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Susan C. Davies

Kathryn Coxe

Hosea Harvey

Bhavna Singichetti

Jinhong Guo

See next page for additional authors

Author(s)
Susan C. Davies, Kathryn Coxe, Hosea Harvey, Bhavna Singichetti, Jinhong Guo, and Jingzhen Yang

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Qualitative Evaluation of High School Implementation Strategies for Youth Sports Concussion Laws

Susan Davies, EdD, NCSP*; Kathryn Coxe, MSW†; Hosea H. Harvey, JD, PhD‡; Bhavna Singichetti, MPH§; Jinhong Guo, PhD§; Jingzhen Yang, PhD, MPH§

*Department of Counselor Education and Human Services, University of Dayton, OH; †Department of Quality, Planning, and Research, Ohio Department of Mental Health and Addiction Services, Columbus; ‡Beasley School of Law, Temple University, Philadelphia, PA; §Center for Injury Research and Policy, Nationwide Children's Hospital, Columbus, OH

Context: All 50 states and the District of Columbia have enacted laws governing concussion management and education. These concussion laws, featuring common tenets regarding removal from play, return to play, and concussion education, have shaped school and district policies.

Objective: To evaluate the strategies commonly used to implement concussion laws at the school and district levels, as reported by certified athletic trainers (ATs).

Design: Qualitative study.

Setting: High schools.

Patients or Other Participants: We interviewed 64 ATs from high schools (1 per school) participating in High School Reporting Information Online.

Data Collection and Analysis: Interviews were conducted with participants between April and October 2015 regarding implementation of the 3 core tenets of concussion laws. Research team members independently evaluated the interview transcripts and field notes to identify common themes in implementation strategies.

Results: Of the 64 schools represented, 90.6% were public schools, 89.1% sponsored more than 15 sports, and all schools employed at least 1 AT and had a written concussion policy. Four commonly used strategies to implement removal from play were reliance on coaches, immediate response, referral and guidance after injury, and notification of key individuals. Use of assessment or baseline tests, communication among parties involved, reliance on AT assessments, and return-to-learn policies were 4 frequent strategies to implement return to play. Finally, 3 major implementation strategies to effectuate concussion education were use of existing educational tools, timing of education, and concussion training for school professionals.

Conclusions: Although concussion laws were passed at different times and varied in content across states, common themes in implementation strategies emerged across jurisdictions. The identification of strategic approaches to implementation will help ensure proper concussion management and education, reducing negative health outcomes among youths with concussions.

Key Words: traumatic brain injuries, adolescents, return to play

Key Points

- Implementation of concussion laws in schools relies on common tenets: removal from play, return to play, and concussion education.
- High school athletic trainers indicated that removal from play was facilitated by coaches, an immediate response, postinjury referrals, and notification of key individuals.
- Return to play was facilitated by the use of baseline tests, communication across parties, athletic trainers' assessments, and return-to-learn policies.
- Concussion education was facilitated by educational tools, timing of education, and training school professionals.

Each year in the United States, between 1.1 million and 1.9 million sports- and recreation-related concussions occur among children and adolescents.[1] Youths who sustain concussions and prematurely return to activity can be at risk for intensified symptoms, prolonged recovery, additional injuries, and even permanent disability.[2] Certified athletic trainers (ATs)—who are often the first to recognize and respond to concussions—work directly with youth athletes, coaches, school staff, and medical providers to ensure that concussed athletes are monitored for a safe return to activity. These ATs commonly supervise and implement the return-to-play protocols that may be required by state law and further dictated by district or school policy.

