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Abstract

Aim: Infection prevention and control (IPC) within residential settings is a central focus of the coronavirus disease 2019 (COVID-19) pandemic. Youth residential summer camps are an excellent model for such environments and have thus far had mixed results. The aim of this report is to describe the successful implementation of a seven-week overnight summer camp with rapid return to normal activities from June to August 2020.

Subjects and Methods: This retrospective study includes 427 individuals who traveled from 24 US States. All staff and campers were tested by serial nasopharyngeal PCR tests in the context of strict infection prevention and control (IPC) measures including cohorts and masking. The entire camp population was isolated from non-camp personnel with special measures for food, supply, and mail delivery.

Results: During the two-week staff session, one staff member tested positive for SARS-CoV-2, was isolated, and sent safely off premises. All other campers and staff had three negative PCR tests: 1-8 days before arrival, upon arrival, and 5-6 days after arrival. After these three negative tests, 6 days into camp, most IPCs, including masking, were successfully lifted and a normal camp experience was possible.

Conclusions: These findings indicate that serial PCR-based testing and strict adherence to IPC measures among cohorts can allow for successful assumption of near normal group activities in a residential setting during the COVID-19 pandemic. This result at an overnight summer camp has broad implications for similar residential communities such as boarding schools, other youth education and development

Background

Individuals in residential environments and congregate settings are historically at increased risk for acquisition and transmission of infectious diseases compared to the average population¹.

The emergence of SARS-CoV-2, the agent causing coronavirus disease 2019 (COVID-19), has dramatically increased the challenges facing residential communities². In individuals who become infected with SARS-CoV-2, the median onset of symptoms occurs 5.1 days after infection³.

Mitigation and prevention strategies have focused on social distancing and cessation of large group activities which have led to decreased youth socialization; this decrease in activities has a negative impact on youth development⁴.

Absence of proper mitigation strategies can lead to the spread of COVID-19. A residential summer camp in Georgia revealed a COVID-19 infection attack rate of 44% with as many as 76% of the individuals in attendance (346 campers and 251 staff) testing positive for SARS-CoV-2⁵.

Highlighting the question:
Can effective infection prevention and control (IPC) measures could minimize, and eventually eliminate the spread of the SARS-CoV-2 virus at an overnight camp with a return of normal activities?

Methods

Quarantine Period:

All staff arrived at least two weeks prior to the start of camp to establish a COVID free "bubble" prior to campers arriving. All methods listed below occurred in two separate waves: staff and campers.

Testing:

A negative SARS-CoV-2 PCR test was required within 7 days of arrival to camp
All staff and campers were tested upon arrival to camp.
All staff and campers were tested 5 days after their arrival to camp.

Infection Control:

Daily symptom and temperature screening were performed for all members of the camp.
Hand washing, masking, social distancing, and disinfection were implemented according to New Hampshire state guidelines for reopening summer camps.

Cohorting:

Staff Cohorts were based on mutual exposure prior to arrival and the geographical area from which individuals were traveling.

Camper Cohorts were established upon arrival to camp. Cohorts were based primarily on age, further stratified by geographical area of travel, and mutual exposure prior to arrival.

All cohorts groups contained 10 individuals or less.

This report was conducted after exempt approval by the Johns Hopkins Institutional Review Board (IRB00261707).

Results

Demographics:

There were a total of 427 individuals at camp, 126 were staff with the median age at 21 years (IQR 18-26 years). Staff traveled from 24 states to reach Camp Robin Hood in Freedom, New Hampshire. Camper origins followed a similar pattern with arrivals from 18 states, and Washington, D.C. (Figure 2).



Figure 2. Map of campers' departure locations to camp. Campers traveled from 18 states and Washington DC to reach Camp Robin Hood.

Staff Arrival & Testing:

One staff member tested positive in pre-arrival testing. This staff member self-isolated at home and did not travel to camp.

One staff member (1/126, 0.8%) tested positive for SARS-CoV-2 when 'on arrival' PCR test was performed. This staff member was isolated and sent off premises within 24 hours.

Risk assessments were performed for individuals exposed to this staff member. Those identified as medium-high risk were quarantined and re-entered the cohort when their day 5 test came back negative.

Camper Arrival & Testing:

All campers tested negative in the pre-arrival testing. The same sequential testing was performed on campers as for staff. All campers tested negative for their 'on arrival' testing and their 'Day 5' camp PCR test (Figure 3).

Testing Surveillance:

During the seven-week camp program four individuals were tested for COVID-19 suspicion apart from routine surveillance. All tests were negative.

Lifting IPC Protocols:

Through close communication with the state of New Hampshire, camp physicians obtained confirmation that IPC protocols including cohorting and masking could be lifted after all staff and campers had tested negative on Day 6. Within six days of camper arrival, cohorts were freely mixed and masks were removed (Figure 3).

