



THE SCHOOL OF PUBLIC POLICY

MASTER OF PUBLIC POLICY CAPSTONE PROJECT

Understanding and Implementing Concussion Policy in Alberta

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Capstone Approval Page

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Capstone Course PPOL 623 A&B

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(Date)



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Capstone Executive Summary

Rates of concussion-related emergency room visits in Alberta have risen exponentially over the past decade, with visit rates highest among youth. Adolescents and youth suffering from concussions tend to have more complicated recovery than children or adults. Youth are at risk of prolonged recovery periods and other difficulties with premature Return-to-Play (RTP) or Return-to-Learn (RTL) should their physical and cognitive recovery not be adequately supported. This capstone analysis is the first study of its kind in Canada to explore the status of concussion policy and protocols in the education system in a province lacking ministry mandated policy.

The current concussion policy landscape in Alberta can best be described as a patchwork of standards across individual agencies, sports organizations, and teams. There is no official policy in the education system, and policies and protocols appear to be at the discretion of individual schools. Staff survey in two different boards in the Calgary area allowed for analysis of current student and parent/guardian education, school management protocols, and staff training on concussions. The investigation indicated disparity and inconsistency within schools and boards across multiple tenets of concussion policy, with many respondents unaware of various components of their school's policy or even whether such protocols existed.

This study's assessment of current policy and protocols is supplemented with recommendations for inclusion for provincial policy in Alberta. As compared to legislation, policy appears to have been effective in Ontario, the only province in Canada with ministry mandated policy in addition to any semblance of concussion legislation. Alberta Education is urged to take heed from the implementation of Ontario's Policy/Program Memorandum on Concussions (PPM No. 158) and require development of, at minimum, strategies to raise awareness, prevent and identify concussions, institute management procedures for diagnosed concussions, and provide appropriate training for educators and other school staff. This assessment closes with a series of recommendations to supplement the overarching policy and its component parts.

Introduction

Return-to-Learn (RTL) protocols and cognitive recovery considerations are relative newcomers to the dialogue surrounding concussion (Carson et al., 2014). Up until the last decade, the focus in concussion research and policy was predominantly on supporting physical recovery needs, avoidance of further injury, and Return-to-Play (RTP) protocols for youth and professional athletes. It is now recognized that recovery for adolescent sufferers needs to be “managed more conservatively and cautiously than adults to allow more time to heal before resumption of preinjury physical or cognitive activities” (Howell, Osternig and Chu, 2014, 625). In terms of cognitive development, the effect of a concussion may be far more devastating for youth as compared to children or adults (Andrews, 2014). When combined with their unique recovery needs, concussed high school youth may be at risk of prolonged recovery periods and other cognitive difficulties should their RTL lack proper in-school support and management. Post-concussive symptoms can have direct negative repercussions for learning and other intellectual functions, and as a result, there is a need for RTL policy to accommodate cognitive impairment and mediate the implications on student academic performance and cognitive recovery.

In 2014 Ontario became the first and only province in Canada to mandate policy requiring school boards to develop and homogenize concussion protocols including RTP and RTL (Ontario Ministry of Education, 2014). In Alberta, there is no provincial policy standardizing concussion protocols in the education system. The void of overarching and unifying policy in the education system has the potential to be detrimental should individual

schools or boards not have adequate protocols in place to support both the physical and cognitive recovery needs of youth.

To better understand current concussion protocols and management in Alberta schools, this capstone project surveyed staff across nine high schools in the Calgary Board of Education (CBE) and the Calgary Catholic School District (CCSD). The primary objective was to examine the current state of student and parent education, school management protocols, and staff training on concussions amongst a diverse staff body. Although the small sample size limits the ability to generalize across all high schools, the lack of consistency within sites and the overall deficit of formality across districts in the absence of mandated policy is explored. A comparison of respondents within the same site is used to assess the consistency of concussion education and protocol knowledge within schools. Next, perceived and required support from boards and Alberta Ministry of Education to implement multiple tenets of concussion policy is described. Finally, a summary comparison of existing legislation and policy is conducted at the state and provincial level to evaluate potential routes for Alberta. A series of recommendations are offered for inclusion in the development of formal concussion policy in Alberta schools.

Background

In Alberta between 2006 and 2015, concussion-related emergency room visits rose by 102% for females and 39% for males, with visit rates highest for both sexes in the adolescent/young adult range of 10-19 years (Figure 1 Appendix A) (Government of Alberta, 2017). Studies show that adolescents suffering from concussions tend to have more complicated recovery (Kirkwood et al., 2008; Baillargeon et al., 2014; Ransom et al., 2015). The still-

developing youth brain is reaching final stages of maturation, which is particularly vulnerable to the deleterious effects of concussions and result in more severe deficits than children or adults (Baillargeon et al., 2012). With rates of concussion-related emergency department visits at unprecedented levels and rising, it's important that adolescents and youth are supported in their recovery and return to physical and cognitive activities.

