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The "Bubble": What Can Be Learned from the National Basketball Association (NBA)'s 2019–20 Season Restart in Orlando during the COVID-19 Pandemic

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Background: The National Basketball Association (NBA) suspended operations in response to the COVID-19 pandemic in March 2020. To safely complete the 2019–20 season, the NBA created a closed campus in Orlando, Florida, known as the NBA "Bubble." More than 5000 individuals lived, worked, and played basketball at a time of high local prevalence of SARS-CoV-2.

Methods: Stringent protocols governed campus life to protect NBA and support personnel from contracting COVID-19. Participants quarantined before departure and upon arrival. Medical and social protocols required that participants remain on campus, test regularly, physically distance, mask, use hand hygiene, and more. Cleaning, disinfection, and air filtration was enhanced. Campus residents were screened daily and confirmed cases of COVID-19 were investigated.

Results: In the Bubble population, 148 043 COVID-19 reverse transcriptase PCR (RT-PCR) tests were performed across approximately 5000 individuals; Orlando had a 4% to 15% test positivity rate in this timeframe. There were 44 COVID-19 cases diagnosed either among persons during arrival quarantine or in non-team personnel while working on campus after testing but before receipt of a positive result. No cases of COVID-19 were identified among NBA players or NBA team staff living in the Bubble once cleared from quarantine.

Conclusions: Drivers of success included the requirement for players and team staff to reside and remain on campus, well-trained compliance monitors, unified communication, layers of protection between teams and the outside, activation of high-quality laboratory diagnostics, and available mental health services. An emphasis on data management, evidence-based decision-making, and the willingness to evolve protocols were instrumental to successful operations. These lessons hold broad applicability for future pandemic preparedness efforts.

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IMPACT STATEMENT

The resumption of the NBA season in June 2020 was the first successful attempt at a large-scale, sustained "Bubble" environment, instituting infection control measures specific to the sports setting early in COVID-19. The methods and protocols that led to the success of the Bubble have not yet been published in detail; the NBA's response provides successful strategies to incorporate into future pandemic management.

BACKGROUND

The National Basketball Association (NBA) was the first US professional sports league to suspend operations in response to the COVID-19 pandemic in March 2020 (1-3). The NBA resumed the 2019–20 season in July 2020 at the Walt Disney World resort in Orlando, Florida, a location offering the opportunity to create a closed campus environment. As NBA personnel arrived on campus, Orlando reached a national high in COVID-19 cases and a 15% test positivity rate (4). In establishing the NBA Orlando campus "Bubble," the NBA, in partnership with the National Basketball Players Association (NBPA), implemented protocols governing campus life, including pre-arrival limitations on activity and COVID-19 testing, followed by an arrival guarantine period on campus, daily PCR testing, indoor masking, physical distancing, enhanced cleaning and disinfection procedures, and enhancement of building ventilation. Although based on known principles to prevent the transmission of respiratory viruses (5–11), this was an unproven approach not previously attempted at this scale. The first NBA personnel arrived in Orlando on June 24, 2020; the 2020 NBA season concluded on October 11, 2020.

We share here key lessons learned and elements that contributed to the success of the NBA Bubble.

MATERIALS AND METHODS

NBA Bubble: People and Protocols

The NBA and NBPA published "Health and Safety Protocols for the Resumption of the 2019–20 Season" and related COVID-19 testing policies (together the "Protocols") in May and June 2020 based on then-current knowledge of COVID-19 diagnoses and prevention. Protocols were continuously evaluated and revised as understanding of COVID-19 evolved. The closed campus environment was established on principles of safety and minimizing exposure to SARS-CoV-2 on a non-contiguous campus that included 3 hotels, 3 basketball arenas, and other supporting facilities. The integrity of the campus and its protocols were augmented by security-monitored borders, restricted access, and surveillance to decrease risk of SARS-CoV-2 introduction into the controlled environment. Team traveling parties, including players and staff, were restricted to 36 individuals and expanded to 41 individuals over the course of the NBA Playoffs. Only essential NBA league staff, media members, and vendors were permitted.

