COVID-19 Risk in Youth Club Sports: A nationwide sample representing over 200,000 Athletes

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Abbreviations: SARS-CoV-2 (COVID-19), Center for Disease Control (CDC), National Federation of State High School Associations (NFHS), Academy of Pediatrics (AAP)

Key Words: Coronavirus, pandemic, SARS-CoV-2, adolescent

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Abstract

Context: The COVID-19 pandemic has affected almost every aspect of life including youth sports. Little data exists on COVID-19 incidences and risk mitigation strategies in youth club sports.

Objective: To determine the reported incidence of COVID-19 cases among youth club sport athletes and the information sources used to develop COVID-19 risk mitigation procedures.

Design: Cross-sectional study.

Setting: Online surveys.

Patients: Soccer and volleyball youth club directors.

Intervention: A survey was completed by directors of youth volleyball and soccer clubs across the country in October 2020. Surveys included self-reported date of re-initiation, number of players, player COVID-19 cases, sources of infection, COVID-19 mitigation strategies, and information sources for the development of COVID-19 mitigation strategies.

Main Outcome Measures: Total number of cases reported, number of players, and days since club re-initiation were used to calculate an incidence rate of cases per 100,000 player-days. To compare reported incidence rates between soccer and volleyball, a negative binomial model was developed to predict player cases with sport and state incidence as covariates and log(player-
days) as an offset. Estimates were exponentiated to yield a reported incidence rate ratio (IRR) with Wald confidence intervals.

**Results:** A total of 205,136 athletes (soccer=165,580; volleyball=39,556) were represented by 437 clubs (soccer=159; volleyball=278). Club organizers reported 673 COVID-19 cases (soccer=322; volleyball=351), for a reported incidence rate of 2.8 cases per 100,000 player-days (soccer=1.7, volleyball=7.9). Volleyball had a significantly higher reported COVID-19 incidence rate compared to soccer (reported IRR = 3.06 [2.0-4.6], p<0.001). Out of 11 possible mitigation strategies, the median number of strategies used by all clubs was 7 with an interquartile range of 2.

**Conclusions:** The incidence of self-reported cases of COVID-19 was lower in soccer clubs than volleyball clubs. Most clubs report using many COVID-19 mitigation strategies to reduce the risk of COVID-19.

**Key Words:** Coronavirus, pandemic, SARS-CoV-2, adolescent, mask use

**Key points:**

1) Overall COVID-19 incidence rates reported by youth club sports did not appear to be higher than national pediatric COVID-19 incidence rates around the same timeframe.

2) Reported COVID-19 incidence rates were lower in soccer clubs compared to volleyball clubs.

3) Clubs consistently used COVID-19 mitigation strategies and used local health authorities and the Center of Disease Control as their main resource for creating these mitigation strategies.

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Introduction

In March 2020, the novel SARS-CoV-2 (COVID-19) was declared a global pandemic and much of the United States issued stay-at-home orders to help prevent the spread of the disease. These orders effectively halted most aspects of everyday life and restricted most individuals to the confines of their own home. Though these measures were critical in slowing the spread of COVID-19 and have been effective at protecting the health care system, the short- and long-term effects of these orders on mental health and well-being among youth athletes represent a growing concern. With the cessation of most public activities, youth sports were nearly universally discontinued in the spring of 2020 and their reinstatement has been mixed throughout the country. Youth sports offer a myriad of social, physical, and mental health benefits for adolescents. Prior research has demonstrated an increase in symptoms of depression and anxiety in adolescents related to quarantines and lock down orders, and it has been suggested that youth athletes may have been particularly negatively affected by the cancelation of school and sports.