Defining Concussion

The understanding of concussion continues to evolve. To evaluate the role policy should play within the concussion paradigm, it is important to define and understand the biomechanics of concussion. A review of the literature uncovers a multitude of differing definitions, which has made comparative research, diagnosis, and treatment difficult over the past 30 years. In an attempt to standardize the definition and share knowledge and evidence-based research on concussion, the International Consensus on Concussion in Sports was developed in 2001 (McCrory et al., 2013). For the purposes of this study, the definition of concussion used will be that as outlined by the Consensus in 2012:

Concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces. Several common features that incorporate clinical, pathologic and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

1. Concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an “impulsive” force transmitted to the head.
2. Concussion typically results in the rapid onset of short lived impairment of neurologic function that resolves spontaneously. However, in some cases, symptoms and signs may evolve over a number of minutes to hours.
3. Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.

4. Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases symptoms may be prolonged (McCroly et al., 2013, 250-251).

In addition to being exceedingly common, concussions can result in temporary or permanent neurological symptoms, making them one of the most complex injuries to diagnose and treat (Tator, 2009). Resulting in a myriad of negative physical, emotional, cognitive, and behavioural outcomes, post-concussive sequelae have the potential to persist for years following injury (King and Kirwilliam, 2011). As indicated in Table 1, the cognitive effects of concussion include reduced information processing speed, decreased attention and concentration and impaired memory and learning, among others (Field et. al., 2003; Sim, Terryberry-Spohr and Wilson, 2008; Kirkwood et. al., 2008; Purcell, 2014). These cognitive effects, combined with ongoing symptoms and behavioural changes, can be detrimental to a youth’s ability to learn and their overall academic performance (Sim, Terryberry-Spohr and Wilson, 2008).

Table 1. Common features of concussion, as outlined by The Canadian Paediatric Society
Source: Purcell (2014, 154).

Symptoms/Physical Signs	Behavioural Changes	Cognitive Impairment	Sleep Disturbances
Headache Nausea/vomiting Dizziness Visual disturbances Photophobia Phonophobia Loss of consciousness Amnesia Loss of balance or poor coordination	Irritability Emotional lability Sadness Anxiety Inappropriate emotions	Slowed reaction times Difficulty concentrating or remembering Confusion Feeling in a fog or dazed	Drowsiness Trouble falling asleep Sleep more than usual Sleeping less than usual

Implications of Premature Return-to-Play (RTP) and Return-to-Learn (RTL)

Without appropriate policy or protocols in place, there is an increased likelihood for premature RTP or RTL. Consequently, many concussed students experience a recurrence or worsening of symptoms (Sandoiu, 2016). While dangerous for many reasons, the literature surrounding implications of a premature return to activity is focused around RTP and “second-impact syndrome.” Second-impact syndrome is the potentially lethal swelling of the brain that occurs when a person suffers another concussion before fully recovering from the initial injury (Byard and Vink, 2009; CBC News, 2015; Rowan’s Law, 2017). Adolescents appear to be most susceptible to second-impact syndrome, and the death of 17-year-old Ontario high school rugby player Rowan Stringer is a prime example of the need for appropriate protocols and management for concussed high school youth (CBC News, 2015; Rowan’s Law, 2017).

Premature RTL also has serious implications. Compared to peers fully recovered from a concussion, students not fully recovered before reintegration into the classroom may experience post-injury difficulties and a prolonged recovery period (Ransom et. al., 2015). A lack of knowledge and management among school staff is thought to contribute to worsening concussion symptoms that may occur from premature RTL (Carson et. al., 2014). Academic adjustments and accommodations can support a student to successfully RTL, however, a lack of clarity can result in variable approaches and understanding of concussions and their management from different staff in the school setting (Dreer et. al., 2016).

Concussion Legislation and Policy

The heightened awareness of the dangers and consequences of concussion coupled with the rate of occurrence in youth and professional athletes in the United States in the early 2000's resulted in unprecedented litigation and regulations (Bonds et al., 2015). Legislation swept the United States beginning in 2009 with Washington and concluding in 2014 with Mississippi. Currently all 50 states (and the District of Columbia) have some form of concussion legislation. Although significant variation exists between states, most require some combination of concussion education, removal from play following suspected concussion, and specific RTP protocol that includes clearance by a medical professional (The Foundation for Global Sports Development, 2014). While specific RTP protocol is legislated in all cases, RTL protocols, support, and management is legislated by only eight states.¹ Initial analysis indicates that like RTP protocols, there is considerable variation within existing RTL legislation. Although the risk of second-impact syndrome and further physical brain injury are primarily the reason for such tightly legislated RTP protocols, the oversight on properly managing the cognitive effects of concussion through RTL protocols is wearisome.

