

Rate of Injury Among Youth Lacrosse Players

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Objective: This study describes the rate of injury and the types and mechanisms of injuries incurred by girls and boys during youth recreational lacrosse.

Design: Prospective cohort study.

Setting: Games were played at a large turf community athletic complex.

Participants: Participants included male and female lacrosse players aged 9-15 years. A total of 143 games were played, resulting in 4603 athlete-exposures (AEs).

Assessment of Risk Factors: Youth players were grouped based on sex and 3 age categories: under 11 (U11; 9-10 years), under 13 (U13; 11-12 years), and under 15 (U15; 13-14 years).

Main Outcome Measures: Certified athletic trainers collected data on type of injury and injury mechanism.

Results: There were 6.3 injuries per 1000 AEs for boys and girls combined. Girls had 7 injuries (3.4 per 1000 AEs) and boys had 22 injuries (8.7 per 1000 AEs). Contusions and lacerations were the most frequent injury ($n = 13$), and body-to-body contact ($n = 10$) was the most common injury mechanism. There were 4 concussions among boys (U13 and U15) and none among girls.

Conclusions: Most injuries evaluated in youth lacrosse were contusions/lacerations; however, serious injuries were observed, including concussions in boys in the age group where body contact is allowed.

Key Words: lacrosse, youth, injury, concussion, sports, epidemiology
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INTRODUCTION

Lacrosse is one of the fastest growing team sports in the United States, with more than 680 000 players on organized

teams in 2011.¹ More than half of these players are younger than 16 years.¹ In boys' lacrosse, stick checking is allowed at the U11 (aged 9-10 years), U13 (aged 11-12 years), and U15 (aged 13-14) levels and body checking is allowed at the U13 and U15 levels.² Boys wear protective equipment including helmets, gloves, and shoulder pads. In girls' lacrosse, intentional body contact is not allowed and players wear protective eyewear and mouth guards. Although studies have documented the rates and types of injuries among collegiate and high school lacrosse players,³⁻⁵ no study has yet assessed injury rates among youth players. Data on injury rates in these players are needed to determine what types of injuries occur at the youth level of play. This information can help inform the sports' governing body in the development of age-appropriate rules and standards of play.

This study sought to use an injury surveillance system with trained clinicians to document injuries incurred by youth lacrosse players.

METHODS

Institutional review board approval was obtained for the study with waiver of informed consent. The study population included male and female lacrosse players aged 9-15 years participating in a recreational lacrosse program in spring 2010. The games were played at a large turf community athletic complex with a maximum of 2 games occurring at the same time. Youth teams were grouped based on sex and 3 age categories: U11, U13, and U15. A total of 143 games were played over the course of a 10-week season.

A certified athletic trainer (AT) was present at all games played. The AT provided coaches and parents with an information sheet that described the study and the role of the AT in evaluating on-field injuries. The AT maintained a central medical station between the 2 active fields and informed coaches before each game of the location of the medical station. If a player sustained an injury during a game or warm-up activity that prevented him or her from leaving the field, the AT would enter the field to evaluate the injury. Alternatively, if ambulatory, athletes were referred to the AT station by parents and coaches during and after games.

All injuries requiring medical attention by the AT were recorded using a reporting form that included information about the mechanism and severity of injury and player information. Players were asked detailed questions about how they were injured to ensure that appropriate data were collected regardless of whether the injury event was observed by the AT on site. Data were recorded regardless of whether participation time was lost. Concussion was diagnosed based

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on recognized concussion signs and symptoms.⁶ For serious injuries, players were referred to physicians for follow-up. If the injury required follow-up by a physician, the AT contacted the player's parents for confirmation of physician diagnosis and treatment. Athletic trainers did not follow-up with coaches after the games.

Results were reported as the rate of injury per 1000 athlete-exposures (AEs). An AE was defined as 1 athlete participating in 1 game in which he or she was exposed to the possibility of injury. The number of participating athletes for each game was recorded by the AT throughout the season. During the 2010 season, there were 2529 AEs for boys and 2074 AEs for girls.

RESULTS

There were 29 injuries requiring evaluation by an AT for a rate of 6.3 injuries per 1000 AEs. Girls had 7 injuries (3.4 per 1000 AEs) and boys had 22 injuries (8.7 per 1000 AEs). Injury rates were highest among U11 boys (18.3 injuries per 1000 AEs) (Table 1).

Contusions and lacerations were the most frequently reported injury for both boys and girls (n = 13, 2.8 per 1000 AEs combined). Of 4 fractures/dislocations, 3 occurred among U15 boys and 1 in U13 girls. Four concussions were reported among U13 and U15 boys (1.6 per 1000 AEs for boys) (Table 2). Three concussions resulted from body-to-body contact and 1 from contact with the ground. The most common mechanism of injury among boys was body-to-body contact (8 injuries, 6 in the U15 age group and 2 in the U11 age group). Five injuries involved contact with a stick, which all occurred in the U15 age group. For girls, contact with another body, a stick, or a ball was each associated with 2 injuries.

