

CARDIOVASCULAR PERSPECTIVE

Competitive Sports, the Coronavirus Disease 2019 Pandemic, and Big Ten Athletics

See Editor's Perspective by Nallamothu

In February 2020, a number of institutions within the Big Ten began discussing the impact of coronavirus disease 2019 (COVID-19) on sports. On March 7, the Big Ten Task Force for Emerging Infectious Diseases was formed to provide council and sound medical advice to ensure the health, safety, and wellness of the Big Ten's students, staff and fans. On March 11, 2020, the National Basketball Association postponed its season after the first player tested positive for COVID-19 infection. The next day, college basketball tournament games were canceled. The issues at hand were clear: the multi-organ adverse effects (including cardiac), high rate of transmission, and overall uncertainty about short and long term effects of the coronavirus raised serious concerns about player safety as well as sports' role in propagation of the virus across the broader community.

In this Perspective, the Big Ten Cardiac Registry Steering Committee reflects on the last several months through a series of questions. Our committee is made up of conference administrators and physicians in sports medicine, infectious disease, and cardiology. We look ahead to opportunities to return to play and contribute to public health. These reflections may be valuable to other organizations also struggling with how to best balance decisions for their members in the setting of imperfect information.

WHAT WERE CORE CONSIDERATIONS BEHIND OUR DECISIONS AND HOW WAS RETURN TO PLAY HANDLED BETWEEN MAY AND AUGUST?

We had several core considerations involved with our decision-making. We had to prioritize the well-being of the student athlete and assessed the following questions. How could we best reduce the risk of infection in student-athletes? Do we have the testing capacity? How easily could we contact trace if there was an outbreak of infection? If we do not return to play, how will this impact the physical and emotional well-being of the players? In addition, can we protect all the coaches and sports medicine staff from infection? Would we be risking community-level spread?

Moving forward entailed great cooperation between universities, athletic departments, local health care and public health organizations. COVID-19 required the development of testing strategies that would not burden the supply chain needs for local hospitals. In general, students in fall sports, including football, were brought on campus first. It was recommended that all student-athletes and staff should sign an agreement of understanding requiring safe health standards to be

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practiced. For all athletes, preparticipation evaluations took place as usual with additional questions regarding possible COVID-19 exposure. Recommendations from the American College of Cardiology's Sports and Exercise Cardiology Leadership Council served as the foundation for return to play planning.¹ Given circumstances and rapidly shifting evidence, these recommendations were by necessity based on expert opinion and continue to evolve.²

On return to campus, the athletes received polymerase chain reaction based testing. Some institutions added antibody testing to screen for past infection. For those with either recent or past COVID-19 infection, even if asymptomatic, institutions required cardiac testing, including high sensitivity troponin, ECG, and if feasible, echocardiogram. Cardiac magnetic resonance imaging (CMR) was ordered depending on degree of symptom presentation and results of cardiac testing with cardiology consultation as appropriate.

WHY WAS THE FOOTBALL SEASON POSTPONED ON AUGUST 11, 2020? WAS IT ALL ABOUT MYOCARDITIS?

The prevalence of COVID-19 within the Big Ten footprint and lack of sufficient testing to adequately ensure the health and safety of our student-athletes were the primary factors. Myocarditis became a focus, but not the only focus during return to play discussions for fall sports, including college football. Myocarditis is a leading cause of sudden cardiac death in athletes, in up to 20% of cases in past observational studies.³ The earliest reports in adult hospitalized patients suggested a higher than expected myocardial involvement with this virus.⁴ In June 2020, an article by Puntmann et al⁵ raised concerns about myocardial inflammation in relatively asymptomatic, nonhospitalized recovering patients. They found that 60% had signs of ongoing inflammation. The subjects were quite different than the collegiate athlete population with a mean age of 49 and relatively high prevalence of comorbidities such as hypertension and diabetes, conditions that could have contributed to the CMR findings. Lindner et al. demonstrated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the myocardium of 24 of 39 (61.5%) consecutive autopsy cases with evidence of active viral replication even without meeting histopathologic criteria for acute myocarditis.⁶

Even before these reports, The Ohio State University and University of Maryland implemented CMR as part of their cardiac testing protocol. Data collected over 4 months at The Ohio State University was recently published.⁷ Myocarditis by CMR was found in 4 out of 26

scanned athletes, and another 8 had late gadolinium enhancement suggesting prior myocardial injury.

These data were recognized to have limitations. Longitudinal follow-up data on clinical outcomes are not yet available and future study is needed on control groups comprised of subjects without illness and subjects with viral illnesses other than COVID-19. Publicized cases in professional and collegiate athletes also drew additional attention. Hence, myocarditis due to COVID-19 and the potential risks it may pose to athletes recovering from COVID-19 became an important topic of discussion.

Given that we were dealing with a novel virus during a pandemic associated with increased adverse outcomes, there was a consensus toward a cautious approach to return to play. That resulted in incorporation of new screening algorithms to assess cardiac involvement by COVID-19 infection in athletes. After multiple consultations with the Big Ten Task Force for Emerging Infectious Diseases and the Big Ten Sports Medicine Committee, and given the rates of transmission among student and professional athletes, the conference leadership, including the University Presidents and Chancellors, determined there was significant uncertainty about the virus and testing protocols to permit fall sports.

WHAT MADE YOU DECIDE THAT FOOTBALL COULD RETURN?