Physical activity levels in youth athletes have also been affected by the cancelation of youth sports. Recent studies have demonstrated a decrease in physical activity among youth during the pandemic. The cancellation of youth sports may accelerate the decrease in sport participation and physical activity, which has been observed prior to the current pandemic to decrease as children age. This may have significant long-term consequences as youth sport activity is a predictor of health and physical activity into adulthood. Participation in
organized sport has been shown to be a major component in reduced childhood obesity rates,\textsuperscript{16,17} which has persisted in the United States and has increased over the years. Furthermore, with the COVID-19 pandemic physical activity rates have decreased dramatically in adolescents and especially youth from areas of low socioeconomic status.\textsuperscript{18} These findings add clarity to projection models that suggest childhood obesity in the United States may increase disproportionately among non-Hispanic blacks and Hispanic children.\textsuperscript{19} Therefore, there is serious need to balance the risks and benefits of youth sports during the COVID-19 pandemic as it pertains to short- and long-term health of youth in the United States.

Though COVID-19 appears to results in less severe disease and lower overall mortality rates among younger populations,\textsuperscript{20} it is unknown how participation in sports results in transmission between participants, though new evidence appears to suggest that youth sports is not a large contributor to COVID-19 transmission.\textsuperscript{21,22} Despite media reports to the contrary, early evidence from adult professional athletes and preprint publications from club and high school sports appear to suggest that COVID-19 transmission between athletes is relatively rare.\textsuperscript{23,24} The Center for Disease Control (CDC) and National Federation of State High School Associations (NFHS) have provided recommendations for restarting sport activities in the United States.\textsuperscript{25,26} Furthermore, the NFHS continues to provide recommendations for holding high school sporting events based on five factors related to current evidence on COVID-19 transmission among participants.\textsuperscript{26} However, as different sports potentially represent different risk factors for COVID-19,\textsuperscript{24} more research is needed on specific sports and the risks associated with them. Soccer and volleyball are popular sports offered for a broad age range, and they are some of the most inexpensive sports in the United States.\textsuperscript{27,28} Therefore, understanding the risks associated with these two sports may allow more sporting opportunities for kids of all
socioeconomic levels. Previous research has suggested that indoor sports may pose a great risk of SARS-CoV-2 virus transmission compared to outdoor sports;\textsuperscript{24} however, volleyball is a non-contact sport that separates two teams during play. Overall, more information is needed on how the risk of COVID-19 in volleyball compares to other sports like soccer which has been suggested to have a relatively low rate of COVID-19 transmission\textsuperscript{21,22,24} Because of the many beneficial effects of youth sport participation, this research is critical to help inform decisions about the re-initiation and continuation of youth sports. Therefore, the purpose of this study was to determine the incidence of reported COVID-19 cases among youth club sport athletes, to describe the reported sources of infection for reported cases, and to describe the information sources used to develop COVID-19 risk mitigation procedures.

**Methods**

This study was approved by the Institutional Review Board of **blinded**. The overall study design was cross-sectional, utilizing an online survey. The survey was given to US Youth Soccer and the National Volleyball Association, who subsequently passed on to member organizations, leagues, and other stakeholders within youth soccer and volleyball at their discretion. Surveys were explicitly intended for the direct of the recipient club and asked for responses on behalf of the entire organization. Sport club directors are generally the administrator for their youth sport club. The survey was distributed on October 1\textsuperscript{st}, 2020 and responses were accepted until November 3\textsuperscript{rd}, 2020. Clubs were excluded from the study analysis if they had not restarted sports at the time the completed the survey.

**Survey**
The survey included demographics that outlined the name of the club, zip code of the club’s primary facility, the state the club was located in, and the sport that was offered by the club. Each director was asked if their club had restarted playing sports since COVID-19 restrictions began in their area. If the director answered that their organization had restarted sports, they were asked to provide the date that sport activity resumed, how many athletes participated in the club during that time, whether they had formal procedures for COVID-19 risk reduction, and how many players had been diagnosed, hospitalized, or died from COVID-19 since the re-initiation. If known, respondents were asked to report the source of any infections in players (household member, school contact, community/social contact, club sport activity, other, or unknown). If the respondent endorsed having a plan regarding COVID-19 risk reduction, they were asked which procedures the organization had been implementing to reduce COVID-19 incidence and which information sources were used to develop the plan. A total of 11 defined procedures to mitigate the risk of COVID-19 were offered as choices as well as 8 possible information sources (shown in Supplemental Table 1). These mitigation strategies and sources of information were based off the most common mitigation strategies proposed by the CDC or in the current literature on preventing the spread of COVID-19.