Currently, there is a void of legislation and official policy related to concussion in Canada, although a national concussion awareness strategy is a priority for the Canadian government. The federal Minister of Health Mandate Letter calls for cooperation with the Minister of Sport and Persons with Disabilities in “increasing funding to the Public Health Agency of Canada to support a national strategy to raise awareness for parents, coaches, and athletes on concussion treatment” (Government of Canada, 2015). Presently, Ontario is the only province with any formal concussion legislation having passed Bill 149 (Rowan's Law) in June

¹ States with return-to-learn legislation include Illinois, Massachusetts, Maryland, Maine, Nebraska, New York, Virginia, and Vermont.

2016. After the death of Rowan Stringer in 2013², a coroner's inquest shone a spotlight on the lack of concussion protocols in Canada for youth compared to those in the United States and other countries around the world (Legislative Assembly of Ontario, 2016a; Legislative Assembly of Ontario, 2016b). According to neurosurgeon and leading concussion authority Dr. Charles Tator, there's a good chance that greater knowledge and awareness of concussions at a school level could have prevented Rowan's death (CBC News, 2015; Rowan's Law, 2017; Hall, n.d.). Although an advancement in terms of legislation, Bill 149 does not mandate minimum protocols like legislation does in the U.S. Instead, the new Bill mandates a committee to review recommendations from the coroner's inquest and review legislation, policies and best practices from other jurisdictions respecting head injuries (Legislative Assembly of Ontario, 2016b). This committee is to present their findings to the Minister of Tourism, Culture and Sport who will then publish the report on the Government of Ontario website. Further action following the publishing of this report is unclear.

In March 2014 the Ontario Ministry of Education introduced official policy requiring school boards to develop, implement, and maintain a policy on concussion (including specific RTL protocols) province wide.³ Doing so in the absence of legislation, the Policy/Program Memorandum on Concussions (PPM No. 158) requires boards to develop, at minimum, strategies to raise awareness, prevent and identify concussions, institute management procedures for diagnosed concussions, and provide appropriate training for educators and other school staff (Ontario Ministry of Education, 2014). A 2016 study by Hachem et al. assessed concussion education and management protocols after enactment of the PPM and found a significant

² Believed to have been due to second-impact syndrome after suffering multiple concussions within a week.

³ To be in place by January 30, 2015.

increase in student education, staff training, and RTP and RTL protocols one year after implementation (Hachem et. al., 2016).

Return-to-Play (RTP) and Return-to-Learn (RTL) Policy in Alberta

The Canadian Concussion Collaborative (CCC) is an amalgamation of health-related organizations concerned with the prevention and management of concussions (Canadian Academy of Sport and Exercise Medicine, 2017). Chaired by the Canadian Academy of Sport and Exercise Medicine, the CCC recommends that all recreation providers and sports organizations or organizers implement a concussion management protocol. In Alberta, many sports organizations have recently developed or are currently developing some form of concussion policy or protocol in spite of a lack of legislation. As a result, concussion policy in Alberta can best be described as a patchwork of standards across individual agencies, sports organizations, and teams.

The Sport Medicine Council of Alberta's Alberta Concussion Alliance (ACA) aims to "provide Albertans with easily accessible research driven concussion prevention and management practices that are simple and safe to use" (Sport Medicine Council of Alberta, 2009). The ACA is a leader in providing strategic direction on the prevention and recovery from concussions and has comprehensive and evidence-informed research available for stakeholders involved in concussion prevention and management. Readily-available resources spanning the areas of awareness, RTL protocols, RTP protocols, videos, websites, and online courses for the prevention and recovery from concussions have aided many sports organizations, such as the

Alberta Soccer Association (2016), in developing their own concussion protocols (Sport Medicine Council of Alberta, 2016).⁴

In the Alberta education system, there is no homogenous policy regarding a unified approach to concussion education, prevention, and management. As a result, the details and depth of current concussion policies and RTP and RTL protocols in schools is unknown. Discussion of need has occurred at the individual school and board level as well as at the Alberta School Boards Association (ASBA) which serves and represents Alberta's 61 school boards (Alberta School Boards Association, 2016a). Requests to ASBA from its member districts have called for support and advice that can be taken forward to the provincial government for future policy development, although consideration of these requests by the provincial Ministry of Education is unclear (Alberta School Boards Association, 2016c). A September 2016 ASBA Board of Directors meeting included presentation of a report from the Student Health and Wellness Task Force that included "an updated Action Plan, a model concussion policy and protocol document as well as a sample concussion policy and a resource article which appeared in the *Canadian Journal of Neurological Sciences*" (Alberta School Boards Association, 2016b, 8). This task force comment was also discussed in the Calgary Board of Education (CBE) board meeting in February 2017 (Calgary Board of Education, 2017). Unfortunately, details on these documents weren't readily available, and requests to ASBA resulted in redirection to individual boards. When specific inquiries were made with boards for policy details, most queries went unanswered. An official in one of ABSA's member boards responded with a statement regarding district-wide policy being in place, however, requests for copies went unanswered and no further details or information were provided.

