563	SARS-CoV-2 Positive n = 351	SARS-CoV-2 Negative n = 212	Test of association
Age	n = 558	n = 351	n = 207	
Mean [SD]	47.0 [14.9]	45.0 [14.3]	50.3 [15.3]	⁺Difference of means = -5.29 (95% CI = -7.86 –-2.71) ($p < 0.001$)
17-24	37 (6.6%)	28 (8.0%)	9 (4.4%)	
25-44	214 (38.4%)	150 (42.7%)	64 (30.9%)	
45-64	246 (44.2%)	148 (42.2%)	98 (47.3%)	
>= 65	61 (10.8%)	25 (7.1%)	36 (17.4%)	
Sex	n = 559	n = 351	n = 208	
Male (ref.)	427 (76.4%)	278 (79.2%)	149 (71.6%)	€ OR = 1.51 (95% CI = 0.99 – 2.28) ($p = 0.0501$)
Female	132 (23.6%)	73 (20.8%)	59 (28.4%)	
Ethnicity	n = 544	n = 338	n = 206	
Hispanic (ref.)	395 (72.6%)	288 (85.2%)	107 (51.9%)	€ OR = 5.31 (95% CI = 3.48 – 8.18) ($p < 0.001$)
*Non-Hispanic	149 (27.4%)	50 (14.8%)	99 (48.1%)	
Work type	n = 484	n = 292	n = 192	

Category	Total n = 563	SARS-CoV-2 Positive n = 351	SARS-CoV-2 Negative n = 212	Test of association
Backstretch^ (ref).	321 (66.3%)	225 (77.1%)	96 (50.0%)	€ OR = 3.35 (95% CI = 2.22 – 5.07) (p<0.001)
Non-backstretch	163 (33.7%)	67 (22.9%)	96 (50.0%)	
Living location	n = 556	n = 349	n = 207	
Onsite (ref.)	278 (50.0%)	224 (64.2%)	54 (26.1%)	€ OR = 5.06 (95% CI = 3.42 – 7.57) (p <0.001)
Offsite	278 (50.0%)	125 (35.8%)	153 (73.9%)	

^ "Backstretch" includes job titles with duties in the backstretch area that were more likely to involve close contact with co-workers.

+ Unpaired t-test.

€ Fisher's exact test

**All racial groups could not be presented due to small cell sizes, so only ethnicity is presented. 114/149 (76.5%) of non-Hispanic staff reported their race as non-Hispanic White. Other non-Hispanic responses included the following: American Indian/Alaskan Native, Asian, Black/African American, non-Hispanic multiracial, and other.*

Table 2. Staff employer or employer arrangement.

Employer	Total n (%)
Trainer	347 (61.6%)
Self-employed	72 (12.8%)
Racetrack	57 (10.1%)
Multiple employers	25 (4.4%)
Other	19 (3.4%)
Cafe	5 (.9%)
California Horse Racing Board	4 (0.7%)
Volunteer	4 (0.7%)
California Thoroughbred Trainers	3 (0.5%)
Unknown	27 (4.8%)
Total	563

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