Statistical Analysis

Data was presented as means and standard deviations (SD) for continuous variables while counts and percentages were used for categorical variables. Time since the organization re-initiated sport participation is expressed as a median and interquartile range (IQR). The overall COVID-19 case rate was calculated as the number of reported cases per 100,000 players (reported cases / total number of players * 100,000). Participation duration was determined as the difference in days between the date of re-initiation and date of survey completion, and player-
days was determined as the product of the number of participating players and duration. COVID-19 incidence rate was expressed as the number of reported cases per 100,000 player-days (reported cases / total number of player-days*100,000) separately for both volleyball and soccer.

Additionally, based on the median duration of participation of 108 days for reporting clubs, the number of cases, total population, case rate, and incidence rate for US children for 15 weeks prior to survey closure (7/23/20 to 11/5/20) was determined using data from the American Academy of Pediatrics (AAP). Similarly, total cases, total population, case rate, and incidence rate were identified for the prior 15 weeks among the general population for each of the states where clubs were located. To compare incidence rates between soccer and volleyball, a negative binomial model was developed to predict player cases with sport and state incidence as covariates and log(player-days) as an offset. Estimates were exponentiated to yield an incidence rate ratio (IRR) with Wald confidence intervals. A chi-square analysis was used to compare the proportion of reported known source of COVID-19 cases among players between soccer and volleyball clubs. The proportion of soccer and volleyball clubs that endorsed each risk mitigation procedure and each information source were compared using chi-square tests. For significant chi-square tests, the standardized residuals for each cell were calculated to determine which cells were the largest contributors to the chi-square analysis and a standardized residual greater than 2 or less than -2 was considered a significant contributor. Statistical significance was set a priori at p < 0.05 and all analyses were performed using R Foundation for Statistical Computing (Vienna, Austria).

Results

The distribution of soccer and volleyball clubs that responded to the survey from various states are outlined in figures 1 and 2. A total of 437 directors from 44 states (volleyball=44;
soccer=15; figures 1 and 2) responded to the survey, including 278 volleyball clubs and 159 soccer clubs. Reported COVID-19 case and incidence rates for youth club sports and US children are shown in table 1. After adjusting for background state incidence rates, volleyball had a significantly higher COVID-19 reported incidence rate compared to soccer (reported IRR = 3.06 [2.0-4.6], p<0.001). The reported sources of infection are outlined in table 2. There was a significant difference in reported sources between volleyball and soccer clubs where volleyball clubs were more likely to report sport as the source of infection compared to soccer clubs (11%, standardized residual=XX versus 1%, standardized residual=XX respectively) and soccer clubs were more likely to report school or community as a source of infection for players compared to volleyball clubs (table 2).

All 437 directors reported having a formal risk reduction procedure. Of the 11 defined COVID-19 mitigation procedures, the median number of procedures selected by all clubs was 7 (inter-quartile range = 2). Soccer and volleyball clubs reported significantly different utilization of various COVID-19 risk reduction procedures (table 3). While both soccer and volleyball clubs predominantly utilized information from local health authorities and the CDC to develop risk mitigation procedures, volleyball clubs were more likely to utilize information from their sport governing body and the NFHS (table 4).

**Discussion**

The overall reported incidence rate of COVID-19 among all youth club athletes during the summer and fall of 2020 was comparable to the incidence reported among children in the United States during a similar timeframe. In addition, most cases were attributed to contacts outside of sport, with only a small number reportedly due to transmission during sport activities. This seems to agree with previous research that found that COVID-19 incidence rates reported
by high school athletic directors were highly correlated with local, background COVID-19 incidence rates. It also appears to agree with the growing body of evidence that seems to suggest that COVID-19 cases among athletes are predominantly attributed to community and social contacts rather than transmission during sports. While caution is needed in making inferential comparisons between data aggregated from state health authorities and data collected through self-reporting from youth sports organizations, nationwide pediatric data during a similar time frame may nonetheless offer context regarding the overall COVID-19 case rate for children during the time when respondent clubs were participating in sports.