⁴ The ACA also utilizes the definition of concussion from the 2012 Consensus, which aligns well with this study.

A recent publication by the law firm Borden Ladner Gervais recently warned school boards to minimize the risk inherent in sports and to manage it appropriately should the risk materialize (Axelrod, 2017). They further call for boards to seek guidance from Ontario's Policy/Program Memorandum (PPM) to develop and maintain concussion policies that include developing, implementing, and providing training on appropriate protocols. Having concussion management present on the agenda and part of the discussion is a promising step in this direction. However, resultant action or policy implementation is unclear.

Methodology

Study Participants

Approval for this study was granted from the Conjoint Faculties Research Ethics Board (CFREB) at the University of Calgary in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS). The survey was intended to evaluate school concussion protocol and its management in senior high schools in the Calgary area, as well as assess the extent of concussion education and training for students, parents/guardians, and staff. Additional ethics applications were approved from the Calgary Board of Education (CBE) and the Calgary Catholic School District (CCSD) to perform research in schools in their districts.

Instrument

A 27-question survey was developed using RedCap, a secure web application used widely by the University of Calgary's Sport Injury Prevention Research Centre (Appendix B).

Survey questions were validated for content by members of the Traumatic Brain Injury NeuroTeam at the Hotchkiss Brain Institute and staff in the University of Calgary's Faculty of Kinesiology and the Sport Injury Prevention Research Centre. Survey respondents included teachers, principals, vice principals, guidance counselors, physical and health educators, coaches, and support and administrative staff.

All respondents were asked general demographic questions including the number of years in their current position and the number of staff and students at their school. Respondents in the CCSD were asked their names, titles, email addresses and school names, but were also given the option to remain anonymous. All responses by CBE staff were anonymous, per district and ethics regulations, and no identifying data including titles or school names was collected.

Respondents were asked about the extent of concussion education and training for students, parents/guardians, and staff as well as management of their school concussion and RTP and RTL protocols. In addition, the survey assessed the respondent's familiarity with different concussion resources. Finally, participant's perception of the measure of support from their respective school board and Alberta Education was gauged using a five-point Likert scale.

Procedure

Decisions for participation at the school level was up to individual principals. All principals in the CCSD and CBE were contacted by email using addresses in the Alberta Schools' Athletic Association School Directory, as provided by the University of Calgary's Sport Injury Prevention Research Centre. First email contact and requests were made with principals of high schools in the CCSD on May 14, 2017 (n=11) and CBE on May 18, 2017 (n=33). Second email contact and requests were made on May 30, 2017, and third and final

email contact and requests made on June 16, 2017. Built-in consent for employees of the CCSD allowed for principals to send out the link for the survey directly to their staff, while CBE ethics process required a signed consent from interested parties be completed and returned to the research team prior to survey participation.

Data Analysis

Survey responses were collected up to and including June 30, 2017. In total, 61 responses were submitted, of which 49 were valid. The process of informed consent included a caveat that participants could revoke their consent by exiting the survey at any time and their responses would not be submitted. As a result, the 12 incomplete responses were not considered in the analysis, nor was their data taken into account.

A mixed methods approach was used to assess the education and management of concussions in Alberta high schools. Descriptive statistics were generated for the survey population. Categorical variables were expressed as percentages and open-ended questions were analyzed qualitatively for content. Analysis occurred at three levels: in aggregate across the whole population of responses; at the district level with broad comparison occurring between boards; and sub-analysis of a number of responses within the same school for two sites in each district.

Comparative Analysis of Legislation and Policy: RTP and RTL Protocols in Selected American States and Ontario

To better understand the legislative and policy backdrop a comparative analysis was performed using state legislation, the 2016 Network for Public Health Law's Summary Matrix of

State Laws Addressing Concussions in Youth Sports (2016) and the Thompson et. al. (2016) study on variation in state laws, conventional content analysis was undertaken for eight American states,⁵ Ontario's PPM and Rowan's Law. Extensive data was condensed and salient themes were identified and analyzed. Coding categories were derived from the text data where best practices, gaps, and limitations could be identified. Analysis was undertaken in the context of implementation in Alberta, and overall concussion management and specific RTP and RTL content were isolated. This information will be considered when discussing the options available for Alberta.

Results

Survey population

The Calgary Board of Education (CBE) and the Calgary Catholic School District (CCSD) both provided ethics clearance for research to be done in their schools. Of the 44 high schools contacted, nine individual institutions participated for an overall institutional response rate of 20.5% with a combined total of 49 unique participants (Figure 2).

Survey responses were collected up to and including June 30, 2017. In total, 61 separate responses were attempted but only 49 responses were complete. The 12 partial responses were incomplete and not officially submitted for analysis, therefore they have been removed from the data set and will not be included in the analysis. CBE staff were responsible for 33 of the 49 records (67.3%) across five sites while CCSD staff were responsible for 16 responses (32.7%) across four sites (Figure 2).

