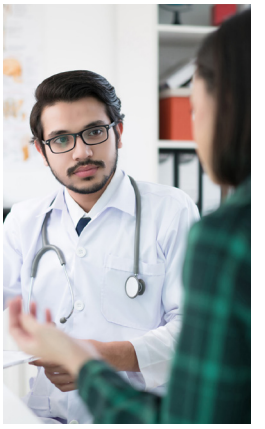
December 2019

Implementation of Max's Law in Oregon High Schools

Results from a Survey of High School Athletic Directors







Oregon Health Authority
PUBLIC HEALTH DIVISION

Acknowledgments

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The project team that helped design this project and provided feedback on the report included:

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- Oregon Health & Science University; Sports Medicine Advisory Committee; Oregon School Activities Association: Jim Chesnutt, M.D.
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- University of Oregon Center on Brain Injury Research and Training: Ann Glang, Ph.D., and Melissa McCart, D. Ed.

David Dowler conducted the analysis and wrote this report.

Peter Weber from the Oregon School Activities Association helped promote and conduct the survey with OSAA-member athletic directors.

Special thanks to all respondents from high schools across Oregon who took the time to complete the survey and share their accomplishments and experiences helping to prevent and reduce the impact of concussions among their student athletes.

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Contents

Executive summary

This report summarizes May 2019 survey findings from Oregon high school athletic directors to learn how well schools are implementing concussion management legislation known as Max's Law. This law mandated three primary concussion management protocols:

- Annual training for coaches in recognizing the symptoms of concussion
- Removal of student athletes suspected of having a concussion from competition or practice, and
- Evaluation and clearance by an eligible medical provider before returning to competition or practice.

Surveys asked about implementation of the law, barriers to implementing the law, adoption of recommended best practices, and the extent of policies and leadership at the district level. Surveys, completed by 170 respondents, represented a response rate of 59%.

Key findings

Schools reported implementing the three primary protocols of Max's Law at high levels.

- 100% of respondents reported incorporating all three protocols into school requirements.
- When asked how often the three required protocols had occurred over the past year (a proxy for implementation), 90% or more replied "all the time."

While the majority reported few or no important challenges for implementation, results helped highlight what has made implementation more difficult across the three protocols.

- For training coaches, important challenges included lack of time (16%) and lack of interest by coaches (12%).
- For removing student athletes after a suspected concussion, open-ended comments suggested barriers of poor communication by athletes who may not wish to stop playing, as well as lack of knowledge or proper follow-through by coaches.
- Top barriers to achieving provider clearance before returning to play were parents' and students' lack of understanding or appreciation of protocols, lack of training or knowledge among health care providers, and communication problems among schools, parents and providers.

Approximately one-half of respondents reported at least some of the families at their school have challenges accessing a health care provider who can provide clearance before returning to play.

- Forty-seven percent answered "all," "most" or "some" had challenges accessing a provider.

While a large majority of schools reported following some of the recommended best practices, there is room for improvement.

- A large majority of schools appear to follow three of the best practices, including having a plan for concussion management (96%), for graduated return to play (98%) and for graduated return to learn (83%).
- Less than half of schools report three other best practices, including providing training for school staff other than coaches (43%), conducting training for parents or students (37%), and having an active concussion management team (21%).
- Two of three respondents had either not used (22%) or were not aware (45%) of the Oregon Concussion Awareness and Management Program's (OCAMP) *Concussion Management Implementation Guide.*

A large majority report incorporating Max's Law protocols at the district level, though most schools have developed policies without significant district influence.

- Between 89% and 91% reported district requirements across the three protocols, but just 32% reported district policies had "a lot" of influence on school concussion management protocols.

Recommendations

These results suggest Oregon schools are doing a good job implementing protocols mandated by Max's Law. Results also suggest how the state might support school and district efforts to continue and improve concussion management implementation and best practices.

- Continue coordination and strategic planning among the Oregon School Activities Association, Oregon Concussion Awareness and Management Program, Center on Brain Injury Research and Training, Oregon Department of Education and Oregon Health Authority to support school efforts in concussion management.
- Help schools overcome barriers to training coaches, including resources to help organize reminders, overcome coach hesitancy and improve outreach to non-mainstream coaches.
- Provide resources and raise awareness among qualified health care providers about current concussion management best practices. Educational efforts with providers will be important after the recent passage of Senate Bill 1547, which expanded types of providers eligible to clear students for return to play and stipulated required training.
- Develop methods to improve training for parents and students to raise awareness of legal requirements and the serious health consequences of brain injuries.
- Improve concussion management training for school staff other than coaches.
- Provide resources and guidance to help schools develop active concussion management teams that meet regularly.

Background

With the passage of Max's Law in 2009 (1), Oregon became the second state to enact legislation requiring specific concussion management policies for student athletes within Oregon school districts. All 50 states and the District of Columbia had enacted similar "return-to-play" laws by the end of 2014.

Oregon's law included the following elements (2):

- **Recognize:** All coaches must receive annual training in recognizing the symptoms of concussion.
- **Remove:** Students suspected of having a concussion must be removed from play.
- **Refer:** Students suspected of sustaining a concussion must be evaluated by a properly trained medical professional.
- **Return:** A student may return to play when all symptoms have resolved, at least one day has elapsed since the injury, and the student has obtained a medical release.

Beyond these elements are recommendations for additional best practices:

- Train all school staff, student athletes and their parents in concussion management.
- Develop a clear district-wide policy.
- Return the student to full activity using an individualized graduated plan to guard against symptom exacerbation or second injury.

Related legislation known as Jenna's Law, enacted in 2014, expanded requirements of concussion management for young people in non-school athletic programs, which included students at private schools. While private schools fall under this separate law, its intent and legal requirements are very similar to those of Max's Law. Therefore, we include all schools in this report, despite these distinctions for which law applies to public and private schools.

We are unaware of any formal evaluation assessing the level of implementation of Max's Law at Oregon's high schools and districts, which was the impetus for this project. This report summarizes findings from a survey conducted with Oregon high school athletic directors during May 2019 to learn about:

- Current school requirements that reflect elements of Max's Law
- Implementation of Max's Law over the past year
- Barriers to implementing the law
- Adoptions of recommended best practices related to concussion management policies not included in the law
- Extent of policies and leadership at the district level.

Methods

Survey development and implementation

Our project team included representatives from the:

- University of Oregon Center on Brain Injury Research and Training (CBIRT)
- Oregon School Activities Association (OSAA), and
- Oregon Health Authority Public Health Division Injury and Violence Prevention Program and Program Design and Evaluation Services.

This team developed an online survey with closed- and open-ended questions asking about:

- Current school requirements and level of implementation of Max's Law
- Barriers to implementation
- Implementation of selected best practices
- Staff responsible for concussion assessment and first aid
- District-level concussion management requirements or policies and their influence on school-level requirements, and
- School and respondent characteristics.

The survey was designed to require between five and 10 minutes to complete. The OSAA Sports Medicine Advisory Committee and the Oregon Concussion Awareness and Management Program (OCAMP) reviewed the survey and provided feedback to the project team. Appendix 1 displays questions included on the survey.

During May 2019, OSAA sent emails to the athletic directors on file at all its full-member high schools (n=291). Emails included information about the survey, its purpose and a link to the online survey. After the initial email, OSAA sent two reminder emails to non-responders.

The Oregon Public Health Division's Science and Epidemiology Council Project Review Team reviewed the project. The team deemed the Institutional Review Board did not need to further review the project.

Analysis

Survey data were often collapsed into two or three outcome categories to ease display and discussion of results. For subgroup analysis, we created school characteristics based on survey and publicly available data. These characteristics included the following:

- **School classification** (1A, 2A, 3A, 4A, 5A, 6A). Classification is based on school enrollment ranging from smallest (1A, with enrollment < 90) to largest (6A, with enrollment = 1,200+).
- **School type** (charter, public, private). Initial analysis indicated meaningful differences between charter and public schools, so we kept these distinct for our results.
- **Average per-pupil spending** (categories defined by approximately equal distribution of average district spending per pupil: under $10,300, $10,300–$10,999, $11,000 or more). Private school data were not available.
- **Population density** (urban area, large town, small town or rural area). These categories were assigned using ZIP code-aligned rural-urban commuting area (RUCA) codes. This scheme allows the use of ZIP codes to assign sub-county areas on a scale that represents urbanization, population density and daily community. RUCA primary codes were used to assign schools to the three categories. See Appendix 2 for more information.