State-level youth sports concussion laws were initially implemented as a response to a perceived rise in youth sports concussions and associated health consequences.[3] All 50 states and the District of Columbia now have laws that govern schools' responsibilities in concussion management.[4] Such laws are typically based on 3 core tenets: (1) removal from play of any athlete with a suspected concussion, (2) return to play only after the athlete receives clearance from a qualified health care professional, and (3) education of coaches, parents, and athletes about concussion.[5] These statewide laws have in turn shaped district

policies, but some districts, schools, and state athletic associations have enacted policies that are even more restrictive than their state laws. For example, a school district may require more extensive concussion training, a longer wait to return to play, or a protocol for establishing a school-based concussion-management team. These variations may be due, in part, to a district's or school's capacity and resources as well as to systems of communication among stakeholders.

Although enactment of such laws and policies is an important step in proactively addressing the health and safety concerns of athletes, little is known about how such laws and policies have been implemented at the school level,[6] including what strategies are commonly being used in the successful implementation of such state laws and school policies. The socio-ecological model suggests that for state youth concussion laws to be effective, the policy intervention must take place in cycles on multiple levels: initiated at the state level, implemented via school systems, and culminating with individual athletes.[7] Guided by this framework, we used a qualitative approach to evaluate the implementation of concussion laws at the high school level. Specifically, we analyzed the strategies reported by ATs that have been used to facilitate the implementation of concussion laws and policies in their schools. Our results can be used as evidence for informed school policy adoption and implementation, directed at preventing youth sports concussions and reducing associated long-term health consequences.

METHODS

Study Participants

This qualitative study was part of a larger study pertaining to implementation of concussion policies at the school level after the enactment of state youth sports concussion laws. Study participants in the larger study were ATs and athletic directors (ADs) from high schools participating in High School Reporting Information Online (HS RIO). High School RIO is a prospective, longitudinal, Internet-based surveillance system established in 2005 that collects sports-related injury data among a nationally representative sample of high schools in the United States.[8]

Data Collection

To protect the privacy of HS RIO participants, access to potential participants was obtained through e-mails sent by HS RIO administrators. Two rounds of e-mail invitations were sent in April and July 2015 to high schools that actively participated in HS RIO in the 2014–2015 or 2015–2016 (or both) academic years. The e-mail invitations included details about the study, a personalized letter, and contact information for the researchers. Specifically, we requested involvement of the individuals who were the most active in their school's policy. Interested individuals were instructed to contact the researchers to schedule and participate in a 30-minute phone interview regarding their respective school's strategies for implementing state concussion laws. A total of 71 participants, 64 ATs and 7 ADs, agreed to participate in the larger study and completed a phone interview between April and October 2015. Detailed information on recruitment, sample size, and data-collection procedures are reported elsewhere.[9] For the purposes of this study, only interviews from ATs were included and reported.

Each interview lasted 30 to 40 minutes. All interviews were conducted by a trained researcher, audio recorded with verbal permission from each participant immediately before the interview, and transcribed verbatim by the same researcher after each interview. This study was approved by the institutional review board at the primary research site.

Interview Guide

A semistructured telephone interview guide was created to collect data on the implementation procedures and practices of participating high schools. The interview questions were developed using the *Codebook for Youth Sports Traumatic Brain Injury Laws* and protocols developed for the state concussion-law policy surveillance portal[10] as well as existing literature on concussion-law and policy implementation.[5,11–15] Additional prompts were included to solicit more details about the strategies used for concussion-law implementation. The initial interview guide was reviewed by 3 concussion researchers and 1 concussion-law researcher. The revised interview guide was then pilot tested with 2 additional concussion researchers and 2 high school ATs.

The final interview guide consisted of 11 demographic questions about the participants and their high schools as well as 15 questions about concussion-law implementation at schools, organized by the 3 tenets of concussion law (removal from play, return to play, concussion education).[5] Each participant was asked whether and how his or her school had implemented the 3 tenets of concussion laws. An open-ended question, "What are some action steps or strategies your school has taken or utilized when implementing and/or following concussion laws?" elicited more detailed responses for the 3 tenets of the concussion laws. The interview guide did not change during the course of the study.