The adjusted incidence rate reported by soccer clubs was found to be about 67% lower than the adjusted incidence rates reported in volleyball clubs. These results agree with previous research that found that high school outdoor sports had lower incidences of COVID-19 than high school indoor sports. This is further supported by the result that volleyball clubs were more likely to attribute COVID-19 cases with club sporting activities than soccer clubs (table 3). A previous study by Drezner et al. demonstrated that no cases of COVID-19 were attributed to playing or coaching club soccer when physical distancing and non-contact rules were in place, which is similar to our data where only two COVID-19 club soccer case were attributed to participating in club soccer. These findings support recent reports and current guidelines that indoor gatherings and activities pose a greater risk of COVID-19 compared to outdoor activities. It is also possible that this may be due to the differences in distribution of respondent clubs between the two sports (figures 1 and 2). For instance, in July and August, Texas and California, where most of the volleyball clubs reported from, had much higher cases than Wisconsin and New York where the majority of our soccer clubs reported from. Case trends became similar between these states in October and November. Nonetheless, we have
attempted to account for this by including the COVID-19 incidence rate for the state of each respondent club as a covariate in the models to compare sports.

It is important to note, that several other explanations for the difference in reported rates between soccer and volleyball may be the underlying cause for this observed difference. Anecdotally, volleyball is a highly communicative sport between teammates. Loud, vocal communication may increase the likelihood of spreading COVID-19 from participant to participant regardless of the outdoor and indoor atmosphere. This communication also happens within a smaller space than a soccer field. This may mean that volleyball athletes spend a greater amount of time within 6 feet of one another during practice and competition than soccer athletes. It is also possible that volleyball athletes may represent an older population of athletes which may predispose to higher incidence rate relative to younger soccer athletes. These are all speculative rationales for our results and suggest that further research is needed for each individual sport on the risk associated with contracting the SARS-CoV-2 virus. Every respondent club reported the development and use of a formal plan to mitigate the risk of COVID-19 and most clubs reported using a large number of risk reduction procedures. The most common practices were symptom monitoring, facemask use, and increased facility disinfection. Volleyball clubs were more likely to use face masks during play, increased facility disinfection, and check player and coaches’ temperatures on site compared to soccer clubs; whereas soccer clubs were more likely to have players and staff check temperatures at home, and implement face mask use for players off the field, face mask use for staff, social distancing for players and staff off the field, and staggered arrival and departure times. Some of these differences may be due to the nature of indoor versus outdoor facility use. For example, it may be easier for a volleyball facility with a controlled entrance to take player and staff temperatures before these individuals
enter the facility, while soccer clubs may find it easier to implement home monitoring of
temperature. Several of these mitigation strategies, like social distancing, face mask use, and
disinfecting surfaces, have demonstrated to be effective at reducing the spread of SARS-CoV-
2;\textsuperscript{35,36} however, many of these strategies do not have significant research regarding their efficacy,
especially within youth sports contexts. The overwhelming majority of clubs (~90\%) reported
using information from local health authorities, suggesting a willingness of clubs to work
alongside local authorities to provide safe sport and physical activity opportunities for youth
athletes. This information may help facilitate the dissemination and implementation of
information regarding COVID-19 mitigation strategies among stakeholders in youth sports.