Pre-arrival strategies. Several steps were taken prior to campus arrival to reduce the risk of SARS-CoV-2 introduction into the Bubble. These included a required testing period, quarantine, and activity restrictions in teams' home cities (e.g., no group workouts), as well as masking and ventilation requirements at training and game

facilities. Beginning June 12, individual player workouts and treatments resumed in team gyms and other facilities. Symptom screening and temperature checks were mandatory before entering the facility; adherence to physical distancing and hand and respiratory hygiene was enforced. Training was limited to a "one player, one basket" rule with minimum distance of 12 feet between players and maximum 2 coaches wearing facemasks. Players and essential staff were required to attend virtual educational sessions focused on strategies to minimize risk of exposure to SARS-CoV-2. Team personnel traveling to Orlando were required to begin every-other-day COVID-19 testing (reverse transcriptase PCR [RT-PCR]) between June 23 and July 1.

Arrival strategies. All members of the team traveling party were required to participate in a quarantine in their team home city for at least 3 days, meaning no travel or activities beyond the team facility, and continue every-other-day RT-PCR testing; group activities remained prohibited. Teams departed for the Bubble July 7–9, with staggered arrivals to minimize exposure during intake. Daily testing was implemented 2 days before departure, and individuals were required to meet travel criteria, including negative RT-PCR test, no symptoms, and no known exposure. Travel protocols required facemasks, physical distancing, and proper hand hygiene. Upon arrival, players and team staff were guarantined in individual hotel rooms until the results of 2 RT-PCR tests collected 24 h apart were negative. People who traveled individually (NBA league staff, media members, select vendors, and players and team staff who could not travel with the team) were required to quarantine at home and provide a documented negative RT-PCR test 72 h before departure. Upon arrival in Orlando, all non-team personnel were guarantined for 7 days and completed daily RT-PCR testing. Afterward, the relatively few participants who left campus were only approved for reentry if their

reason for leaving met certain criteria alongside reentry quarantine and testing. Only local Resort staff and approved staff such as transportation, mail service vendors, and testing staff, were allowed to leave campus, arriving back only at security-designated check points with appropriate credentials and symptom and temperature screening plus masking at all times while on campus.

Medical care. A self-contained medical infrastructure was deployed on campus to provide healthcare while limiting the need to leave campus for medical evaluation and care. Campus medical resources included a 7-bed on-site urgent care clinic, imaging modalities (mobile 1.5 Tesla MRI, mobile 128-slice computerized tomography scanner), a dental van for basic treatments, 10 physicians specializing in orthopedic surgery and sports medicine, emergency medicine, family medicine, internal medicine, physical medicine and rehabilitation, and a clinical psychologist.

Medical care beyond these capabilities was provided off-campus through a "Clean Corridor" process, which focused on the use of personal protective equipment (PPE), private entry and exit routes, disinfection procedures for waiting areas and treatment rooms, minimal contact with others, and expedited access to the medical provider.

Medical and social protocols. Campus residents were required to adhere to the "On-Campus Medical Protocols," a set of guidelines based on core principles (Table 1).

Facemasks were mandated with limited exceptions including while on-court, outdoor exercise, and active eating or drinking. As data regarding the effectiveness of different types of facemasks emerged, rules were refined to prohibit less effective face coverings. Additionally, approved facemasks were provided to campus residents and available at high-traffic locations around campus.

Table 1. Core principles of on-campus medicalprotocols.

- 1. Quarantine in-room upon arrival and as directed by the NBA
- 2. Stay on campus for the duration of your participation
- Participate in daily coronavirus testing, with any positive test resulting in isolation, contact tracing, clinical care, and further tests adjudicated by infectious disease experts and epidemiologists
- 4. Engage in strict physical distancing and use of face coverings
- 5. Follow strict hand and respiratory hygiene
- 6. Reduce use of shared objects and obey venue access restrictions
- 7. Follow rigorous cleaning and disinfecting procedures
- 8. Adhere to the required medical program, which includes daily temperature checks, symptom screening, pulse oximetry, proximity alarm (for all non-players), use of Oura wearable device (optional), and voluntarily participating in a daily wellness assessment survey derived by body temperature, respiratory assessment, and heart rate

Physical distancing was required and closely monitored with enforcement from proximity devices, visual cues, and signage placed throughout the campus. Furniture was rearranged to reflect distances of 6 feet or more. Most residents wore small wearable devices that measured contact distance and time and sent audible and visual warnings to wearers when person-to-person distance was less than 6 feet.

