

Concussions Requiring Hospitalization among Child and Adolescent American Football Players: An Analysis of the Kid's Inpatient Database

INTRODUCTION: American football is a popular sport well known for its high rates of traumatic brain injuries among players. To date, there is a lack of powered, nationwide analyses assessing incidence of concussion requiring hospitalization, outcomes, and associated risks.

METHODS: The Kid's Inpatient Database was queried for American football sports injuries using Ecodes (E007.0) from 1997-2012. Patients with concussion were isolated using ICD-9-Diagnosis codes. Patient characteristics and hospitalization outcomes were investigated utilizing descriptive analytics. Significant changes in annual concussion incidence and assessments of patient characteristics were elucidated using chi-square analysis and independent samples t-tests.

RESULTS: 3453 American football injuries were isolated (2009: 856, 2012: 2597). Players (98.6% males) were on average 14.4 years old. 333 (9.6%) players were admitted for concussion, and annual concussion incidence decreased from 9.5% (81/856) in 2009 to 7.3% (252/2598) in 2012. Relative to the average admission for a football related injury, patients with concussion were less likely to have elective admission (3.3% vs 10.4%, $p < 0.001$), and had a shorter length of stay (1.2 vs 2.4 days, $p < 0.001$). Concussion incidence was higher among patients with attention deficit hyperactivity disorder ([ADHD] 15.9% vs 9.4%, OR=1.8 95%CI [1.1-2.9], $p=0.013$). Concussion incidence was higher among adolescents (>12 -year-old) relative to children (5-12-year-old) (10.6% vs 6.4%, OR=1.8 95%CI [1.3-2.4], $p < 0.001$). 15-year-old players had the highest concussion incidence (13.4%). Children presenting with concussion were more likely to have neurological deficits relative to adolescents (5.9% vs 0.4%, $p=0.001$).

DISCUSSION: Annual concussion incidence among hospitalized football players decreased in recent years, which may reflect improved rules, regulations, or equipment. Adolescent players and players with ADHD were more likely to be admitted with a concussion.