Rather than highlighting statistically significant differences, we used guidelines to identify potentially meaningful differences among subgroups. This strategy reflects a more appropriate and descriptive consideration of potential differences because inferential statistics are not typically used for data taken from an entire target population. We identified potentially meaningful differences by using a cutoff of at least 10% difference among subgroups.* Subgroup differences are displayed to identify those that fall in the less desirable direction (such as lower implementation or higher challenges) to help identify potential subgroups at risk for the outcome in question. Appendix 3 displays full percentages for these outcomes across all subgroups, while tables in the report graphically display the differences between subgroups.

* This cutoff was modified to be 20% when the "more desirable" reference subgroup was one with n < 20. Specifically, this higher difference was used to define meaningful differences when one of these subgroups was the reference group: 3A and 5A schools, and charter schools. Full percentages for subgroup differences are displayed in Appendix 3.

We do not discuss differences by region, but we present selected survey frequencies across the eight traumatic brain injury regional service program districts, which can be found in Appendix 4. These regions (education service districts or ESDs) include:

- Region 1 Eastern Oregon (Intermountain ESD)
- Region 2 Central Oregon (High Desert ESD)
- Region 3 Southern Oregon (Southern Oregon ESD)
- Region 4 Cascade (Linn/Benton/Lincoln ESD)
- Region 5 Willamette (Willamette ESD)
- Region 6 Columbia (Portland Public Schools)
- Region 7 Lane (Lane ESD)
- Region 8 Northwest (Northwest ESD)

We used SPSS statistical analysis software v24.0 for all data management and analysis.

Results

Response rate and sample description

Surveys were sent to athletic directors at all 291 OSAA full-member high schools. Completed surveys were received from 170, resulting in a 59% response rate. Table 1 displays the number of completed surveys and the response rate across school type and classification.

Table 1: Completed surveys and response rate by school classification and type

	Completed surveys	Response rate
High school type*		
Charter	11	48%
Public	131	61%
Private	26	48%
Classification*		
1A	42	48%
2A	36	74%
3A	18	50%
4A	21	62%
5A	15	47%
6A	36	68%
TOTAL	**170**	**59%**

*Two schools were not identified by respondents, so n=168 for these characteristics.

Response rate was higher for public schools compared with charter and private schools, as was the case for 2A, 4A and 6A schools compared to those from other classifications. No subgroup fell below 47% response rate. In general, the overall response rate of 59% is relatively high for this type of survey and provides evidence that these results well represent the target population of Oregon high schools.

We also identified schools across two characteristics representing population density and average per-student spending, displayed in Table 2. These characteristics were included with the assessment of subgroup differences.

Table 2: Percentage of respondent schools by population density and per-student spending

	Percent
Population density (n=166)	
Urban	52%
Large town	21%
Small town or rural area	27%
Average spending per pupil (n=140)	
<$10,300	31%
$10,300–$10,999	30%
$11,000 or more	39%

Most respondents were school athletic directors (92%). Respondents fell evenly across tenure divided by five years or less on the job (50%), or six years or more (50%).

Implementation of Max's Law

Almost all respondents reported being "very familiar" (62%) or "somewhat familiar" (35%) with Max's Law. The percentage not aware of Max's Law was similar across school types (4% for private, 3% for public and 0% for charter schools).

Respondents were asked whether school requirements were in place for three primary concussion management protocols included in Max's Law. They were then asked the extent to which these protocols had been happening at their school over the past 12 months. Assessment results of the law's implementation are in Table 3.

Table 3: School requirements and implementation of Max's Law

Max's Law protocols	Percent with requirement	Percent reporting protocol happening "all the time"*
Annual training for coaches in concussion recognition and management	100%	98%
Immediate removal of student athletes suspected of having a concussion from practice or competition	100%	90%
Health care provider clearance given before allowing student athletes to further participate in practice or competition after a suspected concussion	100%	93%

* The balance of responses fell in the next most frequent response option — "most of the time."

These results provide evidence of very high implementation of Max's Law in Oregon high schools. Every respondent reported all three elements were incorporated into school requirements, and 90% or more reported the protocols were happening all the time during the past 12 months.

There was also a very high level for documenting coach training (98%) and documenting incidents of concussion or suspected concussion (91%) occurring at schools.

Subgroup differences in implementation

Table 4 flags subgroups with evidence of lower implementation across four selected characteristics. We did not compare subgroups for whether requirements were in place or whether coach training was documented as the results (all at 98% or higher) left little potential for meaningful differences. Full percentages for this table can be found in Appendix 3.

Table 4: School requirements and implementation of Max's Law

	Annual training of coaches	Immediate removal of athletes with suspected concussions	Athlete cleared by provider	Concussions documented
Response option for outcome	*Happens "all the time"*			*Yes*
Density				
Urban area				
Large town		⚑		
Small town, rural				
Spending per student				
<$10,300				
$10,300–$10,999				
$11,000 or more				
Classification				
1A				⚑⚑
2A				
3A		⚑		⚑
4A		⚑		
5A				
6A				
School type				
Private			⚑	
Charter				⚑⚑
Public				

⚑ *Indicates differences of at least 10% compared with highest subgroup(s).*

⚑⚑ *Indicates differences of at least 20% compared with highest subgroup(s).*

Percentages displayed for all subgroups in Appendix 3.

Only a handful of subgroup differences emerged for these implementation outcomes, and there were no apparent patterns for deficits within any subgroup across all outcomes.

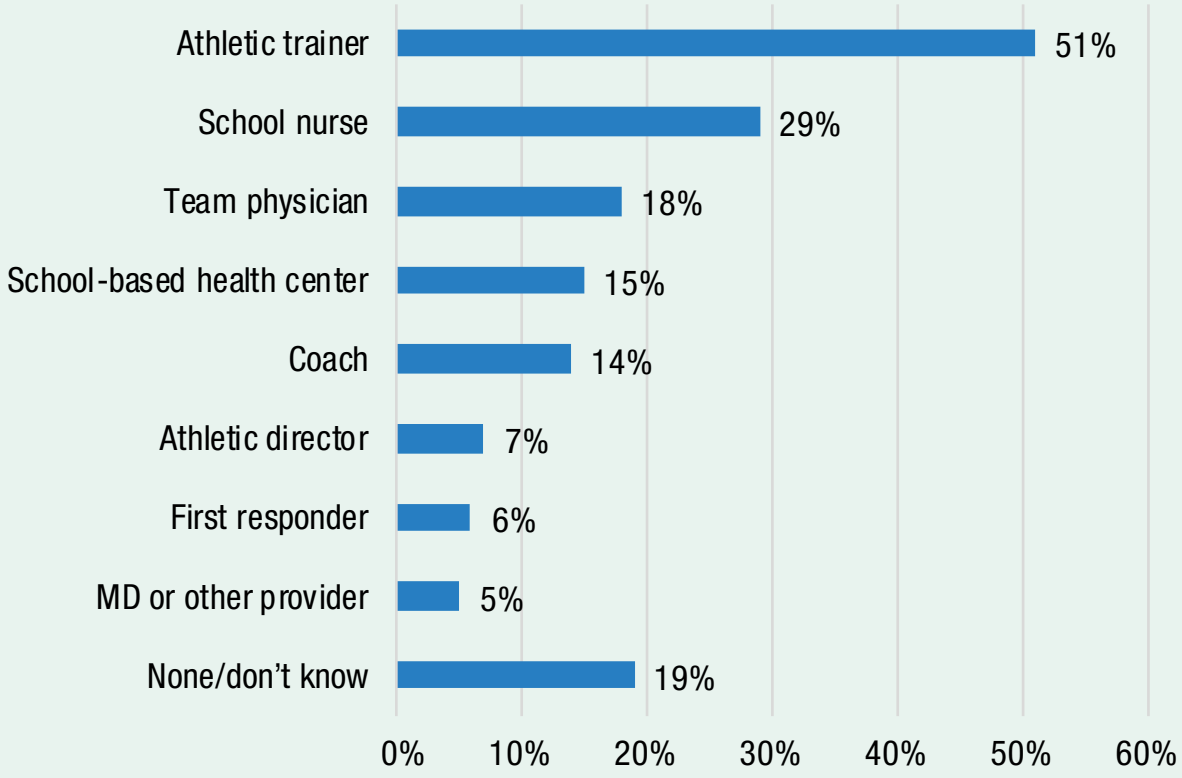
Schools from classifications 3A and 4A and from large rural towns were less likely to immediately remove student athletes after a suspected concussion, while private schools were less likely to require clearance by a health care provider prior to return to play. These differences are minimal. They tease apart protocols happening "all the time" compared with "most of the time." No schools fell into the lower frequency option of "less than half of the time."

