Concussion Incidence and Trends in 20 High School Sports

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Background

Concussion is a common sports-related injury that is associated with adverse short- and long-term outcomes.

Publicizing this data may have contributed to a decline in football participation.

There has been a steady rise in high school sports participation overall.

All states have legislation related to concussion management.

It is important to document the changes in concussion rates over time, especially in the light of policy change.
Methods

National High School Sports-Related Injury Surveillance Study
- Academic years 2013-2014 and 2017-2018
- Sample of high schools with 1 or more athletic trainers (AT)
- 20 sports with participation

Reported injury incidence and athlete exposure (AE) information
- AE defined as 1 athlete participating in 1 school-sanctioned practice or competition

Concussion
- Occurring as a result of participation in an organized practice or competition
- Requiring medical attention
- Being diagnosed as a concussion
- All concussions recorded regardless of activity restrictions
## Sports included

<table>
<thead>
<tr>
<th>Boy’s football</th>
<th>Girl’s volleyball</th>
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<tbody>
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<td>Wrestling</td>
<td>Soccer</td>
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<td>Track and field</td>
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<td>Track and field</td>
<td>Co-ed cheerleading</td>
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Analysis

Data analyzed using SAS

Frequencies, distributions and rates per 10,000 AE with 95% confidence intervals

Injury rate ratios (IRR) compared injury rates by event types (competition vs practice, by sex in sex-comparable sports)

Injury proportion ratios (IPR) compared distributions by injury mechanism and recurrence (contact with another object)
Concussion Frequencies

9542 concussions reported

63.7% during competition

36.3% during practice

Most (81.6%) reported during the regular season
Concussion Rates

4.17 per 10,000 AE

Highest overall rate: boy’s football (10.4)

Girl’s soccer (8.19)

Boy’s ice hockey (7.69)

Overall incidence higher in competition than practice (10.37 vs 2.04)
  ◦ Cheerleading had higher incidence in practice (3.60 vs 2.22)

Overall higher incidence in girls (3.35 vs 1.51)

Temporal trend only found in boy’s football: increased in competition but decrease in practice

Incidence in practice: Boy’s football (5.01), cheerleading (3.60), Boy’s wrestling (3.12)
Timing Within Events

66.9% occurred after the first hour of practice

More concussions reported in the latter half of competitions
  ◦ In sports with quarters or halves, 54.5% occurred in the second half (third or fourth quarter)

Pre-competition/warmup rates were low except for girl’s volleyball and girl’s softball
Mechanism

Most due to contact with another person (62.3%)
  ◦ Higher in boys

Contact with surface 17.5%

Contact with equipment 15.8%
  ◦ Higher in girls
Recurrence

8.3% were recurrent

Boy’s ice hockey 14.4%
Boy’s lacrosse 12.1%
Girl’s field hockey 12.1%

Higher in girls in sex-comparable sports

Decreased rate of recurrent concussions across the study period

◦ Greatest in football
Limitations

Only data from high schools with ATs
Underreporting of symptoms by players
Misdiagnosis
AE as an at-risk exposure method vs hours/games
What can I do with this information?

Injury prevention efforts

Concussion efforts in football should focus on competition as well as practice

Focus on fatigue later in games

Focus on prevention in cheerleading
  ◦ Practice may occur in less-than-ideal places
  ◦ Less access to medical oversight and coaching support
  ◦ Learning new routines

Injury in precompetition or warmup – possibly due to both teams being on the court at the same time

Legislation may be having an impact, with decreased recurrence rates