

Original Research

The Effects of Concussion Legislation One Year Later—What Have We Learned: A Descriptive Pilot Survey of Youth Soccer Player Associates

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Objective: To assess the knowledge of youth soccer athletes' parents, coaches, and soccer officials regarding concussion and return-to-play guidelines contained in the Lystedt Law in Washington State.

Design: Survey study.

Setting: Surveys were distributed via the youth soccer association monthly electronic newsletter in September and October 2010. Links to the survey also were provided via the Washington Youth Soccer Facebook page and Twitter feed.

Participants: Respondents were 18 years or older and were associated with Washington Youth Soccer.

Main Outcome Measures: The percentage of correct responses to questions regarding the identification and management of concussion symptoms and return to play guidelines as outlined in the Lystedt Law.

Results: A total of 391 adults responded; 63% were exclusively parents, 20% were coaches, and 17% were noncoaches (eg, club officers, referees, or volunteers). A total of 96% knew that concussions were a type of traumatic brain injury, 93% identified concussions as serious, and 93% knew that loss of consciousness is not universal. From the responses, 98% identified neurological manifestations of concussions, 90% chose to delay return to play in the presence of neurological symptoms, 85% were aware of the Lystedt Law, and only 73% knew that players must receive written clearance to return to play. A total of 88% were aware that a parent or legal guardian was not allowed to clear an athlete to return to play if a trained professional was not available. Survey respondents were less sure of soccer association guidelines for reporting medical clearance to club officials.

Conclusions: These data suggest that, although general knowledge of parents, coaches, and referees in youth soccer in Washington State is high, gaps in knowledge and practice regarding the prevention of concussion in youth soccer athletes still exist.

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INTRODUCTION

Traumatic brain injury (TBI) is estimated to affect approximately 1.7 million Americans each year [1]. Most of these injuries are considered to be mild in severity and often are referred to as concussions. Approximately 20% of these concussions reported annually are sports related [2]. Recent data show an increasing rate of concussions in youth sports; a 2011 study showed a 4.2-fold increase in concussions in high school athletes during an 11-year period [3]. The long-term sequelae of concussions in teenagers and adults, especially in those with repeated injuries, are becoming more apparent [4], with persisting impairments in cognitive, behavioral, and physical domains [5]. Collegiate athletes who sustain concussions are 3 times more likely to experience second or third concussions and have slowed neurological recovery [6]. Similarly, high school athletes also have demonstrated prolonged recovery times compared with collegiate athletes, as well as worsening symptoms with recurrent injury [4,7].

Given these concerns, efforts to reduce the potential for long-term effects of concussion on young athletes by providing guidelines for return to play recently have been imple-

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mented in many states. The first of these efforts to be formalized in legislation was the Zackery Lystedt Law (Washington House Bill 1824), which was signed into law in May 2009. This law requires that coaches, parents, and youth athletes be educated about concussions and sign a “concussion and head injury information sheet” before initiating practice or competition. The law also requires that all youth athletes playing on public fields who are suspected of sustaining a concussion be removed from play and receive written medical clearance by a trained professional before returning to play. One year after the passage of this law, and with the recent substantial national attention given to the issue of sports concussions, we aimed to estimate the degree to which the adults closely associated with youth recreational and elite soccer in Washington State were familiar with symptoms associated with concussion and the return-to-play guidelines contained in the Lystedt Law. Secondary aims of this survey were to help identify areas where further educational or other soccer program initiatives might enhance prevention of concussion or recovery for youth soccer players.

METHODS

This survey was distributed to adults associated with the Washington Youth Soccer (WYS) association, including parents, coaches, and officials. The survey was distributed via the WYS monthly electronic newsletter for 2 consecutive months in September and October at the beginning of the 2010 youth soccer season. A link to the survey was present on the WYS Web site home page during that time and was available via the WYS Facebook page and Twitter feed. Participants clicking on the link initially were directed to a disclaimer noting that survey respondents were required to be 18 years or older and that participation was voluntary. This site also stated that any information entered into the survey was anonymous. Participants were asked only to identify their county of residence and role in the soccer community. This study was approved by the Human Subjects Division of the University of Washington.

Survey Instrument

The online research tool Catalyst was used to construct the survey. The survey included 53 questions, as well as a blank text box for comments and feedback (see the Appendix). The survey required less than 10 minutes to complete. The following items were included in the survey:

- basic demographic data, including the adult’s role in soccer community (eg, parent, coach, or official) and county of residence;
- multiple-choice questions designed to assess knowledge of symptoms of concussions and knowledge of the return-to-play requirements contained within the Lystedt Law; and

- multiple-choice questions regarding current practices of local soccer teams with regard to training and communication about concussion management.

