Neurologic Injuries in Noncontact Sports

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KEYWORDS

• Noncontact sports • Muscle injury • Cervicocephalic dissection • Concussion
• Return to play • Spinal cord injury

KEY POINTS

- Concussion among noncontact sport participants requires similar assessment and management, but may differ most in aspects related to return to play.
- Cerebrovascular disease may affect athletes who participates in noncontact sports, and presents clinical challenges related to return to exercise and play.
- Muscle and spine disorders may occur with some frequency in noncontact sport participants, and raise knowledge gaps in clinical management, recovery, and return to sport.

NONCONTACT SPORT CONCUSSION

Concussion may be a consequence of unintended falls, head impact, and acceleration or deceleration injury in noncontact sports. The overall evaluation and management of sports concussion are discussed elsewhere. This article focuses on some of the unique aspects of concussion in noncontact sports.

Incident Reporting

The Cleveland Clinic's Concussion Center provides evaluation and management to student-athletes throughout the greater Cleveland, Ohio, area with concussion. In an effort to optimize community-based sports concussion care, the Concussion Center developed and implemented standardized methods of reporting, evaluating, and managing concussion injury in youth and high school athletes.

The collection and reporting of head injury details (eg, symptoms, date, time, location of injury, and action taken) facilitates the collaboration of care between athletic trainers on the sideline and physicians in the hospital or office. The development and deployment of the Concussion Incident Report (IR) module to a mobile tablet device or smartphone allows athletic trainers, who are typically the first medical

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personnel to evaluate an injured athlete, to track head injury details. Additional assessment modules are used to objectively characterize aspects of cognitive and motor status.

Tables 1–3 illustrate the tracking of incidents of concussion among student-athletes at schools with athletic trainers employed by the Cleveland Clinic. From August 2014 through July 2016, Cleveland Clinic athletic trainers completed IR on 1778 student-athletes with concussion, 1071 of which occurred during competition and 707 of which occurred during practice. The use of an IR tool provides data that will guide process improvement, facilitate patient hand-offs, and allow calculation of injury rates for communication to community partners.

Concussion IR were substantially higher in contact sports (n = 1313; 73.8%) and semicontact sports (n = 413; 23.2%), than in noncontact sports (n = 52; 2.9%). Boys football and girls soccer had the highest overall rates of sports concussion (see Table 1). Rates of concussion were higher in competition, than in practice, for all contact and semicontact sports, except boys football, and boys wrestling (see Tables 1 and 2). Among noncontact sports, concussion IR was most common in girls swimming and diving and girls track and field (see Table 3). Rates of noncontact sports concussion, especially girls swimming and diving, were higher when compared with a national sample (see Table 3).[1] A greater number of noncontact sport concussion occurred in practice than in competition in the Cleveland Clinic patient population (see Table 3). Also, higher rates of observed contact and semicontact sport concussions were reported among girls soccer, basketball, and volleyball when compared with a national sample (see Tables 1 and 2).[1] The presence of Cleveland Clinic high school athletic trainers at soccer, basketball, and volleyball practices and competitions likely improved detection. The increased popularity of soccer, as well as community education and awareness of concussion signs and symptoms, may contribute to greater incidence among these athletes.

Exertional Recovery

Guidelines from the American Academy of Neurology[2] and the National Athletic Trainers' Association,[3] which are based on the 2012 International Consensus

Table 1
Frequency of concussion among contact sport athletes, 2014 to 2016

Contact Sport	Game/Event, n (%)	Practice, n (%)	Total, n (%)
Boys football	332 (31.0)	365 (51.6)	697 (39.2)
Girls soccer	183 (17.1)	35 (5.0)	218 (12.3)
Boys soccer	99 (9.2)	22 (3.1)	121 (6.8)
Boys wrestling	42 (3.9)	55 (7.8)	97 (5.5)
Boys lacrosse	44 (4.1)	14 (2.0)	58 (3.3)
Boys hockey	39 (3.6)	6 (0.8)	45 (2.5)
Girls lacrosse	21 (2.0)	11 (1.6)	32 (1.8)
Boys rugby	17 (1.6)	4 (0.6)	21 (1.2)
Girls rugby	11 (1.0)	1 (0.1)	12 (0.7)
Girls hockey	4 (0.4)	2 (0.3)	6 (0.3)
Girls field hockey	3 (0.3)	1 (0.1)	4 (0.2)
Boys boxing	2 (0.2)	0 (0.0)	2 (0.1)
Totals	797 (74.4)	516 (73.0)	1313 (73.8)