⁵ Illinois, Massachusetts, Maryland, Maine, Nebraska, New York, Virginia, and Vermont

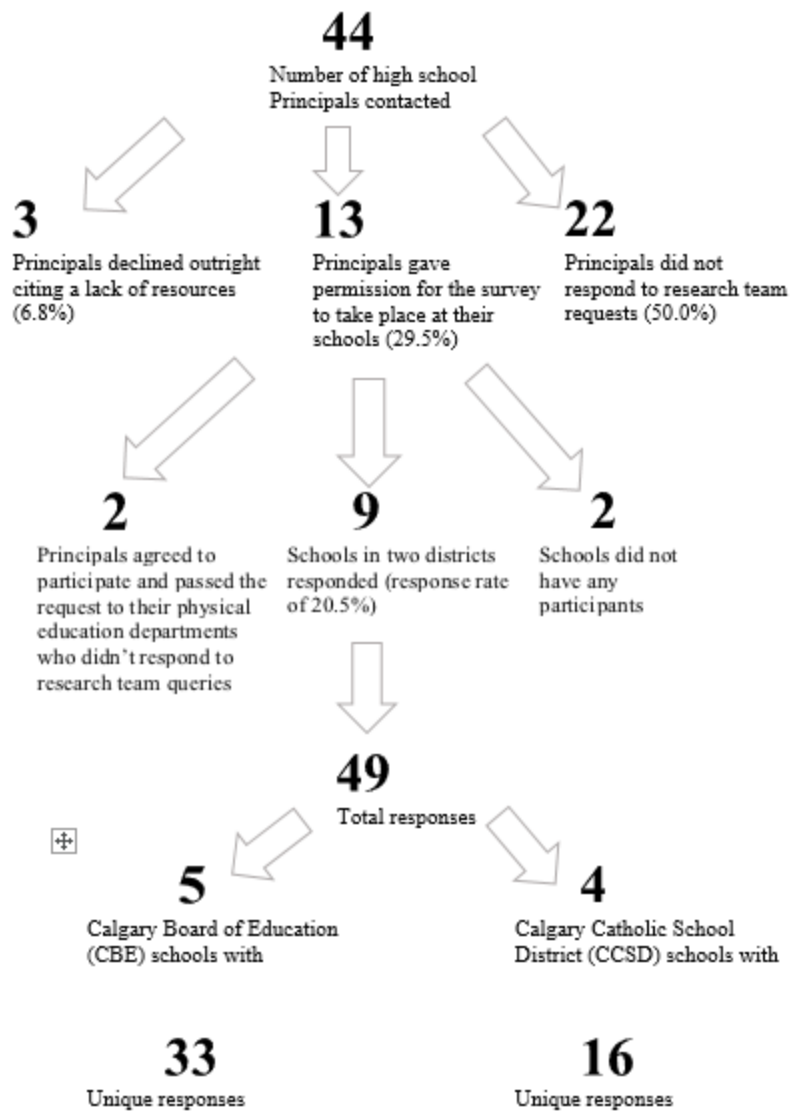


Figure 2. Response rates over 44 unique schools in two districts in Calgary, AB during data collection.

Among the schools that responded, 83.7% had more than 1000 students and 77.6% had more than 75 staff. As Table 2 indicates, there was a wide array of responses when it came to respondents' number of years in their current position – 22.4% reported 1-3 years, 20.4% reported 8-10 years, and 22.4% had greater than 15 years in their current position.

Table 2. General characteristics of survey respondents and their individual schools from both the CBE and the CCSD (n=49)

	Number of Respondents	Percent
<i>Number of years in current position</i>		
<1 year	2	4.1
1-3 years	11	22.4
4-7 years	7	14.3
8-10 years	10	20.4
10-15 years	8	16.3
>15 years	11	22.4
<i>School Size (no. students)</i>		
<600	8	16.3
600-800	0	0
800-1000	0	0
>1000	41	83.7
<i>School size (no. staff)</i>		
<10	0	0
11-30	8	16.3
31-50	1	2.0
51-74	2	4.1
>75	38	77.6

None of the nine responding schools were concussion-free over the last year, and 38.8% of respondents reported at least one documented concussion. Nearly a third of the participants surveyed (32.7%) reported more than 10 incidents at their school (Figure 3). Most notably, the majority of participants didn't know how many concussions occurred at their school over the last year (61.2%).