Immediately after the August 11, 2020, announcement, the Big Ten Council of Presidents and Chancellors and Commissioner Kevin Warren established a third advisory group, the Big Ten Conference Return to Competition Task Force with 3 subcommittees. Frequent discussions and review of the latest data continued between the Council of Presidents and Chancellors, the 3 advisory groups, and local health officials over the subsequent weeks. Several factors contributed to our changing perspective. First, capacity for contact tracing and daily rapid testing, including antigen testing, had evolved enough to permit better surveillance.^{8,9} Second, we gained valuable experience in evaluating athletes with potential cardiac involvement after COVID-19 infection to allow for potentially more informed decisions on return to play. Of all the collegiate sports, football presents one of the greatest challenges to physical distancing—so prevention of infection is especially key in that sport. Once we reached a consensus on (1) our ability to reduce the risk of infection around practice and competition environments through daily testing, (2) strict adherence to accepted infection control measures, and (3) agreement on a robust cardiac evaluation, we were able to crystallize a plan to return to play.

WHAT POLICIES DO YOU NOW HAVE IN PLACE TO ENSURE SAFETY?

The Big Ten Conference Return to Competition Task Force Medical Subcommittee is co-chaired by Dr Jim Borchers, Head Team Physician at the Ohio State University. By September 16, 2020, the Task Force established significant protocols for daily antigen testing, cardiac screening and data collection to guide decision-making regarding practice and competition.¹⁰ Football returned to practice and competition first, but eventually all Big Ten sports will follow testing protocols as they resume competition. Using viral load kinetics, it has been shown daily testing with rapid results (<1 hour) is the most effective surveillance strategy to prevent spread of infection. Tier-1 personnel (players, coaches, trainers, and other individuals that are on the field for all practices and games) will undergo daily antigen testing. Anyone who tests positive for COVID-19 through point of contact daily testing would require a polymerase chain reaction test to confirm the result. Daily testing began for football on September 30, 2020.

Each institution will designate a Chief Infection Officer who will oversee the collection and reporting of data. Using a 7-day rolling average of team-specific data, thresholds to guide participation in practice and competition are defined as: population positivity rate >7.5% (number of positive tier 1 members divided by tier 1 members of the team) and test positivity rate >5% (number of positive tests divided by total number of tests performed). Decisions will also take into account state and local (including university) test positivity rates and local health care resources. The statistics of test positivity rate and team population positivity rate in football are specific to the congregate group in tier 1 for each institution.

All COVID-19 positive student-athletes will undergo comprehensive cardiac testing to include biomarkers, ECG, echocardiogram, and CMR. A cardiology consultant assigned by each institution must review the results. The sports medicine team physicians will make the final determination on return to play. We expect cardiac testing to be obtained once out of isolation within a 10 to 14 day window after a positive test or after resolution of symptoms. The CMR will be obtained after day 14. If cleared to return, the athlete may gradually resume activity between days 14 and 21. As long as no new signs or symptoms develop, a student-athlete may return to game competition 21 days following a COVID-19 positive diagnosis, but not earlier. We recognize these recommendations reflect a conservative approach based on limited published data and expert opinion in the face of great uncertainty.

WHAT IS THE BIG TEN CARDIAC REGISTRY? WHAT DO YOU HOPE TO ACHIEVE BY IT?

The Big Ten institutions will establish a Cardiac Registry with Co-Directors Dr Lawrence D. Rink of Indiana University and Dr Curt J. Daniels of the Ohio State University to examine the effects on COVID-19 positive student-athletes. This will include cardiac evaluation data in all athletes recovering from COVID-19 infection from all sports. We are establishing Core Labs in the areas of CMR, echocardiography, ECG/Arrhythmia, clinical/biomarker, and epidemiology. A regulatory core lead by Dr Chris J. Kratochvil from the University of Nebraska will support registry oversight. The registry has at least 4 goals: to understand the cardiac effects of COVID-19 on the hearts of athletes, to mitigate risk of cardiac events among athletes with history of COVID-19 infection, to inform return to play decisions for these athletes, and to further our scientific understanding of the health effects of COVID-19 in young adults and high-performing athletes. Some of these goals may be achieved with the registry alone, but for others control groups outside the registry will be recruited, including athletes without COVID-19 infection. We will follow clinical outcomes as well. We hope to address many of the unknowns regarding the cardiac manifestations in COVID-19 positive elite athletes and have plans to follow those in the registry longitudinally. We will also participate in a national collegiate registry being designed to describe the prevalence and outcomes of COVID-19 related cardiac injury in athletes.

WHAT ARE YOUR EXPECTATIONS FOR THE FUTURE?

The student-athletes, team staff, sports medicine staff/physicians, cardiovascular staff/technologists/physicians, and universities have been working diligently to incorporate the above-mentioned protocols. Rigorous COVID-19 protocols were undertaken by the Big Ten to diminish risk to student-athletes and athletic staff.

We understand that expert opinion varies as to the assessment of cardiac risk from COVID-19 infection and appropriate surveillance and testing. We acknowledge that our approach to evaluation and data collection may raise important debate and differs from recently published and well thought-out expert statements.^{1,2} However, we also believe these protocols strike an important balance between safety of the student-athletes' desire to resume normal sports and collection of critical data to guide a safe return to competition. We expect the data from this registry will help frame future protocols and recommendations.

In addition, we recognize that not all abnormalities found on cardiac testing represent risks to the athlete

and more often than not reflect exercise-related adaptations. The evolution of the recommendations on ECG interpretation in athletes reminds us of the importance of establishing normative values. COVID-19 has underscored the need for more data on normative CMR findings in athletes. With the cardiac registry, the Big Ten will take the lead to further our understanding of the athletic heart as well as the course of COVID-19 infection in the collegiate student-athlete population. Our findings will be informative for broader public health policy as we fight coronavirus and all strive for safe return to play.

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Disclosures

None.

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