Data Analysis

Transcripts of the 64 interviews were distributed for analysis to all members of the research team; all were trained in qualitative data-analysis methods. Guided by the principles of grounded theory, we first independently compared the transcripts with the field notes recorded during the interviews and then used them to identify common themes in the implementation strategies across the 64 interviews. The identified themes focused on the most common action steps or strategies high schools had taken or used to facilitate school-level implementation of the 3 tenets of their state concussion laws. Only themes that were consistent across a majority of the interviews were selected for the initial analysis. Selected themes were further analyzed to identify the dominant themes of implementation strategies, and a consensus was reached among the research team. This process was repeated until no new themes emerged. The resulting common implementation strategies were then paired with direct quotations from the transcripts. In addition, we identified consistent subthemes in interviews.

RESULTS

Demographic Characteristics of Schools and Participants

A total of 64 high schools from 26 states and the District of Columbia were included in the study, with 90.6% of these schools being public and 89.1% sponsoring more than 15 sports. All 64 schools employed at least 1 AT, with one-third (n = 22, 34.4%) of the schools employing at least 1 additional AT. All participating schools had written concussion policies, and 50 ATs (78.1%) were involved in the development of their school or district concussion policies, either alone or in collaboration with a concussion-management team that included an AT, AD, teacher, and physician.

Strategies to Implement the Removal-From-Play Tenet

Four major policy-implementation strategies were commonly used for the removal-from-play tenet: (1) reliance on coaches; (2) immediate response; (3) referral and guidance after injury; and (4) notification of key individuals (Table).

Reliance on Coaches. The majority of participants perceived the important role that coaches play in identifying an athlete with a possible concussion and consequently removing the athlete from play when a concussion is suspected. Their role became even more critical in the absence of an AT. As a participant from Texas stated, "The coaches take care of it if we're not immediately around . . . they're still referring them [student-athletes] back to us."

Coaches were also often designated in established protocols at many schools as a "secondary individual" to remove an injured athlete from play in the absence of an AT. Thus, to enable coaches' assumption of that responsibility, many schools had additional coach education requirements, such as completing training courses provided by the National Federation of State High School Associations or the "Heads Up" program developed by the Centers for Disease Control and Prevention.

Immediate Response. Many participants acknowledged the importance of removing injured athletes from play as part of the immediate response after a suspected concussion. Immediate responses also included sideline testing, medical attention, and notification of parents. For example, a participant from Delaware noted, "As soon as a suspected concussion occurs, the sideline assessment is administered to the student." A participant from Maine elaborated, "we make sure the parent gets notified right away to take them [student-athletes] to a facility to get examined."

Referral and Guidance After Injury. Many participating schools had established concussion-management protocols that allowed ATs to work closely with medical professionals in making referrals for injured athletes to receive timely medical treatment and speed recovery from a concussion. One participant from New York described the school's process as follows:

> We have 2 chief medical officers specifically for concussions, so if any athlete is removed from play because of any signs and symptoms of a concussion, they have to go and see 1 of those 2 doctors.

Many schools also required that injured athletes and their parents receive written or oral (or both) take-home instructions on follow-up care after removal for a suspected or actual concussion. This information included a list of concussion signs and symptoms as well as important contact information for the AT, school nurse, or physician.

Notification of Key Individuals. Finally, schools also established protocols for notifying school nurses, administrators, teachers, referees, and other key personnel about the injury. One Maryland-based participant commented, "I e-mail our school nurse and she will notify the teachers whether [the child will be attending class], and if he has any symptoms, [they will] send him to the nurse's office."

In some schools, referees are also notified when an injured athlete is not ready to return to play. One participant from Illinois attested to this notification: "I've had athletes try to go back in, and sometimes coaches and us [sic] don't notice it, so definitely notify the referees."