Charter and 1A schools had deficits of at least 20% for documenting concussions or suspected concussions among student athletes.

First aid or initial assessments for those with concussions

Figure 1 displays results for a survey question that asked respondents to indicate who provided first aid or an initial assessment for those with a concussion.

Figure 1: Percent who report provision of concussion assessment or first aid by selected personnel



Athletic trainers appear to be most likely to perform initial assessments or first aid for those with a concussion in schools with access to athletic trainers. The next most popular roles providing this care include school nurses, team physicians, school-based health centers and coaches.

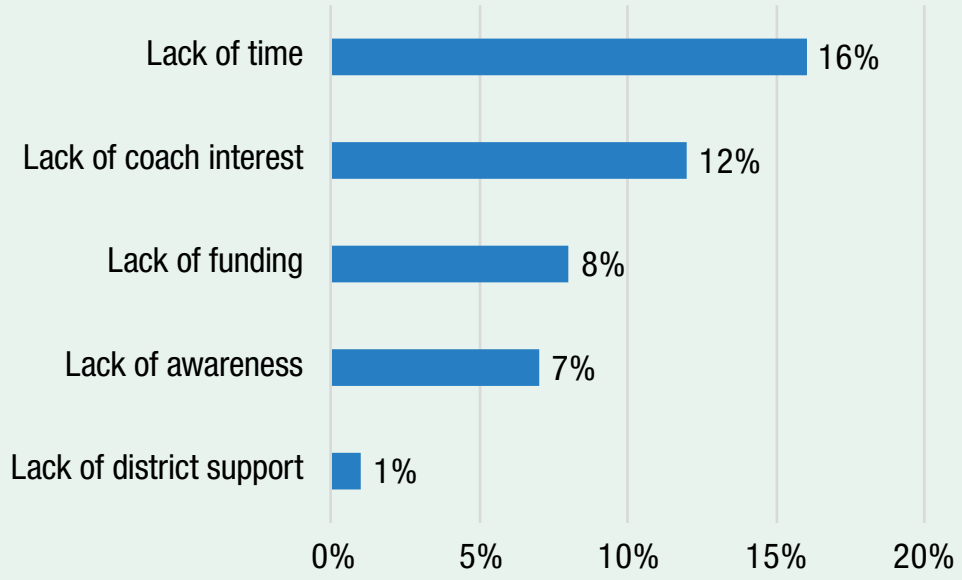
Challenges to implementing Max's Law

Surveys asked for feedback about challenges in implementing the three primary protocols of Max's Law. Respondents were asked to rate selected potential challenges to getting coaches trained as large, moderate, small or not a challenge at all. Respondents were also asked to write in comments about other important challenges for training coaches, immediately removing student athletes after a suspected concussion, and allowing return to play only after clearance by a health care provider.

Challenges to getting coaches trained

Figure 2 displays the percentage of respondents who rated selected challenges for training coaches as "large" or "moderate."

Figure 2: Percentage rating selected challenges for training coaches as large or moderate



These results highlight that no challenges for training coaches were rated as large or moderate by more than approximately one of six respondents. The two most important challenges included lack of time and lack of interest from coaches.

Table 5 flags subgroups with higher levels of challenges across these five potential issues.

Table 5: Subgroups with higher levels of large or moderate challenges for training coaches

Subgroups	Lack of time	Lack of funding	Low awareness of requirements	Lack of coach interest	Lack of district support
Density					
Urban area					
Large town					
Small town, rural	⚑	⚑			
Spending per student					
<$10,300				⚑	
$10,300–$10,999					
$11,000 or more					
Classification					
1A	⚑⚑	⚑			
2A				⚑	
3A				⚑	
4A	⚑	⚑			
5A			⚑		
6A					
School type					
Private			⚑		
Charter					
Public					

⚑ *Indicates differences of at least 10% compared with lowest subgroup(s).*

⚑⚑ *Indicates differences of at least 20% compared with lowest subgroup(s).*

Percentages displayed for all subgroups in Appendix 3.

While differences emerged most often for school classification, there were no strong patterns across all challenges for any subgroups.

Lack of time and lack of funding were rated as large or moderate challenges more frequently for schools in small towns and in classifications 1A and 4A. Lack of awareness about requirements was cited more often for private schools and classification 5A. Lack of coaches' interest was cited as a challenge more often for schools with lowest average student spending and classifications 2A and 3A.

Open-ended comments about challenges for training coaches

Of 84 respondents who left comments about any additional challenges for training coaches, the primary theme (n=40) was there were, in fact, no important challenges. Many of those that expanded on this theme simply stated that it was a state or OSAA requirement.

For those with comments about challenges, the following themes emerged, by order of mention:

- We often need to remind coaches. (10)
- It's more difficult for non-mainstream coaches (new, offsite, part-time, volunteer). (9)
- It's a burden for coaches — one more thing for them to do. (5)
- Watching the same training every year gets old. (3)
- Other comments. (7)

Open-ended comments about challenges for removal of student athletes after suspected concussions

Of the 82 leaving comments, the primary theme (n=42) again emerged that there were no important challenges. The following were the main themes for those commenting about specific challenges:

- Student athletes not communicating or not wanting to stop playing (11)
- Coaches not following protocols or lacking knowledge (9)
- Lack of staffing, including "no athletic trainer" for events off-site (6)
- Parents lack of understanding or support for protocols (5)
- Other comments (8)

Open-ended comments about challenges for clearance by a provider before returning to play

Seventy-nine respondents answered this question, with many (30) again repeating the theme that there were no challenges. Several of those noting challenges mentioned more than one, reflected in the number of comments for each of the following themes:

- Parents' (13) or students' (2) lack of understanding or appreciation of protocols
- Health care provider lack of training or knowledge (11)
- Communication problems between school, parents or health care providers (11)
- Families facing financial burden or inconvenience and logistical problems accessing a provider (8)
- Lack of access to qualified health care providers, including mentions of "no athletic trainer at school" (8)
- Important to rely on athletic trainer judgment, including mentions of a disconnect between athletic trainer and community providers, more often with athletic trainers having the more conservative approach (7)
- Other comments. (3)

Percent with challenges accessing health care provider

One survey item asked:

> *About how many of the student athletes at your school have challenges accessing a health care provider who can provide clearance for returning to play after a concussion?*

Approximately one-half of the respondents reported this as a challenge for student athletes and their families, answering either "about all/most" (9%) or "some" (38%). This suggests access to a health care provider for clearing student athletes to return to play is a challenge for many schools.