Both descriptive and quantitative questions were asked. The latter involved numerical information (eg, “How often have you seen . . .”) or the use of ranking scales (eg, “Indicate your strength of agreement, with 1 being low and 4 being high”). Survey results were entered by subjects directly into a Web-based survey tool that collated results and allowed for descriptive analysis.

RESULTS

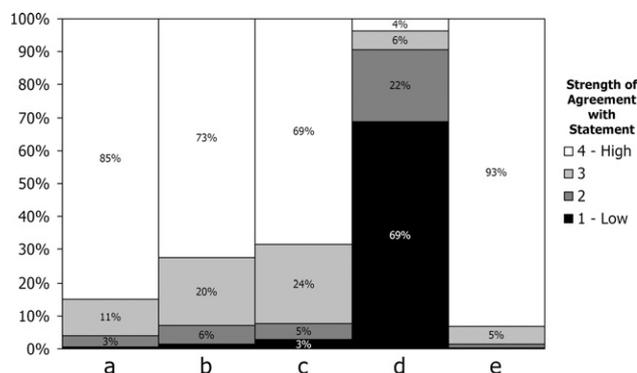
A total of 391 adults responded to the survey. Although the overall response rate was low in relation to the number of e-mail addresses to which the WYS newsletter was sent, no way exists to calculate the number of e-mail messages actually viewed by recipients. The responses followed a census-based geographic population distribution, indicating a reasonably distributed sample across the state. Of those who responded, 63% identified themselves exclusively as parents, 20% as coaches, and 17% as volunteers (eg, association officers, club officers, officials, and other volunteers).

Knowledge of Concussion Symptoms

Most respondents either somewhat agreed or strongly agreed that a concussion is a type of TBI (96%), that all concussions were serious (93%), that concussions can occur without a loss of consciousness (93%), and that identifying and treating a first concussion may prevent further injury (98%). Only 10% of respondents incorrectly chose such distractor items as “concussions were associated with heart attacks” or “numbness in hands and toes” (Figure 1). When asked whether a player should be held out of the game for given symptoms, 90%-100% of respondents chose to hold the player out for appropriate symptoms, such as loss of consciousness, confusion, appearing dazed, moving clumsily, balance problems, change of personality, difficulty remembering events, headache, nausea/vomiting, double/blurry vision, sensitivity to light/noise, memory problems, or answering questions slowly. Sixty-three percent of respondents chose to hold the player out if he or she forgot an instruction, whereas 31% were unsure what to do when a player presented with this symptom. In addition, 78% chose to hold the player out if he or she was not “feeling right” or “feeling down.” Eighty-three percent of respondents were able to correctly answer that continuing to play with a concussion may leave the player vulnerable to further injury and even death.

Lystedt Law Provisions

Most respondents (85%) were able to correctly state that the Lystedt Law mandated evaluation by a trained professional



Concussion Statements

- A concussion is a type of traumatic brain injury or TBI.
- All concussions are serious.
- Most concussions occur without loss of consciousness.
- Concussions are associated with heart attacks and heart abnormalities.
- Recognition and proper response to concussions when they first appear can prevent further injury or even death.

Figure 1. Knowledge of concussions and Lystedt Law. Participants were asked to mark the strength of their agreement with the following statements about concussion: (a) a concussion is a type of traumatic brain injury or traumatic brain injury (TBI); (b) all concussions are serious; (c) most concussions occur without loss of consciousness; (d) concussions are associated with heart attacks and heart abnormalities; and (e) recognition and proper response to concussions when they first appear can prevent further injury or even death.

prior to return to play. Seventy-three percent of respondents also knew that the player must receive written clearance to return to play. Most respondents (79%) were unaware that the trained professional could be a volunteer. The majority of respondents (88%) were aware that a parent or legal guardian was not allowed to clear a youth athlete to return to play, even if a trained professional were not available. Seventy-five percent of respondents noted that their organization had written policies and procedures about head injuries, whereas 20% were unsure.

