Letters

RESEARCH LETTER

Medical Assessment of Head Collision Events in Elite Women’s and Men’s Soccer

The International Conference on Concussion in Sport protocols, which state that all athletes with suspected concussion must receive medical assessment, have been supported by elite soccer organizations. However, a majority of male soccer players do not receive medical assessment after head collision events (HCEs). To our knowledge no research has analyzed HCEs in elite women’s soccer. The purpose of this study was to determine the incidence rate and subsequent medical assessment of HCEs in the 2019 Fédération Internationale de Football Association (FIFA) Women’s World Cup and to compare these with rates from 3 elite men’s tournaments.

Methods | The 52 matches of the 2019 FIFA Women’s World Cup were independently reviewed by 3 trained observers who recorded data on frequency and medical assessment of HCEs, time stopped for assessment, and visible concussion signs. Data were collected using the same standardized form as in prior HCE analyses. The Cohen κ among reviewers was 0.88. Head collision events were defined as any incident in which a player was unable to resume play within 5 seconds of direct head contact. Medical assessment was any assessment on the field or sideline conducted by health care team personnel. Time stopped for assessment was the duration between the player receiving assessment and returning to the match. Players involved in HCEs were observed for the following visible signs of concussion: clutching of head, slowness getting up, disorientation, disequilibrium, loss of consciousness, and seizures.

Data from 3 elite men’s tournaments were combined for the comparative analysis. All 4 studies were conducted in the same way using the same definitions. The Mann-Whitney U test was used for comparison of median time stopped for assessment. Categorical variables were compared using the χ² test or Fisher exact test as appropriate. Incidence comparisons were estimated by quasi-Poisson generalized linear models. Two-sided statistical significance was set at P < .05. R version 3.6.0 (R Core Team 2019) was used for statistical analysis. The research ethics board at St Michael’s Hospital waived the need for approval.

Results | A total of 69 HCEs were identified during the women’s tournament (1.33 per match; 39.5 per 1000 athlete-hours of exposure) and 237 HCEs were identified in the 3 men’s tournaments (1.32 per match; 39.0 per 1000 athlete-hours of exposure) (incidence rate ratio, 0.99 [95% CI, 0.76-1.28]; P=.93) (Table). Of the 69 women involved in HCEs, 53.6% received medical assessment, which was significantly greater than the percentage of men who received medical assessment (33.8%) (P=.003). Five men and 4 women were removed from the match after assessment (P=.46). All men and women who did not receive medical assessment immediately returned to play. The median time stopped for assessment was 70 seconds (range, 10-330) for women and 49.5 seconds (range, 15-280) for men (P=.04). The majority of female (84.1%) and male (88.6%) athletes showed 2 or more signs of concussion after an HCE.

Discussion | Previous research suggests that female athletes may have higher rates of sport-related concussion than men, yet this analysis showed that elite female and male soccer players had rates of HCEs that were not significantly different. Women were more frequently medically assessed than men, although there were no significant differences in the proportions removed from play. Reasons for the similar prevalence of HCEs but different rates of concussion and the higher rate of assessment in women’s soccer are unknown.

The median times for assessment of both sexes were far short of the minimum 10 minutes required to perform a concussion assessment. Changes to improve adherence to the international consensus concussion protocols are needed and could include increasing the role of the video assistant referees in calls for medical assessment, employing independent medical assessors, and allowing temporary substitutions to provide sufficient time for medical assessments. Limitations of this study were that actual independent medical diagnosis of concussions was not available to the study team and off-camera HCEs may have been missed by reviewers.

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The increase in opioid-related overdose deaths in the United States has focused attention on extending access to medications for opioid use disorder. Among the 3 medications approved by the US Food and Drug Administration, buprenorphine is widely viewed as offering the greatest opportunity for expanding access. Between 2009-2011 and 2012-2014, US estimates of office-based visits involving buprenorphine prescriptions increased from 1.9 million to 4.3 million.1 In 2015, an estimated 200 per 100,000 privately insured adults filled at least 1 buprenorphine prescription.2 Yet most individuals with opioid use disorder do not receive treatment, and no general population estimates exist for rates of buprenorphine use. We present trends in US buprenorphine use by demographic groups with estimated length and duration of new treatment episodes.

Methods | Buprenorphine prescriptions filled by persons aged 15 to 80 years were identified in the IQVIA Real World Data: Longitudinal Prescription (IQVIA LRx) database from 2009 through 2018, excluding formulations not approved for opioid addiction. This database contains prescriptions from retail and nonretail pharmacies linked to individuals across years, pharmacies, and payment sources. The proportion of the population covered in the data set increased from 76.5% in 2009 to 92.0% in 2018. Calculated buprenorphine rates were based on the US population accounting for changes in IQVIA LRx coverage. Annual rates of filling 1 or more buprenorphine prescriptions per 1000 persons were calculated by age group and sex. New buprenorphine use episodes started on the date of a buprenorphine prescription fill after 180 days or more without a fill and ended after more than 30 days without buprenorphine supply. Because buprenorphine treatment episodes of 180 days or more are a national performance measure,2 percentages of new episodes of this duration were calculated using longitudinal patient data. Because 16 mg/d is the recommended target buprenorphine dosage, percentages of new episodes including 16 mg/d or greater were also calculated. The Yale University institutional review board deemed the analysis exempt from review.

Results | Among persons aged 15 to 80 years, the annual rate per 1000 population of buprenorphine use increased from 1.97 (n = 351,904) in 2009 to 4.43 (n = 1,037,787) in 2018. Between 2009 and 2018, buprenorphine use per 1000 population increased among adults aged 35 to 44 years from 2.41 to 8.34, but it decreased among individuals aged 15 to 24 years from 1.76 to 1.40 (Figure). Between 2009 and 2018, buprenorphine use per 1000 population among males increased from 2.44 to 5.21, and it increased among females from 1.49 to 3.66.

Approximately 29.3% of buprenorphine use episodes continued for at least 180 days, with similar percentages for males (28.6%) and females (30.2%) (Table). Most new episodes of buprenorphine use (62.9%) included at least 1 prescription for 16 mg/d or greater, with little variation between males (62.8%) and females (62.9%). The percentages of new buprenorphine use episodes continued for at least 180 days, with similar percentages for males (28.6%) and females (30.2%) (Table). Most new episodes of buprenorphine use (62.9%) included at least 1 prescription for 16 mg/d or greater, with little variation between males (62.8%) and females (62.9%). The percentages of new buprenorphine use episodes continued for at least 180 days, with similar percentages for males (28.6%) and females (30.2%) (Table). Most new episodes of buprenorphine use (62.9%) included at least 1 prescription for 16 mg/d or greater, with little variation between males (62.8%) and females (62.9%). The percentages of new buprenorphine use episodes continued for at least 180 days, with similar percentages for males (28.6%) and females (30.2%) (Table). Most new episodes of buprenorphine use (62.9%) included at least 1 prescription for 16 mg/d or greater, with little variation between males (62.8%) and females (62.9%). The percentages of new buprenorphine use episodes continued for at least 180 days, with similar percentages for males (28.6%) and females (30.2%) (Table). Most new episodes of buprenorphine use (62.9%) included at least 1 prescription for 16 mg/d or greater, with little variation between males (62.8%) and females (62.9%).