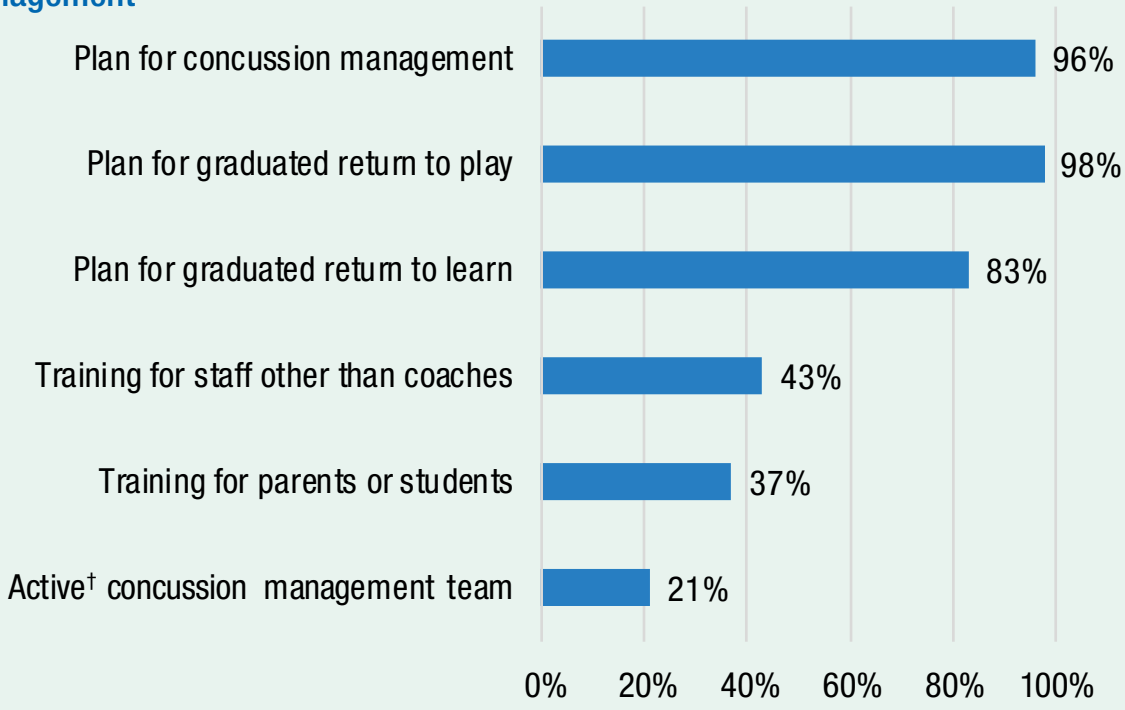
Subgroup analysis indicated that provider access was more challenging for students:

- In large towns (compared with urban areas or small towns)
- At schools with lowest average spending per student
- At 4A schools
- At public schools (compared to charter and private schools)

Best practices for concussion management

The survey included items assessing the level at which schools were implementing selected best practices — elements that while not included as part of Max's Law represent practices accepted as important for effective concussion management.* Figure 3 below displays the percentage of schools reporting implementation of these best practices.

Figure 3: Percentage of schools following selected best practices for concussion management



Three best practices were cited by an impressive percentage of respondents: almost all schools (96%) had a concussion management plan or protocol, and almost all had a plan for graduated return to play (98%) with slightly less having a plan for graduated return to learn (83%). An important caveat for this last finding could be the limited knowledge some respondents might have about this practice at their schools.

Fewer reported best practices related to training (43% for school staff, 37% for parents or students), and just one in five had an active concussion management team.

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* Jenna's Law requires training for athletes and parents. Because this law applies to students at private schools, the results for this best practice should be considered differently for private versus public schools. See Table 4 in Appendix 3 for the breakdown of these percentages by school type.

† Schools with concussion management team that meets "regularly" or "sometimes."

Subgroup differences for implementing best practices

Table 6 highlights subgroups that reported fewer of these best practices. Because of very high implementation, we did not include presence of a plan for concussion management or a plan for graduated return to play.

Table 6: Subgroups with lower implementation of best practices

Subgroups	Training for parents or students	Training for staff other than coaches	Plan for graduated return to learn	Active concussion management team
Density				
Urban area				
Large town				
Small town, rural				⚑
Spending per student				
<$10,300		⚑		⚑
$10,300–$10,999				
$11,000 or more				
Classification				
1A	⚑⚑	⚑	⚑⚑	⚑⚑
2A	⚑			⚑⚑
3A	⚑	⚑		⚑⚑
4A		⚑⚑		⚑
5A		⚑⚑		⚑⚑
6A				
School type				
Private			⚑⚑	
Charter	⚑⚑			⚑
Public				

⚑ *Indicates differences of at least 10% compared with highest subgroup(s).*

⚑⚑ *Indicates differences of at least 20% compared with highest subgroup(s).*

Percentages displayed for all subgroups in Appendix 3.

Subgroup differences emerged across all four school characteristics for presence of an active concussion management team, with deficits apparent for small towns, for schools with lowest average spending per student, for 1A–5A schools compared with 6A schools, and for charter schools.

Charter and 1A–3A class schools were less likely to conduct training for parents or students. Lowest and highest average spending schools and 4A–5A class schools were less likely to conduct training for school staff other than coaches. Private and 1A class schools were less likely to have a plan for graduated return to learn.

In general, subgroups with more deficits for best practices included schools with lowest average spending per student, 1A and 3A schools, and charter schools.

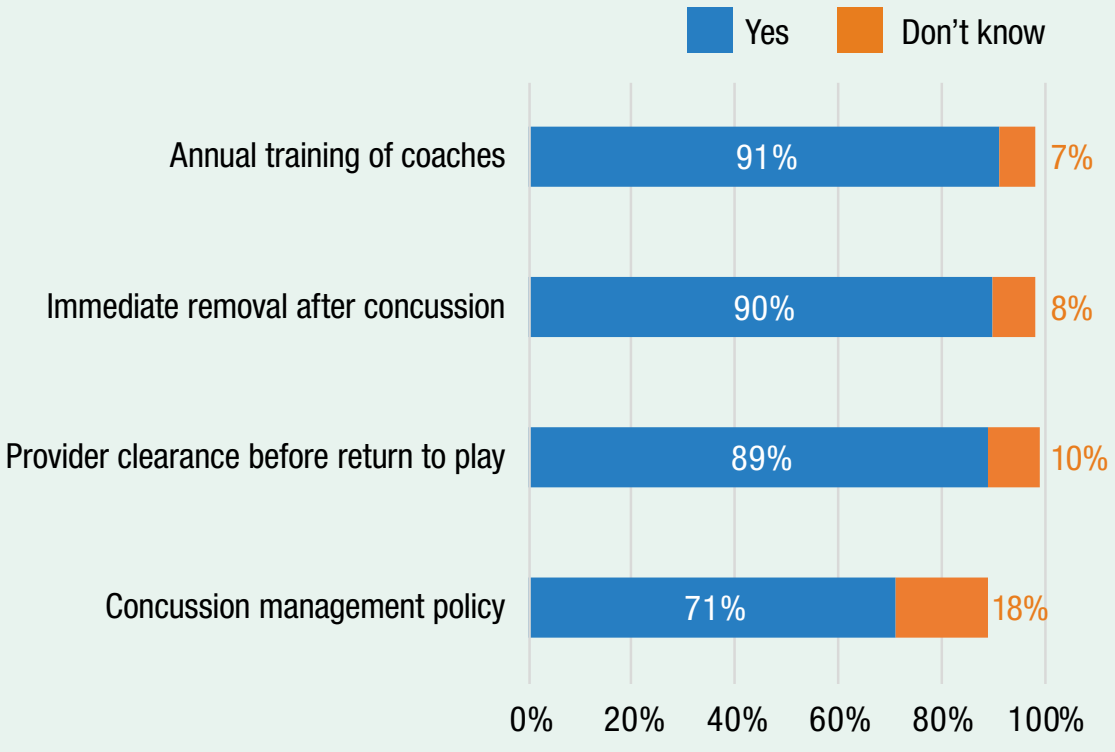
Awareness and use of the OCAMP Guide

Another survey item asked about awareness and use of the Oregon Concussion Awareness and Management Program's (OCAMP) *Concussion Management Implementation Guide*. Two of three had either not used the guide (22%) or had not heard of the guide (45%), indicating some room for improvement for schools' awareness and use of this recommended guide.

District-level requirements and influence

Respondents were asked whether the same three concussion management protocols were required at the district level, as had been asked about at the school level. An additional question asked whether the district had a concussion management policy. Figure 4 summarizes results for these questions.