Current Training Practices of Local Youth Soccer Teams

Significant variability was found among reported soccer team practices regarding a number of procedures that might be associated with concussion or might protect against concussion. Head gear commonly was not used for practice or play, with only 40% of respondents reporting usage of head gear. Variability also was found when respondents were asked whether younger players were being restricted from hitting the ball with their head (“heading”), with 34% noting some restrictions, 48% not aware of any restrictions, and 18% unsure of any policy about youth players heading the ball. When questioned about heading practices in older players, 63% of survey respondents reported knowledge that older players had been instructed in proper heading technique,

17% had not seen instruction for older players, and 20% were unsure if any instruction was provided. Seventy percent responded that they were unaware of team or individual instruction for neck-strengthening exercises.

Administration and Organization of Local Youth Soccer Teams

Most respondents (69%) were not aware of whether their soccer club tracked concussions for their team and individual members during practice sessions or games. Sixty percent of respondents were unable to identify a specific person associated with the soccer club who was in charge of compliance with return-to-play regulations. Most participants (89%) reported signing a “Concussion and Head Injury Information Sheet” before the beginning of practice and play as required by the Lystedt Law. Seventy-five percent of respondents believed they had adequate access to information related to head injury.

Additional Comments by Respondents

A free-text entry box was included as the last item on the survey. A review of the responses revealed 3 topics. First, response was positive to the recent focus on concussion in youth sports and the accompanying increase in concussion education. Second, respondents expressed concern about the lack of guidelines on heading and heading practices for youth soccer teams. Finally, numerous respondents mentioned that continued education and training directed toward referees would be particularly helpful for questions of return to play.

DISCUSSION

One year after the implementation of a state law mandating formal medical clearance for any concussions sustained on public fields in Washington State, we aimed to gauge awareness of adults involved in youth soccer about the law and concussion. Although we had no prelegislation baseline information to assess change, the results from this survey show that these adults demonstrated good general knowledge about concussions and the recent legislation. However, parents often did not have information about club level management of concussion or return to play. The survey also showed discrepancies in heading practice among the youth players.

Despite the overall awareness of parents and coaches about the signs and symptoms of concussions, gaps in knowledge and practice on the prevention of concussion in youth soccer still exist. Youth soccer clubs, manned primarily by volunteer coaches and often volunteer officials, would benefit from organizational structures to assist in collecting data on the incidence of concussion and return-to-play conditions. Although preseason baseline testing and registries are becoming more common at a high school level, consistent

educational efforts and data collection on concussions is spotty at best in recreational, elite, elementary, and middle school levels. In addition, research on effective ways to prevent concussion in children and youth is lacking, hampering efforts by adults associated with youth soccer to effectively prevent concussions.

Since the implementation of the Lystedt Law in 2009, many other states have passed similar laws mandating the evaluation of players before they return to the field of play. To our knowledge, few other studies have been conducted in which investigators examine knowledge about concussions and response to similar legislation in other states or other educational efforts. In previous studies, researchers have shown the effectiveness of education for coaches in prevention of concussions. One survey of high school coaches (mainly football) noted that "Heads Up" educational materials have been effective, with 82% of those who used these materials finding them useful and 50% stating that the materials changed their views on concussions [8]. Concussion education for youth sport coaches has been shown to improve knowledge about sideline head injury management, and coaches with concussion education reported fewer errors in identifying concussion symptoms that merited delay of return to play [8,9].

Comments in this survey point to a wide range of heading practices and head/neck protection strategies at this level of soccer play. Data are not sufficient to conclude that cumulative heading incidents result in neuropsychological impairments in adolescents [10,11]. In addition, the benefit of head protection has been a controversial topic in soccer. The use of protective headgear has not been shown to reduce damage from heading but has been shown to reduce head trauma caused by head-to-head collisions in adolescent soccer players [12,13]. Niedfeldt [14] has expressed concerns that the addition of headgear may lead to more aggressive heading among players. Further research would be highly beneficial in providing evidence on heading practices and outcomes among young soccer players.

This study had several limitations. Although almost 400 adults responded, this number represents only a small fraction of the adults involved in youth soccer. We did not have direct access to the subscriber base to allow direct contact with the individuals for this anonymous survey, which prevented targeted efforts to increase the response rate. It is likely that the respondents were adults who were most aware or concerned about concussions, which could bias the results in favor of higher knowledge levels on the part of the respondents. However, the geographic and adult category distributions of the respondents indicated that survey respondents were from a wide geographic area, comprising urban, suburban, and rural areas that reflect population distribution in the state, which lends strength to the report. The lack of any

baseline survey information prior to the initiation of the return-to-play legislation prevents us from assessing the overall effectiveness of the legislation in producing behavior change. In addition, the survey is focused on soccer and does not provide data for adults supervising other sporting activities.