Discussion

Conclusion:

The ability to return to essentially normal activities after six days at camp during the COVID-19 pandemic demonstrated the efficacy of IPC measures and serial PCR testing on the rate of SARS-CoV-2 infection and transmission.

This experience is concordant with previous data showing that frequent testing allows for timely identification of positive SARS-CoV-2 cases^{6, 7, 8}, demonstrating that carefully planned interval testing among cohorts can allow for successful resumption of near normal group activities.

Limitations:

Camp Robin Hood has its own campus that could be effectively isolated from "outside" contact, minimizing risk of outside exposure

Prevention and infection control measures were implemented by the camp, which might not be feasible in all residential situations depending on the organization's financial status and available workforce.

Future Directions:

The results of this report may be applicable to the safe functioning of other residential settings, including universities, boarding schools, nursing homes, long term care facilities and military installations.

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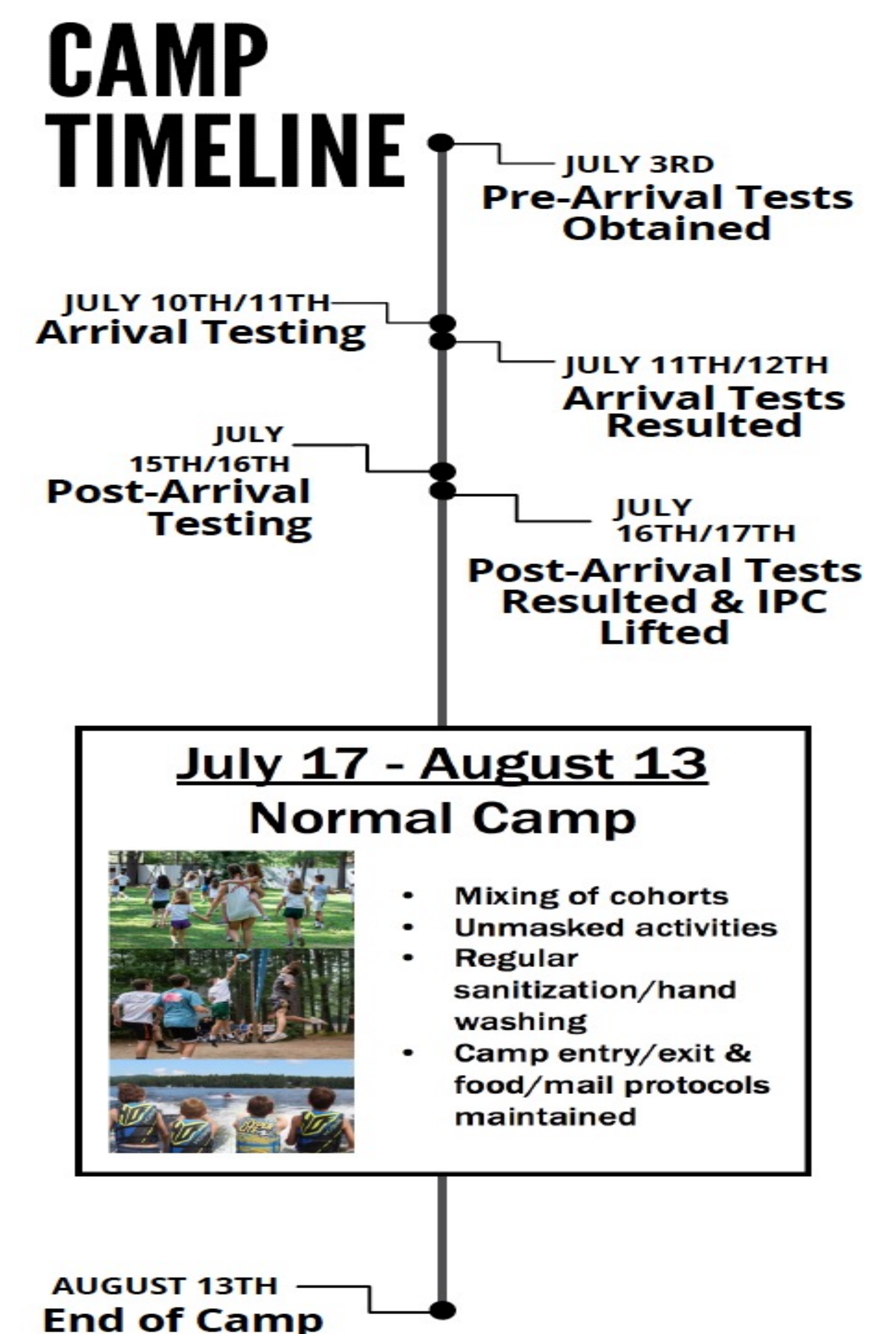


Figure 3: Timeline for camp testing, lifting of IPC protocols and resumption of normal camp activities.

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