Figure 4: Percentage with district-level concussion management requirements and policy



The three protocols of Max's Law (coach training, removal after concussion and provider clearance) were reported at the district level by approximately nine of 10 schools. Nearly all who did not report such requirements didn't know if they existed. Approximately seven of 10 reported their district had the best practice of a concussion management policy.

A final question asked how much influence any district protocols or policies had for school concussion management protocols. Approximately six of 10 reported either "a lot" (32%) or "some" (28%) with the balance reporting very little or none (18%), or no awareness of such policies (23%). This indicates that 60% of schools had developed policies or protocols without a lot of help from the district.

In general, these results suggest a high level of incorporation of Max's Law at the district level, though most schools have developed their own protocols without simply adopting district-level protocols.

Subgroup differences for district-level requirements and influence

We present subgroup differences for these district-level items in Table 7.

Table 7: Subgroups with lower implementation of best practices

Subgroups	Annual coach training required	Immediate removal when concussion suspected required	Athlete cleared by health care provider required	District has policy	District had "a lot" of influence
Density					
Urban area					⚑
Large town	⚑			⚑	⚑
Small town, rural				⚑	
Spending per student					
<$10,300	⚑	⚑	⚑	⚑⚑	
$10,300–$10,999					
$11,000 or more	⚑			⚑	
Classification					
1A				⚑⚑	⚑
2A				⚑	
3A	⚑	⚑	⚑		
4A	⚑	⚑	⚑	⚑⚑	⚑⚑
5A					⚑⚑
6A					
School type					
Private			⚑		⚑⚑
Charter	⚑	⚑		⚑⚑	
Public					

⚑ *Indicates differences of at least 10% compared with highest subgroup(s).*

⚑⚑ *Indicates differences of at least 20% compared with highest subgroup(s).*

There were few subgroup differences for density, though schools from large towns had deficits for three district-level items.

A pattern emerged for schools with lowest average spending per student, with evidence of a lower level of requirements or policy at the district level. It may be notable that this characteristic was defined at the district level, meaning that lower average spending at the district level could be reflected in lower levels of requirements and policy.

The primary pattern that emerged for classification indicated deficits for middle-enrollment schools of class 3A and, particularly, class 4A.

For school type, charter schools reported less influence at the district level, which may reflect their lack of connection to districts compared with other public schools.

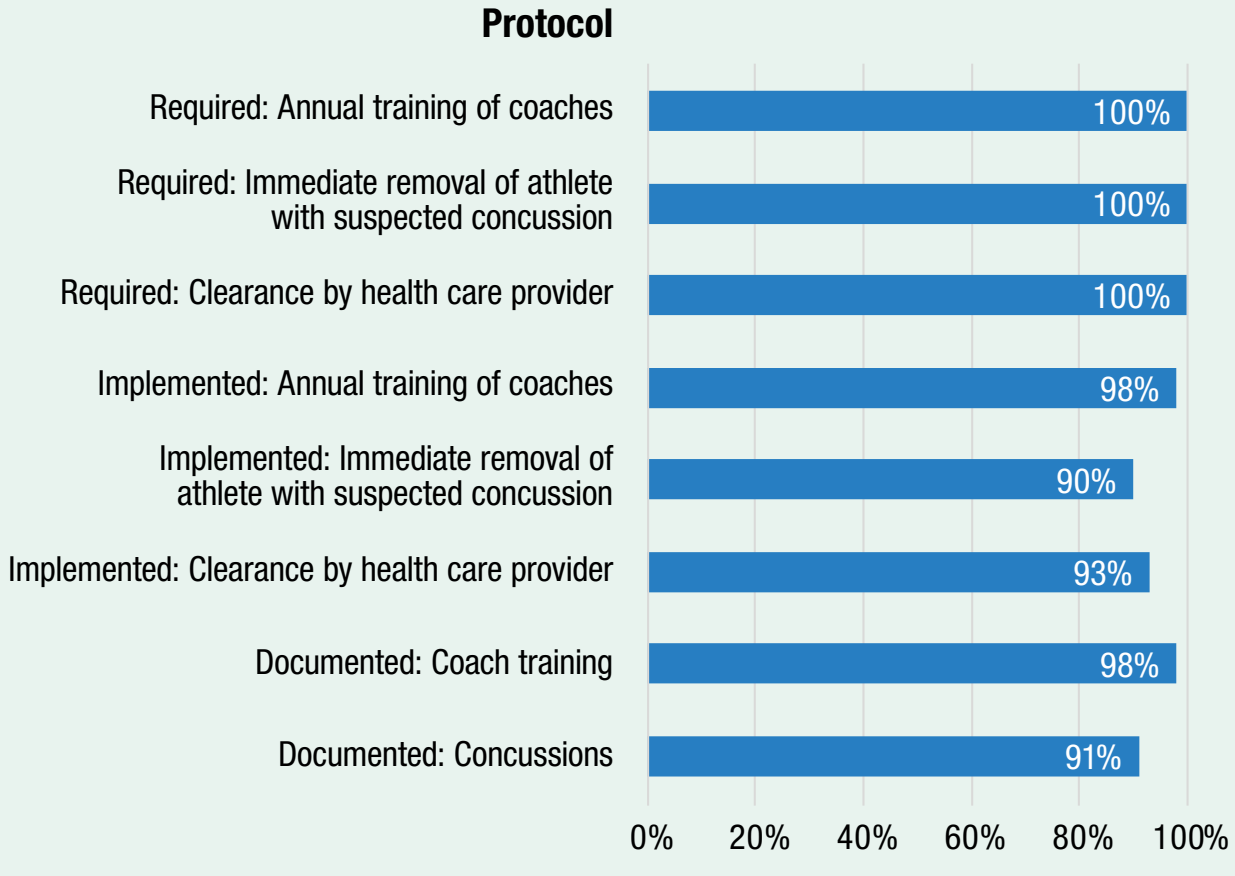
Discussion

Below are the key findings from this assessment of the extent to which Oregon high schools are implementing the key protocols included in Max's Law, along with a summary of challenges that have emerged.

Key findings

- A striking result was that 100% of respondents reported incorporating all the three protocols into school requirements: annual training of coaches, immediate removal from practice or competition after a suspected concussion, and provider clearance required before allowing return to play.
- When asked how often the three required protocols had occurred over the past year (a proxy for implementation), 90% or more replied "all the time."

Figure 5: Percentage of sample high schools that require and implement Max's Law protocols



While the majority reported few or no important challenges for implementation, results helped highlight what has made implementation more difficult across the three protocols.

- For training coaches, the most often cited as a "large" or "moderate" challenge from a list of potential challenges included lack of time (16%) and lack of interest by coaches (12%). From open-ended comments, the top themes included the need to remind coaches to take the annual training and that working with non-mainstream coaches (such as those newly hired, working offsite, part-time or volunteer) made training more difficult.
- For removing student athletes after a suspected concussion, open-ended comments suggested barriers of poor communication by student athletes who may not wish to stop playing, as well as lack of knowledge or proper follow-through by coaches.
- The top barriers that emerged from open-ended comments for achieving provider clearance before returning to play included parents' and students' lack of understanding or appreciation of protocols, lack of training or knowledge among health care providers, and communication problems among schools, parents and providers. Other less-mentioned barriers included financial burden or inconvenience and logistical problems accessing a provider, lack of access to providers, and the lack of agreement between athletic trainers and community providers.

While a large majority of schools reported following some of the recommended best practices, there is room for improvement.

- A large majority of schools appear to follow three best practices, including having a plan for concussion management (96%), for graduated return to play (98%) and for graduated return to learn (83%).
- Less than half of schools report three other best practices, including providing training for school staff other than coaches (43%), training for parents or students (37%), and having an active concussion management team (21%).
- Two of three respondents had not used (22%) or were not aware (45%) of the Oregon Concussion Awareness and Management Program's (OCAMP) Concussion Management Implementation Guide.

A large majority report incorporating Max's Law protocols at the district level, though most schools have developed policies without significant district influence.