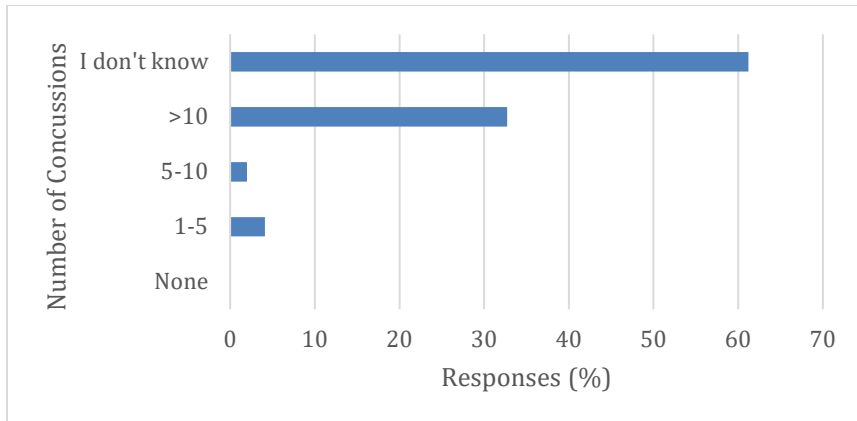


Figure 3. Approximate number of concussions during the last academic year as indicated by CBE and CCSD staff respondents. Values are expressed as percentages of survey responses (n=49).

Concussion Education

Student concussion education was present in the majority (67.3%) of respondent’s schools, although this education was not offered to all students. Concussion education was primarily provided to student athletes in “high risk” team sports such as football, rugby, and hockey (48.5% of responses), while slightly fewer respondents indicated concussion education was provided to student athletes participating in other teams not deemed “high risk” (45.5%). Twenty-six and a half percent of responses indicated a combination of more than one student group receiving concussion education (including the two categories above).

Student concussion education was delivered by teacher coaches most often (60.6%), with 51.5% of respondents indicating physical and/or health educators also provide concussion education to students. Of those who provided student concussion education at their schools, 33.4% reported they didn’t know if this education included the provision of RTP protocol details. Similarly, of those who provided concussion education to their students, 54.5% didn’t know whether details of a RTL protocol were provided to students.

Although not comprehensive across all schools, provision of student education opportunities and school concussion protocols and management are similar between the boards (Table 4). Response rates were similar for all questions except that regarding provision of the details of the RTL protocol to students, where nearly twice as many respondents in CCSD schools indicated students were given details as compared to CBE schools. For both boards, the highest rate of confirmed concussion education, management and/or tracking peaks at just over two-thirds (Table 3). Therefore, there is at least 30% of respondents (ranging up to just about 60%) who don't have or don't know certain aspects of their school concussion policy or protocols in both the CBE and the CCSD.

Table 3. Differences between boards for binary-choice questions regarding student concussion education and school management protocols. Values expressed as percentages of survey responses.

	Calgary Board of Education (n=33)			Calgary Catholic School District (n=16)		
	Yes	No	I don't know/ no answer	Yes	No	I don't know/ no answer
Do students at your school receive concussion education?	69.7	30.3	N/A	62.5	37.5	N/A
Do students receive details of RTP protocol?	45.5	15.1	39.4	43.8	18.8	37.5
Do students receive details of RTL protocol?	24.2	18.2	57.6	43.8	18.8	37.5
Does your school have a formal concussion management or tracking system to track incidence and progress of concussed students?	48.5	51.5	N/A	37.5	62.5	N/A
Does your school have a formal protocol for tracking or managing students who experienced a concussion while outside school hours, programs, and facilities?	9.1	36.4	54.6	6.3	75.0	18.8

Less clarity surrounded parent/guardian education opportunities, with 71.4% of participants not knowing which parents/guardians had the opportunity to receive concussion education and 16.3% reporting these opportunities do not exist at all (Figure 4). In aggregate, more than half of respondents didn't know which parents/guardians were given the opportunity for education on concussions or how it was delivered. Just over half of respondents (51%) were aware of online training tools used for concussion awareness and training, but only 8.2% of responses indicated passing them on in any form to parents/guardians to educate them on concussion awareness and management. Although parent/guardian education was lacking in both districts, it was more restricted in CCSD schools with 25.0% of respondents reporting there were no opportunities for parents/guardians to receive concussion education compared to 12.1% of CBE responses (Figure 5).

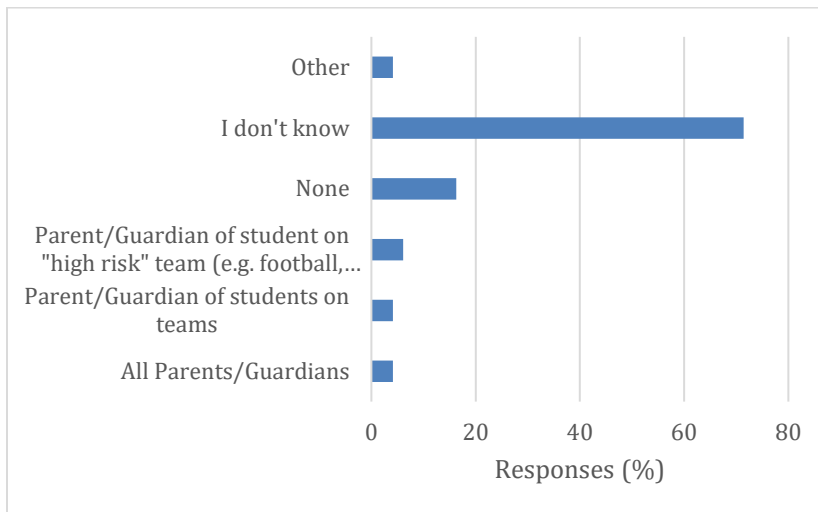


Figure 4. Parent/guardian education concussion opportunities as reported by CBE and CCSD high school staff. Values are expressed as percentages of survey responses (n=49).