Strategies to Implement the Return-to-Play Tenet

Four policy-implementation strategies were used frequently for the return-to-play tenet: (1) use of assessment or baseline tests; (2) communication among the parties involved; (3) reliance on AT assessments; and (4) return-to-learn policies, which are not typically considered as part of the return-to-play tenet (Table).[1]

Use of Assessment or Baseline Tests. Multidimensional assessment batteries (eg, Immediate Post-Concussion Assessment and Cognitive Testing [ImPACT; ImPACT Applications, Inc, San Diego, CA], Sport Concussion Assessment Tool [SCAT; Concussion in Sport Group], Cogstate [Melbourne, Australia]) and symptom scores were identified as helpful tools for informing the return-to-play decision. As one participant from Ohio explained, "After 24 hours, they must have a symptom score of zero and pass the ImPACT to not be referred out [for further assessment]." A respondent from Texas described the testing procedure for students whose symptoms were evident past the initial 24 hours: "We'll test them on that ImPACT computer program . . . whenever their scores are back to baseline and their doctor clears them, we start them on the 5-step return to play."

Communication Among the Parties Involved. Many participants also emphasized the importance of timely and continuous communication among health care professionals and other key individuals who interact with the concussed athlete during injury recovery. A Wisconsin-based participant said, "Anytime they get a concussion, I'm constantly in contact with the parents . . . and I also connect with the teachers. . . . And the coaches are also updated . . . like a day-to-day process."

Reliance on AT Assessments. In some states, youth sports concussion laws permit ATs to provide the requisite return-to-play clearance. All schools represented in this study employed at least 1 full-time AT, and many of these ATs worked closely with concussed athletes during their recovery, including using gradual return-to-play protocols to control the level of improvement and to ensure that recovery was complete before full participation (with contact) in the sport. One participant from Connecticut portrayed the process this way:

Table. Strategies Used to Implement Concussion Laws in High Schools Continued on Next Page

Theme	Subtheme	Quotes (State Abbreviation)
Tenet 1: Removal from play		
Reliance on coaches		"The coaches take care of it if we're not immediately around . . . they're still referring them back to us." (TX)
		"[Coaches] can have up to 3 violations. The third violation is a permanent suspension from coaching any athletic activity. Our first violation is suspension from coaching any athletic activity for the remainder of the season. The second is suspension from coaching any athletic activity for the remainder of the season and next season." (PA)
Immediate response		"If it's more than just a minor concussion, we make sure the parent gets notified right away to take them to a facility to get examined." (ME)
		"As soon as a suspected concussion occurs, the sideline assessment is administered to the student." (DE)
Referral and guidance after injury	Referral	"We have 2 chief medical officers specifically for concussions, so if any athlete is removed from play because of any signs and symptoms of a concussion, they have to go and see 1 of those 2 doctors." (NY)
		"They get a head injury home care sheet that goes home with them with information for parents to look for to take them to the ER . . . then they have to follow up with their primary care or one of the docs that we work with through the orthopedic clinic." (GA)
	Guidance	"When we remove the child, we do send home another concussion information sheet with signs and symptoms for the parents to be aware of along with all the contact information for myself." (SC)
		"We also send home athletes with a triplicate carbon copy form to indicate the signs and symptoms the athlete has and appropriate treatment measures that should be done, signs and symptoms to look out for, and there's a place for the parents to sign saying that you've handed them this form." (NC)
Notification of key individuals		"I e-mail our school nurse and she will notify the teachers whether [the child will be attending class], and if he has any symptoms, [they will] send him to the nurse's office." (MD)
		"I've had athletes try to go back in, and sometimes coaches and us [sic] don't notice it, so definitely notify the referees." (IL)
Tenet 2: Return to play		
Use of assessment or baseline tests		"We'll test them on that ImPACT [Immediate Post-Concussion Assessment and Cognitive Testing] computer program . . . whenever their scores are back to baseline and their doctors clears them, we start them on the 5-step return to play." (TX)
		"As soon as a suspected concussion occurs, the sideline assessment . . . is administered to the student." (DE)
Communication among parties involved		"The people at the clinic and the [certified athletic trainer] are in constant communication about the child." (OH)
		"Anytime they get a concussion I'm constantly in contact with the parents of the whole steps and phases, and I also connect with the teachers. . . . And the coaches are also updated, like a day-to-day process." (WI)
Reliance on certified athletic trainer assessments	Medical clearance	"We have had instances where a physician has cleared a student but we don't feel like they're ready. So we will hold them and make them go through our protocol even if it's more extensive . . . just because they have clearance from someone else doesn't mean that we will clear them." (IL)
		"There have been times when a doctor has cleared them and we've actually held them out longer than what the doctor has said . . . we just know them more on a personal level and know that it's not right yet." (TX)
	Gradual return to play	"Everybody goes through a return-to-play protocol. It can vary from student to student, and that's set up with agreement between myself and the team physician." (OH)
		"We wait 48 hours after they're symptom free, or the doctor allows and they're symptom free, then we start the return-to-play protocol, which is typically a 5-step process, and watch all the symptoms over the course of that time." (CT)
Return-to-learn policies		"This year or next year, [we will] do a staff-wide concussion-training course. We're really focusing now on the return to learn, because everybody kind of gets the return to play, but we're really trying to make sure our student-athletes are returning to student work as well." (WI)
		"What we do is we make sure we monitor them in school also, so the teachers and guidance counselors are also e-mailed to let them know that somebody has a concussion and [to] make accommodations as necessary." (ME)
		"Our concussion policy . . . includes academics, like accommodations following injury. Therefore, the student, any time they receive a concussion, they meet with the school psychologist or counselor . . . and physician, and they go through all of the accommodations that would occur and the reasons that they would need it." (IN)
Tenet 3: Concussion education		
Use of existing educational tools		"I show them a concussion video, it's usually the NCAA [National Collegiate Athletic Association] one. I find that one probably the best one for students, so they know the signs and symptoms." (MD)
		"I try to look for [posters] that are more graphic and will catch the kids' attention." (DC)