Individuals on campus were encouraged to eat and/or socialize outdoors. Indoor eating areas were designed for 6 feet between each seat, with arrangements regularly corrected by staff to reduce close proximity. Teams were assigned a restricted meal room with set seating and a dedicated culinary team that had restricted contact with residents.

Hand and respiratory hygiene were reinforced with hand sanitizing stations, personal hand sanitizers, and signs placed throughout all facilities reminding everyone to clean hands often and cover their coughs and sneezes. Enhanced facility cleaning and disinfection protocols were implemented under the direction of certified industrial hygienists. Protocols governed player and staff social activities and amenities that enforced face masks and physical distancing, in conjunction with rigorous hygiene, cleaning, and disinfecting standards. Outdoor activities such as golf, swimming, fishing, and bike riding were strongly encouraged. Grooming and wellness services adhered to defined protocols. The NBA established processes for the disinfecting of high-touch surfaces, counters, stations, chairs, tools, equipment, linens, and activity items such as cards, ping-pong paddles and balls, and video game controllers.

These strategies were in place throughout the duration of the Bubble (July 1 to October 11, 2020). Upon elimination from competition, each team left the campus within 24 h of their final game to minimize personnel in the Bubble.

Training facilities and ventilation. The NBA built 8 training facilities on campus with courts and gym equipment. Facilities and equipment were disinfected between each team's use. Each individual sleeping room had a dedicated outside air system, fan coil unit, and bathroom exhaust fan so that air could not recirculate between rooms, and air filters at each arena were replaced before each game. In basketball-related facilities, the circulating outside air flow was maximized with one complete turnover offresh air before games and practices, as well as the use of outside air dampers, with oversight from an industrial hygienist. The facilities were also set up to employ vacuums with high efficiency particulate air filtration as part of regular cleaning practices.

Test and symptom surveillance and response protocols. Campus residents were required to screen daily and report symptoms, temperature, and oxygen saturation. For players, team staff and referees, RT-PCR testing was performed daily using multiple platforms, primarily Roche cobas SARS-CoV-2, with a retest procedure developed using Roche cobas SARS-CoV-2, Hologic Panther Fusion SARS-CoV-2, and Cepheid GeneXpert Xpress (used sparingly given limited availability of

test kits). Individual samples were collected as combined nasal and oropharyngeal swabs across multiple locations on campus. Each group (players, team staff, league staff, vendors, and player guests) was assigned a specific timeframe and location at which to report for testing to limit exposure between groups during swabbing. During sample collection, individuals were required to maintain social distancing (6 feet or more) from each other and only removed their masks when instructed by testing personnel. The samples were then packaged for further processing and nucleic acid extraction at off-site laboratories. Based on the assay instructions for use, an amount was taken for the primary test and the remainder was saved for retesting if needed. Transportation and other logistics were optimized to promote turnaround times of return of results to be typically within 12 h of sample collection. Serology testing for antiviral IgG antibodies against the SARS-CoV-2 nucleocapsid protein was conducted pre-arrival to the campus using Abbott ARCHITECT and Ortho-Clinical Diagnostics Vitros or while on-campus using Roche Elecsys to understand immune history and any previous infections that may have been initially undetected. Repeat testing of anyone who tested positive while asymptomatic used combinations of test types to rule out false-positive results and avoid unnecessary isolation and missed games. Team personnel and external vendors living off campus followed a similarly robust testing schedule. External vendors likely to have close contact with NBA players or personnel, such as bus drivers, were also required to test on the day before and of their shift. Results of daily testing were reported within 24 h to the central leadership team and team compliance officers, as well as to the individuals themselves.

Resort employees could not be required to test due to workplace rules but were incentivized with gift cards to test voluntarily. Personnel engaged in facility operations also followed behavioral protocols and strict distancing requirements. Weekly analyses of testing results were undertaken to track COVID-19 incidence and program effectiveness across the Bubble population.

When a suspected case was identified, such as among a member of the housekeeping or food services staff, a contact tracing team assessed possible COVID-19 exposures and close contacts. Contact tracing activities included a case investigation, infectious disease consultation, and close contact notification and quarantine management. The case investigation consisted of: (a) a structured interview with the infected individual to identify their activities and contacts within a 48-h lookback period; (b) review of available wearable proximity data and surveillance videos; (c) walkthroughs of physical spaces to assess sizing and spacing; and, in limited cases, (d) environmental sampling of contact surfaces (e.g., vehicles, tabletops, door handles). Case investigations were presented to infectious disease consultants to advise on quarantine decisions and/or testing strategies such as whether retesting was required, appropriate time points, and frequency of retesting, and when release from isolation was possible. Close contacts were notified of potential exposure and provided with quarantine, testing, and symptom monitoring instructions until they were cleared to rejoin the campus, e.g., after consecutively testing negative for a sufficient time post-exposure as determined by an infectious disease physician.

