

**Patients** 496 patients (289 male/207 female, 19.7±9.4 years) presented with 561 concussions in 1471 visits.

**Assessment of Risk Factors** Concussions were subdivided into acute and PCS by time from injury to first appointment.

**Main Outcome Measurements** Demographics, injury mechanisms, Standardized Concussion Assessment Tool (SCAT) scores, management, and recovery timelines.

**Results** Acute concussions accounted for 88% of injuries and 12% were PCS. Females (RR=1.4) and adults ≥ 25 years (RR=3.6) were more likely to be diagnosed with PCS. In both, injuries occurred most commonly in hockey, football, and soccer. Family physicians were the most frequent referral provider (58% acute, 76% PCS). Median injury-appointment time was 11.0 days (acute) compared to 182.0 days (PCS). Initial total SCAT symptom score was significantly greater ( $p<0.001$ ) in PCS (56.0±33.0) compared to acute concussion (39.8±31.9). Therapies (i.e. referral, medication, intervention) were prescribed in 44% of acute injury visits compared to 73% of PCS visits ( $\chi^2=88.6$ ,  $p<0.00001$ ). Recovery timelines for return to work, school, and sport were significantly longer in PCS patients than in those with acute concussions ( $p<0.05$ ).

**Conclusions** Athletes who are female and/or ≥25 years of age may be at greater risk for PCS progression, requiring closer monitoring and further injury prevention efforts. Considering the number of referrals from family physicians, further concussion education may better optimize initial management and shorten delays in seeking necessary sports medicine consultation.

#### 412 ABSTRACT WITHDRAWN

#### 413 METHODOLOGICAL CONSIDERATIONS FOR QUANTIFYING PRIOR INJURY HISTORY TO STUDY RISK OF INJURY RECURRENCE

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**Background** History of injury is an important predictor of future injury risk. Accurately assessing injury history can be challenging as it is influenced by the period of time used for the ‘lookback window’.

**Objective** Compare two lookback window definitions to quantify injury history and assess impact of this definition on the association between history of ankle sprain and incident game ankle sprain: 1) ‘1-year lookback period’ limited to a history of ankle sprain within the past year and requiring ≥1 year of NBA participation, and 2) ‘all-comers lookback period’ including any history of ankle sprain regardless of the timing of the prior sprain or the number of years of prior participation.

**Design** Retrospective Cohort Study

**Setting** U.S. National Basketball Association (NBA)

**Participants** All NBA players who participated in at least one game from 2013–14 through 2016–17.

**Assessment of Risk Factors** History of ankle sprain included prior game and non-game ankle sprains.

**Main Outcome Measurements** Game ankle sprains were obtained from the audited NBA electronic medical record, which is standardized across all 30 teams.

**Results** Across this 4-season study, 554 game ankle sprains were reported among 946 players and 122,010 player-games. Using the primary definition, players with a history of ankle sprain in the past year were 1.41 (95% CI 1.13, 1.74) times as likely to sustain an incident game ankle sprain, relative to players with no history of ankle sprain. These results are consistent with prior research and pathobiology of ankle sprain. In contrast, the ‘all-comers lookback period’ definition led to an entirely different conclusion with a null result (IRR=1.01, 95% CI 0.80, 1.27).

**Conclusions** In this analysis, accounting both for a defined exposure time via a fixed 1-year lookback period and for the recency of the prior sprain(s) yielded robust and interpretable results.

#### 414 POPULATION TESTING FOR COVID-19: AN APPROACH FOR INFECTION PREVENTION

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**Background** Population screening with highly sensitive diagnostic tools, such as nucleic acid amplification testing (NAAT), can enable early identification and isolation of cases and reduce transmission of SARS-CoV-2.

**Objective** To describe the results of a rigorous, large-scale COVID-19 testing and monitoring program with confirmatory processes and adjudication of positive results.

**Design** Descriptive Epidemiology Study

**Setting** 32 U.S. National Football League (NFL) Clubs during the 2020 season

**Participants** NFL players and staff

**Methods** The NFL/NFL Players Association instituted a COVID-19 Testing and Surveillance Program for the 2020 Season, which included daily testing for players and staff, full medical follow-up and adjudication of cases. Clinical adjudication was based on subsequent daily testing, symptoms, and clinical history; persons remained in isolation during adjudication.

**Results** Between August 1 and November 14, 2020, a total of 632,370 RT-PCR tests were administered to 11,668 individuals; 270 (2.4%) confirmed cases were observed. PPVs of the initial positive result ranged from 73–82% across RT-PCR platforms. Initial positive results were positive on re-processing 61–79% of the time. PPV increased when both results were positive to >95%; however, initial positives that were negative on confirmatory processing resulted in true cases a portion of the time, depending on machine and population prevalence. High Ct values (33 to 37) could indicate onset of infection.