Table. Continued From Previous Page

Theme	Subtheme	Quotes (State abbreviation)
Timing of education	Preseason	"We do a PowerPoint every year at the 'meet the coaches' night . . . basically answering some questions of . . . taboos parents have heard like 'I'm supposed to wake my kid up every 30 minutes at night' and kind of just debunk some myths." (MD)
	Postconcussion	"Once a student sustains a concussion, we review all the signs and symptoms, and we go over what they have to do to return them to play . . . the consequences, the long-term effects if they don't follow what they need to do." (OH)
	Baseline testing	"Typically, I do all the baseline testing, so I will use that as an opportunity to give some additional education about why we're doing this test and what the purpose is." (WI)
Concussion training for school professionals		"We have done a very good job at educating. Our principal and administration is [sic] completely on board with what's going on . . . we've had meetings with teachers, so teachers are completely on board and know what's going on. I mean we've just done a lot of educating and start at like the seventh-grade level so that when they do get to high school, it's not new." (PA)

> We wait 48 hours after they're symptom free, or the doctor allows, and they're symptom free, then we start the return-to-play protocol, which is typically a 5-step process, and watch all the symptoms over the course of that time.

Many participants identified a default level of risk aversion in approving return to play. Whereas they nearly always worked in conjunction with physicians, at times they did not agree with clearance by a physician who they felt might not know the athlete as well as they did. According to the explanatory statement by a Texas-based participant, "We've actually held them out longer than what the doctor has said . . . we just know them more on a personal level and know that it's not right yet."

Return-to-Learn Policies. Finally, return-to-learn policies and procedures emerged as a key component of concussion recovery despite not being a core tenet and not being required by the majority of states represented in the interview population. As a participant from Maine observed, "we make sure we monitor them in school also, so the teachers and guidance counselors are also e-mailed to let them know that somebody has a concussion and make accommodations as necessary." A respondent from Wisconsin remarked,

> This year or next year, [we will] do a staff-wide concussion-training course. We're really focusing now on the return to learn, because everybody kind of gets the return to play, but we're really trying to make sure our student-athletes are returning to student work as well.