Limitations

This study has several limitations. The information provided was self-reported by soccer
and volleyball club directors and cannot be verified through medical records or other sources.
The self-reporting nature of the survey may also introduce recall bias as directors were asked to
remember how many cases they had since their restart which may have been months prior to
completing their survey. Nonetheless, we do not have reason to believe that a systematic bias
exists between sports with respect to self-reporting that would account for differences between
volleyball and soccer. Our method for survey distribution may have introduced sampling bias
into our results and we cannot account for the total number of organizations that received our
survey, only the number that ultimately completed it. Additionally, our number of player-days
assumes that all players participated at every practice and game between the start date and the
end of the survey. As mentioned above, caution is needed in comparing our data with data
reported by the AAP for nationwide pediatric COVID-19 incidence, but we have provided this to
contextualize our findings. Furthermore, we did not use a validated survey; however, as COVID-19 is a new and rapidly growing concern, we feel confident that the developed survey asked the necessary questions to answer the current research questions. Clubs reported COVID-19 cases over different timelines based on re-initiation and survey completion dates, and came from areas with varying background COVID-19 incidence, both of which may have impacted the reported incidence rates. Nonetheless, when comparing club soccer and volleyball incidences, we tried to account for this by adjusting for state level COVID-19 incidence rates. Reported sources of infection were provided by the club director and were not provided by formal contract tracing by health authorities. Lastly, though these clubs represented a large number of youth athletes from a national sample, it may not be generalizable to other populations.

Conclusion

In this survey-based study, reported COVID-19 incidence rates among youth club sport athletes were comparable to those reported for US children during a similar timeframe. After adjusting for background state incidence rates, soccer clubs reported a lower COVID-19 incidence rate than volleyball clubs. This may be due to the indoor nature of the sport which is in line with previous research on indoor and outdoor sporting activities and the risk of COVID-19; however, additional factors may add to this difference like the difference in state locations between soccer and volleyball in this study. Although both soccer and volleyball clubs reported that only a small percentage of COVID-19 cases were attributable to sport participation, this was more likely in volleyball than soccer. All clubs reported having a formal plan regarding COVID-19 mitigation and most clubs reported using a large number of risk reduction procedures. Differences in incidence rates, reported infection sources, and the procedures utilized may be due to the differences between indoor and outdoor sport participation and may be due to the nature of
each sport such as proximity to opponents and teammates, vocal communication, and the
cultures surrounding each sport that could translate into different interactions and behaviors
outside of play.
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Table 1. Reported COVID-19 cases, case rates, and incidence rates for respondent club soccer, respondent club volleyball, and nationwide children during the summer and fall of 2020.

|                        | Club soccer | Club volleyball | Club total | *US Children |
|------------------------|-------------|-----------------|------------|--------------|
| **Total cases (N)**    | 322         | 351             | 673        | 639,231      |
| **Total population (N)** | 165,580    | 39,556          | 205,136    | 75,471,700   |
| **Total person-days (players*days since restart)** | 19,476,766 | 4,445,197       | 23,921,963 | 7,924,528,500 |
| **Case rate per 100,000 (cases/100,000 players)** | 194         | 887             | 328        | 847          |
| **Incidence rate (cases/100,000 player-days)** | 1.65        | 7.90            | 2.81       | 8.07         |

*a Total person-days were calculated from the American Academy of Pediatrics data using the 15 weeks prior to survey closure (November 3rd) to align with the median duration of participation of reporting clubs.

*b Total population (adults and children) and cases reported in the states where clubs were located. Total person-days were calculated from state case information using the 15 weeks prior to survey closure (November 3rd) to align with the median duration of participation of reporting clubs.
Table 2. Frequency and percentage of reported sources of COVID-19 infection among youth club sport athletes during the summer and fall of 2020.

| Source Contact | Overall N=580a | Volleyball N=313 | Soccer N=267 |
|----------------|----------------|------------------|--------------|
| Household      | 302 (52%)      | 165 (53%)        | 137 (51%)    |
| School         | 142 (25%)      | 67 (21%)         | 75 (28%)     |
| Community      | 93 (16%)       | 40 (13%)         | 53 (20%)     |
| Sport          | 36 (6%)        | 34 (11%)         | 2 (1%)       |
| Other          | 7 (1%)         | 7 (2%)           | 0 (0%)       |

aNot all cases had a reported source hence there are only 580 cases represented in this table out of 673 total cases.
bA Chi-square analysis was used to compared reported known sources of COVID-19 between volleyball and soccer: $X^2=36.9, p<0.001$
Table 3. Reported utilization of various COVID-19 risk reduction strategies between youth soccer and volleyball clubs during the summer and fall of 2020.