In summary, our survey of adults connected with youth soccer in Washington State indicates that, in general, knowledge of concussion symptoms and legislative guidelines on medical clearance for return to play is good. Research on effective means of preventing concussion via equipment or practice guidelines would be highly beneficial.

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APPENDIX. August 2010 Youth Soccer Concussion Survey.

YOUTH SOCCER CONCUSSION SURVEY AUGUST 2010

1. What is your role in the Washington youth soccer community? (Select one or more answers)

Coach/Assistant Coach

Licensed Trainer

Referee

Referee Assignor

Parent

Club Officer

Club Assignor

Instructor

Association Officer

Volunteer

Other: _____

2. What is your county of residence? _____

3. Please mark the strength of your agreement with these statements about concussion.

| | Low | | | High |
|--|-----|---|---|------|
| A concussion is a type of traumatic brain injury or TBI. | 1 | 2 | 3 | 4 |
| All concussions are serious. | 1 | 2 | 3 | 4 |
| Most concussions occur without loss of consciousness. | 1 | 2 | 3 | 4 |
| Concussions are associated with heart attacks and heart abnormalities. | 1 | 2 | 3 | 4 |

| | Low | | | High |
|---|-----|---|---|------|
| Recognition and proper response to concussions when they first appear can prevent further injury or even death. | 1 | 2 | 3 | 4 |

4. Please indicate the strength of your agreement about the causes of concussions.

| | Low | | | High |
|---|-----|---|---|------|
| Concussions are caused by a bump, blow, or jolt to the head that can change the way your brain normally works. | 1 | 2 | 3 | 4 |
| Concussions can occur from a blow to the body that causes the head to move rapidly back and forth. | 1 | 2 | 3 | 4 |
| Even a "ding," "getting your bell rung," or what seems to be a mild bump or blow to the head can be serious. | 1 | 2 | 3 | 4 |
| Concussions can occur in any sport or recreational activity. | 1 | 2 | 3 | 4 |
| Concussion severity is greater in smaller players. | 1 | 2 | 3 | 4 |
| A repeat concussion that occurs before the brain recovers from the first can slow the recovery or increase the likelihood of having long-term problems. | 1 | 2 | 3 | 4 |

5. **You be the coach.** Which of the signs and symptoms listed below after a bump, blow or jolt to the head or body are sufficient reasons to keep a player out of play the day of the injury?

| | Keep Out | Return | Too Close |
|---|----------|--------|-----------|
| 1 = Definitely keep out of play | | | |
| 2 = Definitely return to play | | | |
| 3 = Too close to call | | | |
| Appears dazed or stunned | 1 | 2 | 3 |
| Is confused about assignment or position | 1 | 2 | 3 |
| Forgets an instruction | 1 | 2 | 3 |
| Is unsure of game, score, or opponent | 1 | 2 | 3 |
| Is excessively hungry | 1 | 2 | 3 |
| Moves clumsily | 1 | 2 | 3 |
| Answers questions slowly | 1 | 2 | 3 |
| Complains of being hot or cold | 1 | 2 | 3 |
| Shows moves, personality, or behavior changes | 1 | 2 | 3 |
| Can't recall events PRIOR to hit or fall | 1 | 2 | 3 |
| Can't recall events AFTER hit or fall | 1 | 2 | 3 |
| Loses consciousness (EVEN BRIEFLY) | 1 | 2 | 3 |

6. **You be the parent.** Your daughter or son reports the signs and symptoms listed below after a bump, blow, or jolt to the head or body. Which are sufficient reasons to keep them out of play the day of the injury?

| | Keep Out | Return | Too Close |
|--|----------|--------|-----------|
| 1 = Definitely keep out of play | | | |
| 2 = Definitely return to play | | | |
| 3 = Too close to call | | | |
| Headaches or "pressure" in head | 1 | 2 | 3 |
| Nausea or vomiting | 1 | 2 | 3 |
| Reports feeling feverish | 1 | 2 | 3 |
| Double or blurry vision | 1 | 2 | 3 |