Between 89% and 91% reported district requirements for annual training of coaches, immediate removal of student athletes after a concussion, or provider clearance before return to play. However, just 32% reported district policies had "a lot" of influence on school concussion management protocols.

Subgroup differences emerged for many of the selected outcomes, though there were no large and consistent patterns for any specific subgroup across all outcomes.

While no consistent patterns emerged for subgroup differences, it is possible to summarize trends for subgroups by noting which had deficits (at least 10% difference in the less desirable direction) most often among the selected outcomes we discuss in this report:

- Large towns and small towns had more deficits (5 and 4 respectively) compared with urban areas.
- Schools with lowest average spending per student (<$10,300) had more deficits (8) compared with schools with higher average spending.
- Among the six school classifications (1A–6A), those with more deficits included 4A (11), 1A (8) and 3A (8).
- Charter and private schools had more deficits (6 and 5 respectively) compared with public schools.

Recommendations

These results suggest Oregon schools are doing a good job implementing protocols mandated by Max's Law. Results also suggest how the state might support school and district efforts to continue and improve concussion management implementation and best practices.

- Continue coordination and strategic planning among the Oregon School Activities Association, Oregon Concussion Awareness and Management Program, Center on Brain Injury Research and Training, Oregon Department of Education and Oregon Health Authority to support school efforts in concussion management.
- Help schools overcome barriers to training coaches, including resources to help organize reminders, overcome coach hesitancy and improve outreach to non-mainstream coaches.
- Provide resources and raise awareness among qualified health care providers about current concussion management best practices. Educational efforts with providers will be important after the recent passage of Senate Bill 1547, which expanded types of providers eligible to clear students for return to play and stipulated required training.

- Develop methods to improve training for parents and students to raise awareness of legal requirements and the serious health consequences of brain injuries.
- Improve concussion management training for school staff other than coaches.
- Provide resources and guidance to help schools develop active concussion management teams that meet regularly.

Limitations

These results were based on surveys. They could be inaccurate due to types of respondent bias, including poor memory or hesitancy to present the school in a bad light. Athletic directors were targeted for this survey and may not have been knowledgeable about all topics (e.g., whether schools are following best practices related to "return to learn"). Results may not represent the target group of all Oregon high schools to the extent that those who did not answer the survey differed from those who did. Also, our assessment of subgroup differences may have been hampered by small numbers, which could lead to non-reliable estimates.

Endnotes

1. Safety of school sports-concussion [Internet]. 2011 [cited 2019 Nov 21]. Available from: http://www.ode.state.or.us/teachlearn/subjects/pe/ocampguide.pdf.

2. Max's Law: concussion management implementation guide OCAMP. Oregon Concussion Awareness and Management Program for School Administrators [Internet]. [cited 2019 Nov 21]. Available from: www.cbirt.org.

Appendix 1: Survey items and raw frequencies

N=170. Response rate = 59%. Surveys were completed online during May 2019.

1. What is your role (check all that apply):
   (could add to more than 100%, missing=1)

   92% Athletic Director

   1% Assistant Athletic director

   5% Athletic Trainer

   2% Activities Director

   1% Athletic Secretary/Administrative Assistant

   6% Other

2. How long have you been in that role? *(missing=0)*

   14% Less than 1 year

   36% 1-5 years

   18% 6-10 years

   32% More than 10 years

   0% Not applicable

3. What is the name of your high school? _____ (missing=2)

4. How familiar are you with Oregon's youth concussion law (Max's Law)? *(missing=0)*

   62% Very familiar

   35% Somewhat familiar

   3% I have not heard of this law

5. Consider the three concussion management protocols listed below. For each protocol, indicate whether it is required at your school or not. *(missing=0)*

	Yes	No	Don't know
a. Annual training for coaches in concussion recognition and management.	100%	0%	0%
b. Immediate removal of student athletes suspected of having a concussion from practice or competition.	100%	0%	0%
c. Health care provider clearance given before allowing student athletes to further participate in practice or competition after a suspected concussion.	100%	0%	0%

6. Consider the three concussion management protocols listed below. For each protocol, indicate whether it is required **at your district** or not. *(missing=4)*

	Yes	No	Don't know
a. Annual training for coaches in concussion recognition and management.	91%	2%	7%
b. Immediate removal of student athletes suspected of having a concussion from practice or competition.	90%	1%	8%
c. Health care provider clearance given before allowing student athletes to further participate in practice or competition after a suspected concussion.	89%	1%	10%

7. Does your school document coach training in concussion recognition and management? That is, does your school keep records of names and times for those who complete these trainings? *(missing=0)*

   98% Yes

   1% No

   1% Don't know

8. Does your school document incidents of concussion or suspected concussion among student athletes? *(missing=0)*

   91% Yes

   5% No

   4% Don't know

9. To help us understand how well any school requirements translate into reality, please indicate to what extent each of the following has been happening **at your school** over the past 12 months: *(missing=0)*

	All of the time	Most of the time	Less than half of the time	Don't know	Doesn't apply
a. Coaches have received annual training in concussion recognition and management.	98%	2%	0%	0%	0%
b. Student athletes suspected of having a concussion have been removed immediately from practice or competition.	90%	10%	0%	0%	0%
c. Student athletes have only returned to practice or competition after being cleared by a health care provider.	93%	7%	0%	0%	0%

10. For your school, which of the following have been challenges to getting coaches trained in concussion recognition and management? For each, indicate whether it has been a large, moderate or small challenge, or not a challenge at all. *(missing=0-2)*

	Large Challenge	Moderate Challenge	Small Challenge	Not a challenge
a. Lack of time.	2%	14%	31%	53%
b. Lack of funding.	4%	4%	10%	82%
c. Lack of awareness of training requirements.	1%	7%	20%	73%
d. Lack of interest by coaches.	1%	11%	30%	58%
e. Lack of support from the district.	0%	1%	6%	93%

Themes from open-ended comments, by order of number of mentions (See end of report for raw comments by themes).

11. Briefly describe any other important challenges at your school for getting coaches trained in concussion recognition and management: *(84 comments, missing=85)*
    - None, no challenges mentioned. (40)
    - We often need to remind coaches. (10)
    - It's more difficult for non-mainstream coaches (new, offsite, part time, volunteer). (9)
    - It's a burden for coaches, one more thing for them to do. (5)
    - Watching the same training every year gets old. (3)
    - Other comments. (7)

12. For your school, briefly describe any important challenges to establish protocols for removing student athletes from practice or competition after a suspected concussion: *(82 comments, missing=88)*
    - None, no challenge. (40)
    - Student athletes not communicating or not wanting to stop playing. (11)
    - Coaches not following protocols or lacking knowledge. (9)
    - Lack of staffing, including "no athletic trainer," or for events off-site. (6)
    - Parents lack of understanding or support for protocols. (5)
    - Other comments. (8)

13. For your school, briefly describe any important challenges to implement requirements for clearance by a health care provider before returning student athletes to practice or competition: *(79 comments, split in some cases to 2+ comments, missing=91)*
    - None, no challenge. (30)
    - Parents' (13) or students' (2) lack of understanding or appreciation of protocols.
    - Health care provider lack of training or knowledge. (11)
    - Communication problems between school, parents, or health care providers. (11)
    - Families facing financial burdens or hassles getting to a health care provider. (8)
    - Lack of access to qualified health care providers. Includes mentions of "no athletic trainer at school." (8)
    - Important to rely on athletic trainer judgment. Includes mentions of a disconnect between athletic trainer and community providers, more often with athletic trainers having the more conservative approach. (7)
    - Other comments. (3)

14. About how many of the student athletes at your school have challenges accessing a health care provider who can provide clearance for returning to play after a concussion? *(missing=2)*

    2% About all

    7% Most

    38% Some

    52% None or very few

    1% I don't know

15. Which of the following groups have received concussion recognition and management training in the past 12 months, if any (check all that apply)? *(missing=0. Can add to more than 100%. If 'athletes', 'parents', 'other school staff' not marked, respondents assigned "none/don't know".)*

    39% None / Don't know or not sure

    34% Student athletes

    19% Parents of student athletes

    43% School staff (other than coaches)

    0% Other (please specify) (all answers assigned to appropriate responses)

    Note: 61% marked at least one group: 33% marked one, 22% marked two, 6% marked three.