In terms of staff training and education opportunities, CCSD schools were more thorough at all sites, while 9.1% of CBE respondents indicated there were no staff training requirements at their school in terms of concussion education or management (Figure 5).

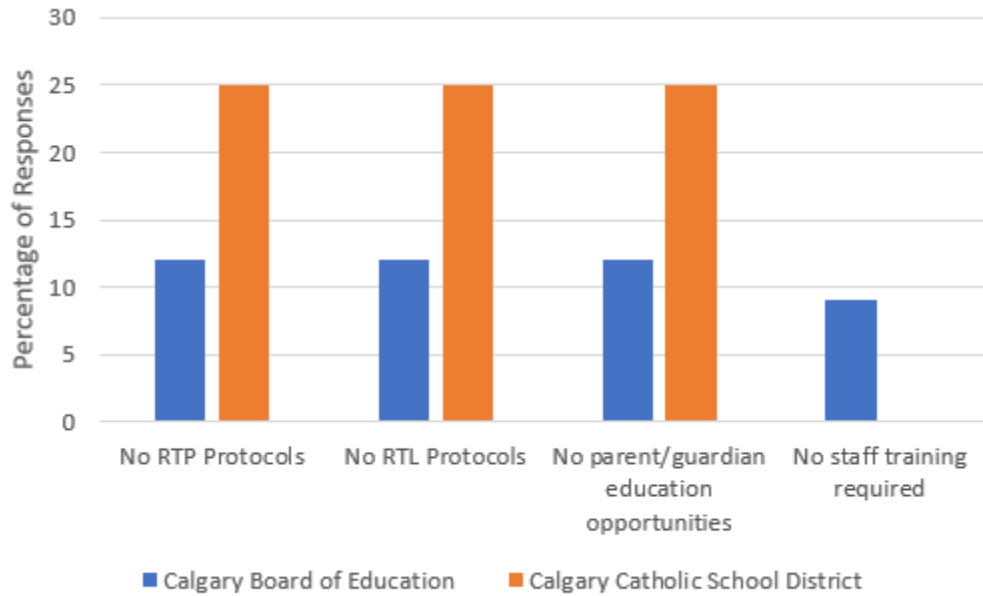


Figure 5. Lack of RTP and RTL protocols, parent/guardian education opportunities, and staff training requirements in the Calgary Board of Education and Calgary Catholic School District (n=49).

Concussion Management and Tracking

A method of formal concussion tracking or management system to track the incidence and progress of concussed students was not common in the schools surveyed. Over half (55.1%) of respondents reported an absence of a formal system at their school. Of those with a formal system (n=22), 13.6% could not provide details when asked to describe the system other than that they were aware one existed but didn't know the minutiae. Other responses of formal concussion/injury tracking systems included: sports medicine students and coaches are responsible for tracking, Sport Concussion Assessment Tool (SCAT) or other medical clearance from student's doctor, and school or district-wide incident reporting systems.

Overall management of RTP protocols at schools was most often the responsibility of coaches, principals or parents (Table 4 Appendix C) however the monitoring of a student's progress through RTP protocols often involved coaches, parents or teachers (and not principals).

More than a quarter of respondents (28.6%) reported they didn't know who is responsible for overall RTP protocol management (Table 4 Appendix C).

Responsibility for the overall management of RTL protocols at the schools surveyed was even less clear than it was for RTP protocols. Coaches held the most responsibility according to 20.4% of respondents and principals held responsibility half as often as they did with RTP protocols (10.2%). Team-based management was reported by 4.1%. Just under one in five respondents reported their school does not have a RTL protocol (16.3%). More than a third of respondents (34.7%) said they didn't know who is responsible for managing RTL protocols or monitoring a student's progress through them (Table 4 Appendix C).

The level of understanding of both RTP and RTL protocols differs within school boards. Over a third of respondents in the CBE didn't know who held overall responsibility of RTP or RTL protocols at their school or who is involved in monitoring a student's progress through them (Table 5). In the CCSD 25.0% didn't know who was responsible for RTL protocols at their school or who is involved in monitoring a student's progress through them, while most had some knowledge of RTP protocols and monitoring. While many respondents didn't know the details of RTP or RTL protocols in their schools, analysis between boards indicated that protocols (both RTP and RTL) were less developed in CCSD schools overall as compared to CBE schools (Figure 5). A striking number of respondents indicated a lack of knowledge in many areas related to concussion education and management. As can be seen in Table 5, there was a higher proportion of uninformed staff in the CBE as compared to CCSD.