Infected individuals were identified and isolated early in infection, preventing spread.

**Interventions** Daily or frequent testing using three NAAT platforms, rapid point-of-care testing, and symptom monitoring.

**Main Outcome Measurements** COVID-19 infection.

**Conclusion** Routine RT-PCR testing allowed early detection of infection. Cycle threshold values provided a useful guidepost for understanding results. Confirmatory processing of initial positive values significantly improved PPV. Antigen POC testing was unable to reliably rule out COVID-19 early in infection. Adjudication processes were able to confirm or rule out SARS-CoV-2.

#### 415 INJURY TRENDS IN MEN'S ENGLISH PROFESSIONAL FOOTBALL: AN 11 YEAR CASE SERIES

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**Background** In a recent single season audit of men's English professional football, the incidence of injury was reported as 9.11 injuries/1000 h (Jones et al., 2019). Whilst this provides an up to date estimate of a single season, there is a paucity of research examining the incidence of injury over multiple seasons in English football.

**Objective** The aim of this study was to examine the injury trends in English professional football over 11 seasons (2007/8–2013/14 and 2015/16–2018/19).

**Design** Retrospective case series.

**Setting** Professional football players competing in the English Football League.

**Participants** 363 players from four squads.

**Main outcome** Data collection procedures followed the guidelines set out in the Union of European Football Associations (UEFA) consensus for all 11 seasons. Injury incidence per 1000 h was estimated from match and training exposure.

**Results** There were 907 injuries recorded over 11 years. The overall incidence rate was 6.5/1000 h (95% CI). The incidence rate in match play was significantly higher than training (58 vs 2.8/1000 h,  $P < 0.001$ , 95% CI). Incidence rates remained stable over 11 years and there was no significant difference for muscle and ligament incidence rates between seasons ( $< 0.05$ ).

The most common site of injury was the thigh, (27%, 242/907). Muscle strains accounted for 49% (445/907) of all injuries. The hamstrings were the most frequently injured muscle group, accounting for 17% (150/907) of all injuries and 34% (150/445) of muscle injuries. There was a significant increase in the number of hamstring injuries occurring during match play across seasons ( $P = 0.024$ , 95% CI). Re-injuries constituted 6% (55/907) of all injuries and caused longer absences than initial injury (14.7 vs 8.5,  $P < 0.001$ , 95% CI).

**Conclusions** Whilst overall incidence rates remain stable, the incidence of hamstring injuries remains high and re-injuries had a higher severity than initial injuries.

#### 416 ASSESSING THE RISK OF SARS-COV-2 TRANSMISSION IN INTERNATIONAL PROFESSIONAL GOLF

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**Background** There is no published data on the incidence or risk of SARS-CoV-2 virus transmission when playing golf, a sport played outdoors where social distancing is possible.

**Objective** The purpose of this prospective study was to report incidence and transmission regarding SARS-CoV-2, of professional golfers competing on the PGA European Tour across 23 events in 11 countries.

**Design** Prospective cohort study

**Setting** PGA European Tour events

**Patients (or Participants)** Professional golfers participating on the PGA European Tour

**Interventions (or Assessment of Risk Factors)** Daily symptom and temperature checks, and weekly Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) screening were performed to determine potential carriage of SARS-CoV-2.

**Main Outcome Measurements** Onset and type of symptomology were analysed. Gene expression and Cycle Thresholds were reviewed for all positive cases. Repeat PCR testing was performed on all positive players. RT-PCR analysis included human house-keeping genes, and various RNA genes specific for SARS-CoV-2.

**Results** During the study period, there were 2900 RT-PCR tests performed on 195 professional golfers competing on the European Tour. Four players tested positive on-site during the study period (0.14% of tests; positive results were declared with  $Ct < 40$ ). Two positive tests were returned as part of routine protocols while two reported a history of close contact with an individual who had tested positive for SARS-CoV-2 and were isolated and target tested. All were asymptomatic at time of testing, with three developing symptoms subsequently. None required hospital admission. There was no transmission from player to player.

**Conclusions** Risk of transmission of SARS-CoV-2 virus can be mitigated by highly accurate RT-PCR testing of participants and by setting up a safe bubble which includes testing players and support staff, as well as all persons coming into contact with them during the course of the tournament for example drivers and hotel staff. This report can also provide reassurance for participants and policy makers regarding community golf, which can be encouraged for the health benefits it provides, in a relatively low risk environment, with minimal risk of transmission by observing sensible viral hygiene protocols.