16. Does your school have a concussion management plan/protocol? *(missing=2)*

    96% Yes

    1% No

    2% Don't know

17. After a concussion, does your school use an action plan for graduated return to play? *(missing=3)*

    97% Yes

    1% No

    2% Don't know

18. After a concussion, does your school use an action plan for graduated return to school ("return to learn")? *(missing=3)*

    83% Yes

    8% No

    9% Don't know

19. Do any of the following provide first aid or an initial assessment for those with concussions at your school (check all that may apply)? *(missing=0. Can add to more than 100%. Additional options added to reduce "other": Coach, AD, EMT, MD)*

    19% None/ don't know

    51% Athletic trainer

    18% Team physician

    29% School nurse

    15% School-based health center

    14% Coach

    7% Athletic Director

    6% EMT

    5% MD or other health care provider

    3% Other (please describe) _____

    Note: 81% marked at least one item: 42% marked one, 35% marked two, 18% marked three, 4% marked 4.

20. Does your school have a concussion management team? *(missing=3)*

    29% Yes

    66% No

    5% Don't know

21. How often does the concussion management team meet? *(Of 49 with a team, missing=121 / of total, missing=0)*

    22% / 6% Regularly, throughout the year

    49% / 14% Sometimes, but not regularly

    29% / 8% Doesn't meet

22. Has your school or school district used the Oregon Concussion Awareness and Management Program's (OCAMP) Concussion Management Implementation Guide? *(missing=3)*

    24% Yes, our school has used this guide

    9% Yes, our district has used this guide

    22% No

    45% I am not aware of this guide

    3 (2%) respondents indicated both school and district had used the guide

23. Does your school district have a concussion management policy? *(missing=6)*

    71% Yes

    11% No

    18% Don't know

24. How much influence did any district protocols or policies influence the concussion management protocols at your school? *(missing=0)*

    32% A lot of influence: our school protocols were directly influenced by the district

    28% Some influence

    18% Very little or no influence: our school policies were developed independently

    23% I am not aware of any policies or procedures at the district level

25. Which county or group of counties best represents the area of the state that your school is located? *(missing=0)* (Displayed by TBI regions)

    15% Baker, Grant, Malheur, Morrow, Umatilla, Union, Wallowa

    7% Crook, Deschutes, Harney, Jefferson, Gilliam, Sherman, Wheeler

    17% Douglas, Jackson, Josephine, Klamath, Lake

    11% Benton, Coos, Curry, Lincoln, Linn

    11% Marion, Polk, Yamhill

    19% Clackamas, Hood River, Multnomah, Wasco

    7% Lane

    15% Clatsop, Columbia, Tillamook, Washington

26. Is there anything else we should know about related to concussion management at your school or school district? *(24 comments, missing=146)*

    - Clarification of procedures related to concussion management. (8)
    - Comments about successfully following concussion policies. (7)
    - Suggestions or concerns. (5)
    - Other comments. (4)

Other data, from OSAA contact list or web resources:

School type *(missing=2)*

		Response rate
7%	Charter	48% (11/23)
78%	Public	61% (131/214)
15%	Private	48% (26/54)

School classification *(missing=2)*

		Response rate
25%	1A	48% (42/87)
21%	2A	74% (36/49)
11%	3A	50% (18/36)
13%	4A	62% (21/34)
9%	5A	47% (15/32)
21%	6A	68% (36/53)

Spending per student (from district average) *(missing =30)*

31%	< $10,300,
30%	$10,300–$10,999
39%	$11,000 or more

RUCA codes for urban/ rural (missing=4)

52%	urban (metropolitan)
21%	large rural city or town (micropolitan)
27%	small rural town (small town and rural areas)

Appendix 2: Methods to define population density

We created categories to represent population density. They were assigned using ZIP code-aligned rural-urban commuting area (RUCA) codes. This scheme allows the use of ZIP codes to assign sub-county areas on a scale representing urbanization, population density and daily community. RUCA primary codes were used to assign schools to the three categories we called:

- Urban area
- Large rural town
- Small rural town.

These categories were assigned from the following primary codes, as indicated by the dividing lines.

Table 1: Primary RUCA codes, divided into three population density characteristics

Urban area	
1	Metropolitan area core: primary flow within an urbanized area (UA)
2	Metropolitan area high commuting: primary flow 30% or more to a UA
3	Metropolitan area low commuting: primary flow 10% to 30% to a UA
Large rural town	
4	Micropolitan area core: primary flow within an urban cluster of 10,000 to 49,999 (large UC)
5	Micropolitan high commuting: primary flow 30% or more to a large UC
6	Micropolitan low commuting: primary flow 10% to 30% to a large UC
Small rural town	
7	Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)
8	Small town high commuting: primary flow 30% or more to a small UC
9	Small town low commuting: primary flow 10% to 30% to a small UC
10	Rural areas: primary flow to a tract outside a UA or UC

More information about RUCA codes can be found at: https://www.ruralhealthinfo.org/topics/what-is-rural#ruca.

Appendix 3: Tables of subgroup differences with full percentages

Below are the full percentage tables that inform subgroup difference tables presented throughout the report. We bolded percentages that reflect "flagged" differences, meaning those that represent potentially meaningful differences in the less desirable direction (such as less implementation, or higher barriers). In the report, one flag represents a difference of at least 10%, and two flags represent a difference of at least 20%. These cutoffs were relaxed to 20% and 30% when the reference subgroup had less than 20 members (3A and 5A schools, and charter schools).

The number of respondents added up over subgroup response options may not add up to the total number of survey respondents (170) because some respondents may not have given answers to the survey items represented in the columns.

Table 1: Max's Law implementation by schools that report protocols happen "all the time"

	n	Annual training of coaches	Immediate removal when concussion suspected	Athlete cleared by health care provider	School documents concussions
Density					
Urban area	97	98%	93%	94%	91%
Large town	31	97%	**80%**	89%	91%
Small town, rural	38	100%	91%	93%	89%
Spending per student					
<$10,300	44	98%	84%	95%	91%
$10,300–$10,999	42	98%	93%	98%	93%
$11,000 or more	54	100%	93%	93%	91%
Classification					
1A	42	98%	91%	88%	**76%**
2A	36	100%	92%	89%	94%
3A	18	94%	**83%**	94%	**89%**
4A	21	100%	**81%**	95%	91%
5A	15	93%	93%	100%	100%
6A	36	100%	94%	97%	100%
School type					
Private	26	96%	89%	**81%**	85%
Charter	11	100%	100%	100%	**73%**
Public	131	99%	89%	95%	93%
Total	170	98%	90%	93%	91%

Bolded percentages reflect "flagged" differences, meaning those that represent potentially meaningful differences in the less desirable direction.

Table 2: Barriers to annual training for coaches, by those reporting the challenge was "large" or "moderate"*

	n	Lack of time	Lack of funding	Low awareness of requirements	Lack of coach interest	Lack of district support
Density						
Urban area	97	10%	3%	5%	10%	0%
Large town	31	17%	9%	6%	11%	3%
Small town, rural	38	**24%**	**13%**	11%	13%	2%
Spending per student						
<$10,300	44	18%	9%	9%	**18%**	5%
$10,300–$10,999	42	12%	5%	7%	7%	0%
$11,000 or more	54	19%	9%	7%	9%	0%
Classification						
1A	42	**29%**	**12%**	10%	12%	0%
2A	36	14%	8%	6%	**17%**	3%
3A	18	0%	0%	0%	**17%**	6%
4A	21	**24%**	**19%**	5%	10%	0%
5A	15	13%	0%	**20%**	7%	0%
6A	36	8%	0%	6%	6%	0%
School type						
Private	26	15%	4%	4%	12%	0%
Charter	11	18%	9%	**18%**	0%	0%
Public	131	16%	8%	7%	12%	2%
Total	170	16%	8%	7%	12%	1%

Bolded percentages reflect "flagged" differences, meaning those that represent potentially meaningful differences in the less desirable direction.