| Procedure                                      | Overall N(%) | Volleyball N(%) | Soccer N(%) | \(^*\)P-Value |
|------------------------------------------------|--------------|-----------------|-------------|---------------|
| Player/staff symptom monitoring                | 369 (84%)    | 237 (85%)       | 132 (83%)   | 0.536         |
| Player/staff temperature checks at home        | 206 (47%)    | 94 (34%)        | 112 (70%)   | \(<0.001\)    |
| Face mask use for players while playing        | 117 (27%)    | 108 (39%)       | 9 (6%)      | \(<0.001\)    |
| Face mask use for players off the field        | 308 (70%)    | 180 (65%)       | 128 (81%)   | \(0.001\)     |
| Face mask use for staff                        | 350 (80%)    | 211 (76%)       | 139 (87%)   | \(0.004\)     |
| Social distancing for players while playing    | 147 (34%)    | 101 (36%)       | 46 (29%)    | 0.115         |
| Social distancing for players off the field    | 278 (64%)    | 146 (53%)       | 132 (83%)   | \(<0.001\)    |
| Social distancing for staff                    | 283 (65%)    | 161 (58%)       | 122 (77%)   | \(<0.001\)    |
| Increased facility disinfection                | 304 (70%)    | 225 (81%)       | 79 (50%)    | \(<0.001\)    |
| Staggered arrival and departure times for events | 269 (62%)    | 161 (58%)       | 108 (68%)   | \(0.038\)     |
| Player staff temperature checks on site        | 234 (54%)    | 199 (72%)       | 35 (22%)    | \(<0.001\)    |

\(^*\)Chi-square analysis was used to compare procedures used by volleyball and soccer clubs
Table 4. Reported utilization of various sources of information on COVID-19 risk reduction strategies between youth soccer and volleyball clubs during the summer and fall of 2020.

| Source                                | Overall N(%) | Volleyball N(%) | Soccer N(%) | P-Value |
|----------------------------------------|--------------|-----------------|-------------|---------|
| Local Health Authority                 | 386 (88%)    | 245 (88%)       | 141 (89%)   | 0.863   |
| US Centers for Disease Control         | 306 (70%)    | 193 (69%)       | 113 (71%)   | 0.718   |
| USA Sport Governing Body               | 290 (66%)    | 194 (70%)       | 96 (60%)    | **0.045** |
| American Academy of Pediatrics         | 32 (7%)      | 16 (6%)         | 16 (10%)    | 0.096   |
| American Medical Society for Sports Medicine | 24 (5%) | 16 (6%) | 8 (5%) | 0.749 |
| National Athletic Trainers Association | 19 (4%)      | 13 (5%)         | 6 (4%)      | 0.656   |
| National Federation of State High School Associations | 80 (18%) | 62 (22%) | 18 (11%) | **0.004** |

*a Chi-square analysis was used to compare procedures used by volleyball and soccer clubs*
Number of soccer clubs surveyed per state
Number of volleyball clubs surveyed per state
COVID-19 in Youth Sports

Demographics

**Study Overview**
Sports have tremendous health benefits for children, but it remains unclear whether club sport participation, with risk reduction procedures in place, increases the risk of children contracting COVID-19. This study is being conducted through the Department of Orthopedics and Rehabilitation at the University of Wisconsin School of Medicine and Public Health to better define the risks associated with COVID-19 among youth athletes and aid local decision-making regarding the continuation of youth sports.

Please respond regarding your youth sport organization as a whole. Thank you for your participation!

What is the name of your club?

What is the zip code for your club’s primary facility?

What state is your club’s primary facility located in?

What sport is offered by your club?