TABLE 1. Injury Frequency, AEs, and Rates (Per 1000 AEs) (95% Confidence Intervals) by Age Group and Sex

Age Group and Measures	Boys	Girls
U11 (aged 9-10 y)		
Injuries	4	1
AEs	219	187
Rate (95% CI)	18.3 (5.8-44.1)	5.3 (0.3-26.4)
U13 (aged 11-12 y)		
Injuries	3	1
AEs	307	466
Rate (95% CI)	9.8 (2.5-26.6)	2.1 (0.1-10.6)
U15 (aged 13-14 y)		
Injuries	15	5
AEs	2003	1421
Rate (95% CI)	7.5 (4.3-12.1)	3.5 (1.5-6.7)
Total		
Injuries	22	7
AEs	2529	2074
Rate (95% CI)	8.7 (5.6-13.0)	3.4 (1.5-6.7)

CI, confidence interval.

TABLE 2. Frequency (N) and Incidence Rate per 1000 AE of Injuries Among Youth Lacrosse Players by Sex

	Boys, n (IR)	Girls, n (IR)	Total, N (IR)
Contusion/laceration	10 (4.0)	3 (1.4)	13 (2.8)
Dislocation/fracture	3 (1.2)	1 (0.5)	4 (0.9)
Concussion	4 (1.6)	0 (0)	4 (0.9)
Sprain/strain	1 (0.4)	2 (1.0)	3 (0.7)
Wind knocked out	2 (0.8)	0 (0)	2 (0.4)
Undetermined*	2 (0.8)	1 (0.5)	3 (0.7)
Total	22 (8.7)	7 (3.4)	29 (6.3)

*Includes 2 unconfirmed injuries indicated as possible fractures. IR, incidence rate.

DISCUSSION

The majority of injuries for both boys and girls youth lacrosse players were minor and included strains, sprains, lacerations, and contusions. Less common but present were more severe injuries including fractures, dislocations, and concussions. All 4 concussions involved male athletes in the U13 and U15 age groups. All the fractures and dislocations also occurred among U13 and U15 players. Because health professionals are typically not present at youth lacrosse games, these findings suggest that it may be worthwhile to educate parents and coaches of youth players about signs and symptoms of concussion for injury identification and development of a concussion action plan for medical evaluation.

U11, the youngest age group, experienced the highest overall rate of injuries for both boys and girls. All the injuries were considered minor and were the result of incidental contact either with another player while running or with the ground after tripping and falling. This higher injury rate may be a reflection of the willingness of younger athletes to seek medical care. The lower skill level of these younger athletes may also have contributed to the higher overall injury rate seen in this age group.

These results are based on a single season of data collection with a single recreational league and therefore the results may not reflect experience in other youth lacrosse programs. Furthermore, the total number of injuries is low, limiting our ability to make comparisons between groups based on age and sex. It is possible that there was underdiagnosis or underreporting of injuries among those youth who chose not to seek on-site care or who experienced injury symptoms after leaving the field, but our surveillance system with ATs on site seems to have been effective in encouraging injured youth to seek medical care.

In conclusion, the 29 youth lacrosse injuries documented by certified ATs in this small sample showed that the majority of injuries were contusions/lacerations, but more serious injuries such as fracture, dislocation, and concussion did occur. Concussions were observed in boys' lacrosse at the level of play where body checking is allowed.

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REFERENCES

1. US Lacrosse. 2011 US Lacrosse participation survey. Available at: <http://www.uslacrosse.org/LinkClick.aspx?fileticket=tlqhe4P9DsM%3D&tabid=1464>. Accessed May 31, 2013.
2. US Lacrosse. *Youth Rules & Best Practices Guidebook for Boys*, 2nd ed. Available at: <http://www.uslacrosse.org/LinkClick.aspx?fileticket=LLXxOqGDRoU%3d&tabid=14314>. Accessed June 4, 2013.
3. Diamond PT, Gale SD. Head injuries in men's and women's lacrosse: a 10 year analysis of the NEISS database. National Electronic Injury Surveillance System. *Brain Inj*. 2001;15:537-544.
4. Dick R, Lincoln AE, Agel J, et al. Descriptive epidemiology of collegiate women's lacrosse injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 through 2003-2004. *J Athl Train*. 2007;42:262-269.
5. Hinton RY, Lincoln AE, Almquist JL, et al. Epidemiology of lacrosse injuries in high school-aged girls and boys: a 3-year prospective study. *Am J Sports Med*. 2005;33:1305-1314.
6. McCrory P, Meeuwisse W, Johnston K, et al. Consensus statement on Concussion in Sport 3rd International Conference on Concussion in Sport held in Zurich, November 2008. *Clin J Sport Med*. 2009;19:185-200.