* The response options included large, moderate, small, not a challenge.

Table 3: Respondent estimates of percentage of student athletes with challenges accessing a provider for clearance for returning to play: percentage who report "about all/most," "some" or total of both categories*

	n	Lack of time	Lack of funding	Low awareness of requirements
Density				
Urban area	97	6%	38%	44%
Large town	31	9%	54%	**63%**
Small town, rural	38	16%	27%	43%
Spending per student				
<$10,300	44	23%	43%	**66%**
$10,300–$10,999	42	10%	36%	45%
$11,000 or more	54	2%	42%	43%
Classification				
1A	42	7%	46%	54%
2A	36	12%	27%	38%
3A	18	17%	28%	45%
4A	21	10%	52%	**62%**
5A	15	0%	53%	53%
6A	36	8%	31%	39%
School type				
Private	26	0%	29%	29%
Charter	11	0%	18%	18%
Public	131	12%	42%	**53%**
Total	170	9%	38%	47%

Bolded percentages reflect "flagged" differences, meaning those that represent potentially meaningful differences in the less desirable direction.

* The response options included about all, most, some, none or very few, I don't know.

Table 4: Percentage reporting selected best practice elements in place at their school

	n	Training for parents or students	Training for staff other than coaches	Plan for graduated return to learn	Active concussion management team
Density					
Urban area	97	36%	45%	81%	25%
Large town	31	43%	40%	89%	17%
Small town, rural	38	36%	40%	81%	**14%**
Spending per student					
<$10,300	44	41%	**39%**	86%	16%
$10,300–$10,999	42	33%	50%	85%	26%
$11,000 or more	54	37%	41%	87%	23%
Classification					
1A	42	**24%**	**40%**	**68%**	**10%**
2A	36	**33%**	47%	85%	**12%**
3A	18	**39%**	**39%**	89%	**6%**
4A	21	48%	**33%**	81%	**29%**
5A	15	60%	**33%**	100%	**20%**
6A	36	42%	56%	89%	47%
School type					
Private	26	42%	46%	**64%**	16%
Charter	11	**9%**	45%	82%	9%
Public	131	39%	43%	87%	23%
Total	170	37%	43%	83%	21%

Bolded percentages reflect "flagged" differences, meaning those that represent potentially meaningful differences in the less desirable direction.

Table 5: Percentage reporting district-level existence of required protocols and a concussion policy*

	n	Annual training of coaches	Immediate removal when concussion suspected	Athlete cleared by health care provider	District has policy	District had "a lot" of influence on concussion protocols
Density						
Urban area	97	93%	89%	86%	77%	27%
Large town	31	**82%**	91%	91%	63%	29%
Small town, rural	38	93%	91%	91%	65%	40%
Spending per student						
<$10,300	44	**84%**	**82%**	**80%**	**59%**	34%
$10,300–$10,999	42	100%	98%	98%	85%	39%
$11,000 or more	54	**89%**	92%	92%	**68%**	31%
Classification						
1A	42	95%	93%	90%	**59%**	**30%**
2A	36	94%	97%	94%	**68%**	39%
3A	18	**82%**	**82%**	**82%**	89%	35%
4A	21	**80%**	**80%**	**80%**	**52%**	**14%**
5A	15	93%	100%	93%	87%	**7%**
6A	36	92%	86%	86%	83%	44%
School type						
Private	26	91%	87%	**78%**	77%	**13%**
Charter	11	**82%**	**82%**	82%	**55%**	40%
Public	131	92%	92%	91%	71%	34%
Total	170	91%	90%	89%	71%	32%

Bolded percentages reflect "flagged" differences, meaning those that represent potentially meaningful differences in the less desirable direction.

* Response options included a lot, some, very little or none, not aware of any district policies or procedures.

Appendix 4: Selected survey results, by traumatic brain injury (TBI) regional service program districts

The following table presents survey results by TBI districts. Results are collapsed to a dichotomy to mirror methods in the report, and to ease display of the information. Comparisons should be made with caution because of small numbers. Counties making up each region include:

1	Eastern:	Baker, Grant, Malheur, Morrow, Umatilla, Union, Wallowa
2	Central:	Crook, Deschutes, Gilliam, Harney, Jefferson, Sherman, Wheeler
3	Southern:	Douglas, Jackson, Josephine, Klamath, Lake
4	Cascade:	Benton, Coos, Curry, Lincoln, Linn
5	Willamette:	Marion, Polk, Yamhill
6	Columbia:	Clackamas, Hood River, Multnomah, Wasco
7	Lane:	Lane
8	Northwest:	Clatsop, Columbia, Tillamook, Washington

Table 1: Survey results by TBI region

	Eastern	Central	Southern	Cascade	Willamette	Columbia	Lane	Northwest	TOTAL
Number of respondents	*25*	*11*	*29*	*18*	*19*	*32*	*11*	*25*	*170*
% "very familiar" with Max's Law	68%	55%	59%	50%	68%	53%	91%	68%	62%
% with requirement									
Annual training of coaches	100%	100%	100%	100%	100%	100%	100%	100%	100%
Immediate removal when concussion suspected	100%	100%	100%	100%	100%	100%	100%	100%	100%
Athlete cleared by health care provider	100%	100%	100%	100%	100%	100%	100%	100%	100%
% reporting happens "all the time"									
Annual training of coaches	96%	100%	100%	100%	100%	100%	100%	92%	98%
Immediate removal when concussion suspected	92%	82%	83%	89%	95%	94%	100%	88%	90%
Athlete cleared by health care provider	96%	91%	93%	89%	84%	91%	100%	100%	93%
% reporting "yes"									
Coach training documented	100%	100%	93%	100%	100%	100%	100%	92%	98%
Concussions documented	100%	91%	72%	94%	89%	91%	91%	100%	91%
% reporting as “large” or “moderate” challenge for training coaches									
Lack of time	8%	27%	17%	17%	16%	6%	18%	28%	16%
Lack of funding	8%	0%	3%	17%	5%	3%	27%	8%	8%
Lack of awareness of training requirements	4%	18%	10%	11%	5%	0%	0%	13%	7%
Lack of interest by coaches	20%	0%	10%	17%	5%	9%	27%	8%	12%
Lack of support from the district	0%	0%	3%	0%	6%	0%	0%	0%	1%
% reporting “all” “most” or “some” students have challenges accessing provider	48%	45%	52%	67%	32%	43%	50%	44%	47%
% with best practices in place									
Training for parents or students	40%	36%	24%	39%	42%	47%	18%	40%	37%
Training for staff other than coaches	36%	55%	38%	56%	47%	31%	45%	52%	43%
Plan for concussion management	96%	100%	90%	100%	95%	100%	100%	96%	96%
Plan for graduated return to play	100%	100%	93%	94%	100%	97%	100%	96%	97%
Plan for graduated return to learn	100%	91%	72%	94%	84%	81%	80%	72%	83%
Active concussion management team	16%	36%	10%	11%	32%	29%	20%	20%	21%
% whose school had used OCAMP Guide	16%	27%	34%	22%	16%	22%	45%	20%	24%
% reporting protocols required at district									
Annual training of coaches	92%	100%	93%	83%	94%	91%	91%	88%	91%
Immediate removal when concussion suspected	96%	91%	86%	83%	94%	88%	100%	92%	90%
Athlete cleared by health care provider	96%	91%	82%	83%	94%	84%	100%	88%	89%
% reporting concussion management policy at district	64%	82%	68%	56%	89%	70%	80%	75%	71%
% reporting district had “a lot” of influence on school protocols	40%	36%	30%	22%	50%	30%	40%	17%	32%

Oregon Health Authority
PUBLIC HEALTH DIVISION
Injury & Violence Prevention Program
Phone: 971-673-0987

You can get this document in other languages, large print, braille or a format you prefer. Contact the Injury & Violence Prevention Program at 971-673-0987. We accept all relay calls or you can dial 711.

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