Campus access. Campus access control was carefully governed and monitored. Campus residents were provided credentials granting access to certain locations, based upon their role and the degree of quarantine and testing they were required to complete. Access and movement were managed by trained campus health monitors based on an integrated digital framework leveraging scannable bracelets, wearable devices, testing results, and daily symptom reporting. Campus health monitors were stationed at each point of entry to ensure scanned credentials allowed

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appropriate access both from a policy (role) and health perspective. Individuals were not permitted in hotel rooms beyond their own. Resort staff were restricted to specific properties and hotel floors. Housekeeping staff were always required to wear appropriate PPE, did not come in close contact with residents, and serviced rooms no more than once per week except for special requests.

COVID-19 statistics in Orange County, Orlando, and Florida were monitored in consultation with the Orange County Health Department and the Florida Department of Health. In collaboration with the Orange County Health Department, the National Urban League, UnidosUS, and testing companies (Quest, BioReference [BRL] Labs, Cue, and Vault), the NBA provided free RT-PCR COVID-19 testing for thousands of the Orlando population as well as in other NBA team home cities.

RESULTS

Testing and Surveillance

Beginning on June 24, 2020 through the closure of the Bubble on October 16, 2020, 148 043 COVID-19 RT-PCR tests were performed across approximately 5000 total players, guests, team staff, league staff, media, and vendors. Of these, 81% were performed on "residents" of the Bubble those staying in on-campus hotels, requiring quarantine before entry, and daily testing once onsite—and the remaining 19% were tests administered to staff and vendors living off campus (excluding Resort employees) or for pre-arrival screening prior to travel to Orlando. In addition, more than 27 000 tests were performed on Resort employees through the voluntary test program.

Among players, team staff, vendors, League staff, and player guests who worked or resided on campus, there were 20 confirmed positive cases detected prior to their entry into the Bubble. The average daily positivity rate among those arriving to the campus after travel or local residents accessing the campus for work (e.g., vendors) was consistently below 1%, excluding Resort employees monitored separately. This positivity rate includes unconfirmed ("false") positives, defined as a positive test followed by 2 consecutive negative tests, and tests detecting viral shedding or "COVID-19 persistent positives," which was defined as individuals who recently recovered from a COVID-19 infection based on clinical assessment, patient reports, and taking into account COVID history and symptoms or lack thereof, but still tested positive post-recovery on sensitive RT-PCR tests with very low viral loads (also termed viral shedding). Observational data on these individuals was published, as this was the first welldescribed cohort shown to be previously infected with COVID-19, recovered, asymptomatic, and intermittently testing positive (viral shedding) post-recovery (12).

During the 4-month period of the Bubble's operation, the COVID-19 positivity rate in the outlying Orlando community ranged from 4% to 15% (4). Among the non-Resort staff, there were 44 COVID-19 cases diagnosed among persons during either arrival quarantine or while actively working on campus when positive for 1 day, after collection of a positive test, but prior to receipt of the positive result the next day. No cases of COVID-19 were identified among NBA players or NBA team staff living in the Bubble once cleared from guarantine (Table 2). Among the 44 cases, 20 cases were detected while individuals were in guarantine prior to entering campus, and 24 were vendors and other nonteam staff actively working on campus for up to 1 day while positive before their test result was returned (24-h turnaround time on RT-PCR). There were an additional 36 individuals who tested positive and were determined to be persistent positives (individuals who had recently recovered from a COVID-19 infection) (12).