If you selected “other” for the sport offered by your club, please type in the sport your club offers.
Does your organization offer club sport activities for boys, girls, or both?

- **Boys**
- **Girls**
- **Both**

What is the age range of your participants?

**Age range**

- Youngest: 
- Oldest: 

Have you restarted playing sports since the COVID-19 restrictions began in your area?

- **Yes**
- **No**

What date did you resume sport activity for your organization? *(Please enter as mm/dd/yyyy)*



How many athletes do you currently have participating in your club?



How many staff members (coaches, directors, etc.) currently work for your club?



Do you have a formal plan regarding COVID-19 risk reduction procedures?

- **Yes**
- **No**

Which of the following procedures have you been using to reduce COVID-19 risk since restarting? *(Please check all that apply.)*
Player/staff symptom monitoring  
Player/staff temperature checks at home  
Player/staff temperature checks on site  
Face mask use for players while playing  
Face mask use for players off the field  
Face mask use for staff  
Social distancing for players while playing  
Social distancing for players off the field  
Social distancing for staff  
Increased facility disinfection  
Staggered arrival and departure times for events  
Other

Which (if any) of the following sources of information did you review or use to develop your risk mitigation procedures: (Please check all that apply.)

- Local health authority guidelines or restrictions
- US Centers for Disease Control (CDC)
- American Academy of Pediatrics (AAP)
- American Medical Society for Sports Medicine (AMSSM)
- National Athletic Trainers Association (NATA)
- National Federation of State High School Associations (NFHS)
- USA sport governing bodies (example USA volleyball, USA swimming, etc.)
- Other

COVID-19 Measurements

How many individual PLAYERS in your organization have been diagnosed, hospitalized, or died from COVID-19 since restarting?

|   | Cases | Hospitalizations | Deaths |
|---|-------|------------------|--------|
| Players |       |                  |        |

How many of the positive COVID-19 cases in PLAYERS were traced back to each source.

| Number of cases |
|-----------------|
| Household member (example: mom, dad, sibling, etc.) |   |
| School contact (example: classmates, teachers, school sports, etc.) |   |
How many individuals **STAFF MEMBERS** within your organization have been diagnosed, hospitalized, or died from COVID-19 since the each sports restart?

| Cases | Hospitalizations | Deaths |
|-------|------------------|--------|
|       |                  |        |

How many of the positive COVID-19 cases in **STAFF MEMBERS** were traced back to each source.

| Number of cases |
|-----------------|
|                 |

- **Household member** (example: mom, dad, sibling, etc.)
- **School contact** (example: classmates, teachers, school sports, etc.)
- **Community/social contact** (example: friends, parties, extended family, restaurants)
- **Club sport activity** (example: practice, game, conditioning)
- **Other**
- **Unknown**

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Supplementary table 1. List of responses to the question “Which of the following procedures have you been using to reduce COVID-19 risk since restarting?” and “Which (if any) of the following sources of information did you review or use to develop your risk mitigation procedures?”

| COVID-19 mitigation procedures:       | Sources for mitigation procedures:                           |
|--------------------------------------|-------------------------------------------------------------|
| Player/staff symptom monitoring      | Local health authority guidelines restrictions              |
| Player/staff temperature checks at home | US Center for Disease Control (CDC)                      |
| Player/staff temperature checks on site | American Academy of Pediatrics (AAP)                   |
| Face mask use for players while playing | American Medical Society for Sports Medicine (AMSSM)    |
| Face mask use for players off the field | National Athletic Trainers Association (NATA)             |
| Face mask use for staff              | National Federation of State High School Association (NFHS) |
| Social distancing for players while playing | USA sport governing bodies (example USA volleyball, USA swimming, etc.) |
| Social distancing for players off the field | Other                                                      |
| Social distancing for staff          |                                                             |
| Increased facility disinfection      |                                                             |
| Staggered arrival and departure times for events |                                                             |
| Other                                |                                                             |

*a Survey instructed to select all that applied for these questions*