1 = Definitely keep out of play

2 = Definitely return to play

3 = Too close to call

| | Keep Out | Return | Too Close |
|--|----------|--------|-----------|
| Sensitivity to light | 1 | 2 | 3 |
| Sensitivity to noise | 1 | 2 | 3 |
| Numbness in hands and toes | 1 | 2 | 3 |
| Feeling sluggish, hazy, foggy, or groggy | 1 | 2 | 3 |
| Concentration or memory problems | 1 | 2 | 3 |
| Confusion | 1 | 2 | 3 |
| Does not "feel right" or is "feeling down" | 1 | 2 | 3 |
| Balance problems or dizziness | 1 | 2 | 3 |

7. Washington's Zackery Lystedt Law states (Select one or more answers)

- Continuing to play with a concussion or symptoms of head injury leaves the young athlete especially vulnerable to greater injury and even death.
- A youth athlete who has been removed from play may not return to play until the athlete is evaluated by a licensed health care provider trained in the evaluation and management of concussion.
- The youth athlete must receive written clearance to return to play from a licensed health care provider.
- The health care provider may be a volunteer.
- If no licensed health provider is available, the parent or legal guardian may give written clearance to return to play.

8. Tell us what you have witnessed about the following activities at practice or in games.

1 = Have not seen this

2 = Have seen this

3 = Not sure

| | Not Seen | Seen | Not Sure |
|--|----------|------|----------|
| Players wear protective head gear (such as "ForceField Headbands") | 1 | 2 | 3 |
| Goal posts are padded on the practice pitch | 1 | 2 | 3 |
| Players do neck-strengthening exercises | 1 | 2 | 3 |
| Younger players are not allowed to head the ball | 1 | 2 | 3 |
| Older players are instructed on proper heading technique | 1 | 2 | 3 |

9. Please tell us about any firsthand experience you have had with youth soccer head injuries *since July 2009*.

| | Never | Once | 2-5 Times | More than 5 Times |
|---|--------------|-------------|------------------|--------------------------|
| 1 = Never | | | | |
| 2 = Once | | | | |
| 3 = Two to five times | | | | |
| 4 = More than five times | | | | |
| Concussions are caused by a bump, blow, or jolt to the head that can change the way your brain normally works. | 1 | 2 | 3 | 4 |
| Concussions can occur from a blow to the body that causes the head to move rapidly back and forth. | 1 | 2 | 3 | 4 |
| Even a "ding," "getting your bell rung," or what seems to be a mild bump or blow to the head can be serious. | 1 | 2 | 3 | 4 |
| Concussions can occur in any sport or recreational activity. | 1 | 2 | 3 | 4 |
| Concussion severity is greater in smaller players. | 1 | 2 | 3 | 4 |
| A repeat concussion that occurs before the brain recovers from the first can slow the recovery or increase the likelihood of having long-term problems. | 1 | 2 | 3 | 4 |

10. Please tell us about your experiences with youth soccer head injury training *since July 2009*.

| | Disagree | Agree | Not Sure |
|---|-----------------|--------------|-----------------|
| 1 = Disagree | | | |
| 2 = Agree | | | |
| 3 = Not sure | | | |
| My organization has an individual(s) trained in evaluation and management of concussions. | 1 | 2 | 3 |
| I have access to accurate information regarding soccer-related head injury. | 1 | 2 | 3 |
| My organization has written policies and procedures about head injuries. | 1 | 2 | 3 |
| I have signed a Washington Youth Soccer "Concussion Information Sheet" for my son or daughter. | 1 | 2 | 3 |
| Our soccer club collects information on all suspected concussions from practice sessions and games. | 1 | 2 | 3 |

11. For parents: Please indicate the ages of the youngest and oldest youth soccer players in your family for the 2009-2010 season.

| | <6 | <8 | <10 | <12 | 14 or younger | 15 | 16 | 17 | 18 or older |
|---|--------------|--------------|---------------|---------------|----------------------|-----------|-----------|-----------|--------------------|
| 1 = Younger than 6 years | | | | | | | | | |
| 2 = Younger than 8 years | | | | | | | | | |
| 3 = Younger than 10 years | | | | | | | | | |
| 4 = Younger than 12 years | | | | | | | | | |
| 5 = Age 14 or younger | | | | | | | | | |
| 6 = Age 15 years | | | | | | | | | |
| 7 = Age 16 years | | | | | | | | | |
| 8 = Age 17 years | | | | | | | | | |
| 9 = Age 18 years or older | | | | | | | | | |
| We only had one child in youth soccer last season | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Youngest youth soccer player | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Oldest youth soccer player | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

12. Thank you for taking this youth soccer concussion survey. Please add any comments you believe the study team should hear.