Strategies to Implement the Concussion-Education Tenet

Three major policy-implementation strategies were most often applied to the concussion-education tenet: (1) use of existing educational tools, (2) timing of education, and (3) concussion training for school professionals (Table).

Use of Existing Educational Tools. Many schools used materials created by outside organizations for concussion education. For example, the "Heads Up" poster created by the Centers for Disease Control and Prevention has been used as a visual educational tool for athletes both in locker rooms and in high-traffic areas around the school. Some schools also required athletes to watch concussion-education videos produced by the National Federation of State High School Associations, though the videos were developed for coaches. In addition, some schools used a state athletic association Web site or the National Athletic Trainers' Association Web site for educational materials.

Timing of Education. Many schools used preseason parent and team meetings to add to their concussion-education programs. Custom-developed computer presentations or videos were shown, rather than relying on information sheets that individuals might not read. Several schools used one-on-one conversations or brought in medical staff during preseason baseline testing to discuss concussion signs and symptoms and to stress the importance of reporting. One Ohio-based participant described, "We do baseline testing on all of our athletes . . . [the] concussion clinic came in to do the ImPACT testing, educate kids on signs and symptoms, and talk about what to do if a concussion occurs." A participant from Illinois stated, "We have gone to educating the athletes more than having them reading stuff online or on a pamphlet. We have brought in our team physician before to talk to the kids, [who] comes in about once a year."

Several participants also mentioned the opportunity for concussion education after an injury because symptoms often develop several days later. Many schools also used this postconcussion period to reiterate the safe return-to-play steps in the concussion policy.

Concussion Training for School Professionals. Concussion education for school professionals inside and outside of athletics, including teachers and counselors, was included in many schools' concussion-management protocols. This emphasizes the importance of creating a network of professionals knowledgeable about concussion symptoms and conveying the responsibility that each staff member has in reporting and managing concussions in various settings, including classrooms and meetings. One participant from Maine relayed this information about such a program:

> The teachers are notified whenever they have a student in class that's dealing with a concussion and then there are steps put into place that allows the student to make up any missed work or have class assignments altered in a way that allows them to complete assignments, and that allows them to heal from the injury.

In some schools, school nurses and physicians were also trained to recognize concussion symptoms and to communicate with all other staff members who interact with concussed athletes. Study participants referred to this as a "checks-and-balances" procedure: school attendance, practice and game participation, and return-to-learn protocols were all monitored to ensure that an athlete did not return to any activity too early or late during recovery.

DISCUSSION

As of 2014, all states and the District of Columbia had enacted youth sports concussion laws, which require implementation at the district, school, and sport levels. We used a qualitative approach to engage ATs in identifying common strategies that facilitate the implementation of concussion laws in high schools. The results indicated that effective implementation of the core tenets of concussion law goes beyond simply removing injured athletes from play, monitoring them for return to play, and distributing information sheets. The ATs who participated in this study largely emphasized the importance of involving multiple stakeholders and using various existing resources for the successful implementation of their state concussion laws and policies at the school level. For example, in the first tenet (removal from play), 3 of the 4 themes related to working with other people—relying on coaches, providing referrals, and notifying key individuals. The ATs also highlighted the necessity of ensuring that student-athletes not only have a safe return to play but also a safe return to learn.

Tenet 1: Removal From Play

Because ATs are not in attendance at every athletic event—particularly those involving younger athletes—they rely on coaches to recognize and respond to athletes with possible concussions. This involves training coaches in the signs and symptoms of concussion and, in some cases, changing the "shake-it-off" culture surrounding concussions.[16,17] Removal-from-play decisions also generally required immediate injury assessment, referral information, and postinjury education materials. Finally, educating athletes preinjury to better recognize concussion and notifying parents and other stakeholders immediately postinjury align with best practices, which suggest that the more people who know about a concussion, the more likely the patient will be managed appropriately.[18]