In addition to these positive cases among individuals in the NBA protocols, there were many

| Table 2. Positive cases detected during theNBA bubble. | | | |
|---|---|--|---|
| Role | Detected prior to entry (e.g., in quarantine) | Detected during period working in bubble ^a | Persistent positives (e.g., post-infection viral shedding) ^b |
| Players | 2 | 0 | 28 |
| Team staff | 2 | 0 | 1 |
| Vendors ^c , league staff, and player guests | 16 | 24 | 7 |
| Total | 20 | 24 | 36 |

subjected to NBA mandatory testing protocols and positive test results for these employees were based on a voluntary testing program. ^b"Persistent positive" individuals were those who were previously infected with SARS-CoV-2, had recovered clinically and were

infected with SARS-CoV-2, had recovered clinically and were asymptomatic, but continued to intermittently test positive on a Roche Cobas RT-PCR test with a high cycle threshold (above the limit of detection) (12).

^cRefers to individuals who are not affiliated with NBA teams but rather staff or vendors providing services to support operations of the Bubble (e.g., broadcast personnel, health providers, transportation).

Resort employees actively working in the Bubble while residing locally. Because testing was not mandatory for Resort employees, not all cases may have been detected. Within the voluntary Resort employee testing program, 35 Resort workers were diagnosed with COVID-19, and in all cases these individuals had been working on campus while positive for 1 or more days (albeit it while wearing a mask and engaging in the other required campus protocols).

DISCUSSION

This first-of-its-kind experience in professional sports was remarkably successful in that there were no COVID-19 infections among NBA players and team staff over a 4-month period

in the Bubble at a time when infected persons were entering campus daily and infection rates were as high as 15% in the local community (4). This tightly controlled environment with robust infection prevention protocols allowed for the completion of 205 basketball games and the end of the 2019-2020 NBA season (13). While resource-intensive, our experience demonstrated the effectiveness of establishing protocols that were rigorously followed and effectively communicated and governed, that followed proven prevention measures such as masking, distancing, hygiene, and ventilation, and strategically used testing, isolation, and contact tracing to mitigate spread of infection once cases were identified. The NBA and the NBPA are well-resourced organizations that are fortunate to have the capacity to have enacted this program, but we believe that the principles we followed can be applied in settings where financial and occupational health resources are more limited.

Several characteristics of the Bubble accounted for its success, noting that these worked together as a comprehensive system, representing current knowledge at the time, and the contribution to success of each component cannot be measured individually. First, bearing in mind that basketball players compete indoors and in close proximity unmasked, players and team staff were required to reside on campus for the duration of the Bubble, in order to establish a protected Bubble in the setting of a highly contagious respiratory virus. Pre-arrival screening prior to travel to Orlando, alongside mandatory quarantine on campus to rule out new COVID-19 cases, were key in keeping the Bubble safe. Frequent testing, along with rigorous enforcement of safety protocols when not playing basketball, allowed players to participate safely in an unmasked, close contact sport. RT-PCR tests were used as the primary testing mechanism because, at the time, they were the gold standard approach being used by public

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health agencies in the United States, were recommended by expert advisors during the design of the Bubble, and were substantially more sensitive in internal assessments conducted by scientific advisors for the NBA.

Second, the Bubble had a well-defined community of 40 on-the-ground, trained compliance officers who promoted and enforced adherence to protocols and monitored compliance among their respective groups. Their responsibilities included active screening for symptoms, enforcement of rules, observing protocol implementation, arranging facilities, and creating an overall culture of safety and protocol adherence. The most important aspect of their work was to engender the trust of the persons in the Bubble by explaining the importance of the established rules. This compliance team received feedback from the campus population and relayed that to leadership, who made protocol modifications when appropriate-a critical practice in overall success.

Third, there was a unified networked approach to communications throughout the ecosystem. While some protocols were not popular, there was unified leadership and messaging about their importance. Key opinion leaders, namely the NBA Commissioner and the President and Executive Director of the NBA Players Association, messaged together the rules and the reasons behind them. NBA staff and team compliance officers echoed and reinforced these messages on the ground to all participants, from players to staff to scheduled workers, with continuous education through written documents, videos, virtual presentations, text messages, and app alerts. Participation in the Bubble was voluntary, and individual buy-in to assist with protocol adherence kept colleagues accountable.

Fourth, the Bubble was designed with layers of protection between the people most core to the environment—players and NBA team staff living continuously on campus—and the people farthest from that core, with the most risk of external exposure-off-site vendors-and those in the middle, Bubble/league staff. The testing results show that Bubble residents had interactions with COVID-19-positive staff, vendors, and others providing campus services. One of the true successes of the Bubble was that, despite many vendors being on campus while infected (typically for 1 day while their test results were pending), the on-campus protocols-with high focus on masking, distancing, ventilation, and hand hygiene in particular-were effective and able to prevent these infections from reaching the players and team staff at the core. This continuum of protection provides a useful framework for any environment where prevention of an infectious disease, even with a high level of unknowns in transmission, is a key goal, and many of these strategies can be translated to settings in which not as many resources can be directed to infection prevention.