Tenet 2: Return to Play

Although most state laws do not require baseline testing, our participants indicated that such tests are useful in decision making for injury identification and return to play. Participants also emphasized the value of communication among the parties involved in the return-to-play process. This finding aligns with best-practice recommendations that suggest the implementation of a school-based concussion team, preferably with a designated team leader, to ensure a coordinated, collaborative process for sharing information and supporting the concussed athlete.[18,19]

The ATs in this study also highlighted their own expertise and value in facilitating return-to-play decisions.[20] They were uniquely positioned to implement return-to-play protocols and to contribute to return-to-play decisions due to their presence on staff, their background and training, and their personal knowledge of individual athletes' typical demeanor.[9] In addition, many states allow ATs to provide return-to-play clearance to concussed athletes. Often, although physicians are designated to provide clearance, an AT may override this decision and keep an athlete out of play longer. This divergence of opinion suggests the value of a larger stakeholder team for evaluating injury and return-to-play decisions.[14]

Many schools require an athlete to return to the classroom before returning to play. In these cases, ATs ensured that teachers, counselors, and school psychologists became knowledgeable about the policies and that they were educated on possible cognitive deficits and accommodations that might be necessary for the athlete. Furthermore, the ATs remained in constant communication with the medical staff to safely reintegrate the athlete into the classroom and then back to play.

Tenet 3: Concussion Education

Our population followed the accepted principle that the most influential concussion education is facilitated by existing educational tools, such as videos, posters, handouts, Web sites, and outreach presentations.[21] Given that participants in this study were ATs, their suggestions understandably focused on logical timing of concussion education for athletes (preseason, postinjury). School-wide or system-wide concussion management encompasses all students—not only athletes. Therefore, an additional opportunity to provide education about concussion is before the start of the school year, so all school personnel are more aware of potential complications that can accompany a premature return to activity.[18]

Participants in this study emphasized that having comprehensive concussion team training helped ensure that multiple professionals better understood how to recognize, report, and treat concussions as well as how to support the injured athlete and his or her family. For example, when teams train together, they can be better assured that educators and athletic personnel are hearing the same information, which may validate the influence of a school- or district-based concussion team.[22]

Limitations

It is important to note that these findings represent perspectives from 1 member (eg, AT) of what is typically a collaborative concussion-response team. Thus, the collected responses may not represent other key individuals, such as school nurses and administrators, who are involved in the implementation of policies mandated by concussion laws. Second, despite drawing from a national sample, our participants represented only high schools participating in HS RIO, which all employ ATs who provide care to their student-athletes. Therefore, our findings might not represent schools without ATs. Third, because concussion laws varied by state, the reported successful concussion–policy-implementation strategies could vary by school and may not be generalizable to all schools. Finally, our responses were affected by response bias, due to the recruitment method, and relied on the assumption that participants were

being truthful and honest in their descriptions of school policies.

CONCLUSIONS

Concussions laws are relatively new in most states. Thus, it is imperative that those who are responsible for creating and implementing policies derived from such laws, particularly policies relating to the 3 tenets (removal from play, return to play, and concussion education), are well versed in strategies that improve and facilitate the implementation of such laws.[23] We identified several key implementation strategies, including but not limited to the roles of key individuals, education and awareness strategies, and effective communication among the involved parties. Whereas the implementation of laws may vary from state to state and district to district, identifying the most common strategic implementation techniques and guiding principles can help ensure that athletes with concussions are recognized and treated appropriately. Further efforts are needed to disseminate these common implementation strategies and practices to a wider range of schools, including middle schools and schools without ATs, in order to reduce both the short- and long-term negative health consequences among all student-athletes.

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Address correspondence to Jingzhen Yang, PhD, MPH, Center for Injury Research and Policy, Nationwide Children's Hospital, 700 Children's Drive, RB3-WB5403, Columbus, OH 43205. Address e-mail to ginger.yang@nationwidechildrens.org.