Fifth, in addition to the weight and uncertainty caused by the pandemic itself, the mental health burden caused by living separated from friends and family for an extended period, claustrophobia associated with quarantining in isolation for several days, and monotony associated with daily routines and "pandemic fatigue" was felt by many players and others living in the Bubble. To address this situation, access to mental health services was provided. The NBA retained a clinical psychologist to reside on campus, provide individual consultation, and advise NBA leadership on how to help players and staff cope with their circumstances and living environment. Players and staff also had access to telehealth appointments with their personal mental health specialists and local providers. The death of George Floyd and the shooting of Jacob Blake during the Bubble further contributed to the strain and impact of isolation and separation from family, friends, and community. Recognizing the mental health impacts of these historical racism-driven events, the NBA and NBPA encouraged and supported player and

team activism and, before the season concluded, announced the formation of The National Basketball Social Justice Coalition to continue the efforts that were catalyzed in the Bubble.

Sixth, data management and communication in the Bubble were important, and more complex than anticipated. Establishment and upkeep of an accurate roster merged with testing and other health data was required to promote protocol compliance during daily movement on/off campus. Real-time data linkages between laboratory data, wearables, clinical reports, and basketball/ work schedules were required to maintain a central database to generate daily compliance reports, enforce protocols, and alert campus health teams to concerning symptoms or test results. The process of unifying data and resolving discrepancies to fuel real-time reports and analytics was a complex exercise.

Lastly, categorization of people into tiers that controlled access and reduced in-facility exposures was critical to prevention of viral spread. Individuals were tiered into risk groups that were based on required access to players vs ability to operate separately (e.g., media, League operations staff, cleaning crews, facility staff) (12). Each tier was subject to varying levels of protocols based on criticality to business operations and required access, a practice that was used throughout the pandemic.

The Bubble approach has, in various forms, been implemented in other settings throughout the pandemic (e.g., Olympics, film production), and in each case has proven to be a challenge, and not without limitation, with some of these Bubbles eliminating all cases in the core personnel like the NBA Bubble and others not doing so. Sequestering individuals within a closed campus for an extended period is difficult, as fatigue to rigorous protocols inevitably sets in and isolation from families and lifestyles has implications, including for mental health. Additionally, the financial and personnel resources required for such an undertaking are high. Nonetheless, our experience demonstrated protocols can successfully enable a closed community to function safely within a broader community with high disease prevalence, and highlighted success factors that are broadly applicable in a pandemic caused by a respiratory virus. More generally, it showed that basic infection prevention practices can greatly reduce the risk of infection and that people can interact and complete their activities if sufficient care is taken to redesign the way that they undertake those activities.

It is important to note that campus protocols were adjusted quickly during the Bubble using real-time data analyses, many of which contributed to the scientific literature. While research was not a goal of the Bubble, daily testing in this closely monitored environment produced new, real-world evidence about the performance of novel diagnostics (previously published) and our understanding of viral shedding, and continues to provide findings on transmissibility, reinfection, emerging variants, and vaccine effectiveness in what became a 24-month longitudinal cohort (12, 14–18).

CONCLUSIONS

In summary, the NBA used a rigorous and phased approach to successfully complete its 2019–20 season while working with the NBPA to protect players and staff during the COVID-19 pandemic. The Bubble was maintained for nearly 4 months through a set of multifaceted interventions that required regular review and modification, followed by thorough education and monitoring. Every facet of business and daily routines was scrutinized with a willingness to change any component to provide a safe environment. Critical to the success of the bubble was the implementation and routine activation of high-quality laboratory diagnostics. These strategies were successful, as no transmission of SARS-CoV-2 occurred among players and team staff, despite close physical contact during play and high rates of transmission in the surrounding community. We believe the interventions and strategies used in the NBA Bubble environment provide a successful blueprint for future pandemic management in sport or similar settings.

Nonstandard Abbreviations: NBA, National Basketball Association; RT, reverse transcriptase; NBPA, National Basketball Players Association.

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