Table 5. Proportion of responses which indicated an “I don’t know” answer from each of the two school boards noted. Values expressed as percentages of survey responses.

	Calgary Board of Education (n=33)	Calgary Catholic School District (n=16)
Which students receive concussion education at your school?	6.1	6.3
Who delivers the concussion education program to students?	15.2	6.3
Who holds responsibility for/is in control of the management of RTP protocols at your school?	33.3	18.8
Who is involved in monitoring the student’s progress through RTP protocols at your school?	36.4	12.5
Who holds responsibility for/is in control of the management of RTL protocols at your school?	39.4	25.0
Who is involved in monitoring the student’s progress through RTL protocols at your school?	39.4	25.0
Which staff at your school are required to complete any concussion training?	24.2	0.0
Which parents/guardians at your school have an opportunity to receive concussion education?	78.8	56.3
How is concussion education delivered to parents/guardians at your school?	69.7	56.3

Analysis within Institutions

Responses varied within the same site, indicating a lack of knowledge and consistency within institutions. As can be seen in the sub-analysis below, two unique respondents from the same school in the CBE, with considerable lengths of employ in their current positions, reported

vastly different responses across select questions (Table 6). Further analysis of multiple responses from within another CBE school can be seen in Table 7 (Appendix C).

Table 6. Analysis of two unique participant’s responses to select questions from within the same school in the Calgary Board of Education.

	Respondent #55	Respondent #36
Which students at your school receive concussion education?	Students on teams	Students on teams Students in physical education classes Other
Who delivers concussion education to students?	Teacher coach	Physical/health educators Teacher coach
Do students receive details on RTP protocol?	Yes	I don’t know
Do students receive details on RTL protocol?	Yes	I don’t know
Does your school have a formal concussion management or tracking system?	Yes	No
Who manages RTP protocols?	Teacher Coach Parent/Guardian	School does not have RTP protocol
Who monitors RTP protocols?	Teacher Coach Parent/Guardian	School does not have RTP protocol
Who manages RTL protocols?	Teacher Coach	School does not have RTL protocol
Who monitors RTL protocols?	Parent/Guardian	School does not have RTL protocol
Which staff are required to complete concussion training?	Physical/health educators Teacher coaches of teams	Teacher coaches of teams
Which parents/guardians have an opportunity to receive concussion education?	I don’t know	None
How is concussion education delivered to parents/guardians?	Encouraged to attend information nights on concussions Provided pamphlet or other resource	Encouraged to attend information nights on concussions
How many concussions last year?	I don’t know	>10

Variation in responses was also observed within schools in the CCSD. As can be seen in Table 8, there was considerable disparity in nearly all questions, indicating fractured consistency in concussion policy and protocols much like that seen amongst CBE respondents. Of particular note is the lack of consensus in all four responses when it comes to management of RTP and RTL protocols. Respondent 17 indicates RTP management responsibility belongs to the Principal, while the Principal of that location (one of the other three respondents) indicated another individual as holding responsibility. Analysis of responses from within another CCSD school can be seen in Table 9 (Appendix C).

Table 8. Analysis of four unique participant’s responses to select questions from within the same school in the Calgary Catholic School District.

	Respondent #14	Respondent #16	Respondent #17	Respondent #21
Which students at your school receive concussion education?	None	None	Student athletes on “high risk” teams	None
Do students receive details on RTP protocol?	No	No	Yes	I don’t know
Do students receive details on RTL protocol?	No	No	Yes	I don’t know
Please describe your formal concussion tracking system.	School does not have a formal concussion tracking system	School does not have a formal concussion tracking system	Student accident injury reporting service	School does not have a formal concussion tracking system
Who manages RTP protocols?	Our school does not have an RTP protocol	Coach Parent/guardian	Principal	I don’t know
Who monitors RTP protocols?	Our school does not have an RTP protocol	Coach Parent/guardian	Coach	I don’t know
Who manages RTL protocols?	Our school does not have an RTL protocol	Coach Parent/guardian	Teacher	I don’t know
Who monitors RTL protocols?	Our school does not have an RTL protocol	Coach Parent/guardian	Teacher	I don’t know
Which staff are required to complete concussion training?	Teacher coaches of teams	Teacher coaches of teams	Teacher coaches of “high risk” teams	Teacher coaches of “high risk” teams
Which parents/guardians have an opportunity to receive concussion education?	None	I don’t know	I don’t know	I don’t know
How is concussion education delivered to parents/guardians?	Parents/guardians do not receive concussion education	I don’t know	I don’t know	I don’t know
How many concussions last year?	I don’t know	I don’t know	>10	>10

Overall Support

A five-point Likert scale was used to gauge the level of perceived support felt by respondents from their respective school board and Alberta Education in working with multiple tenets of concussion policy. Responses were varied with a pretty even split between those who felt supported in certain areas of their school’s concussion policy and protocols and those who did not (Figure 6).

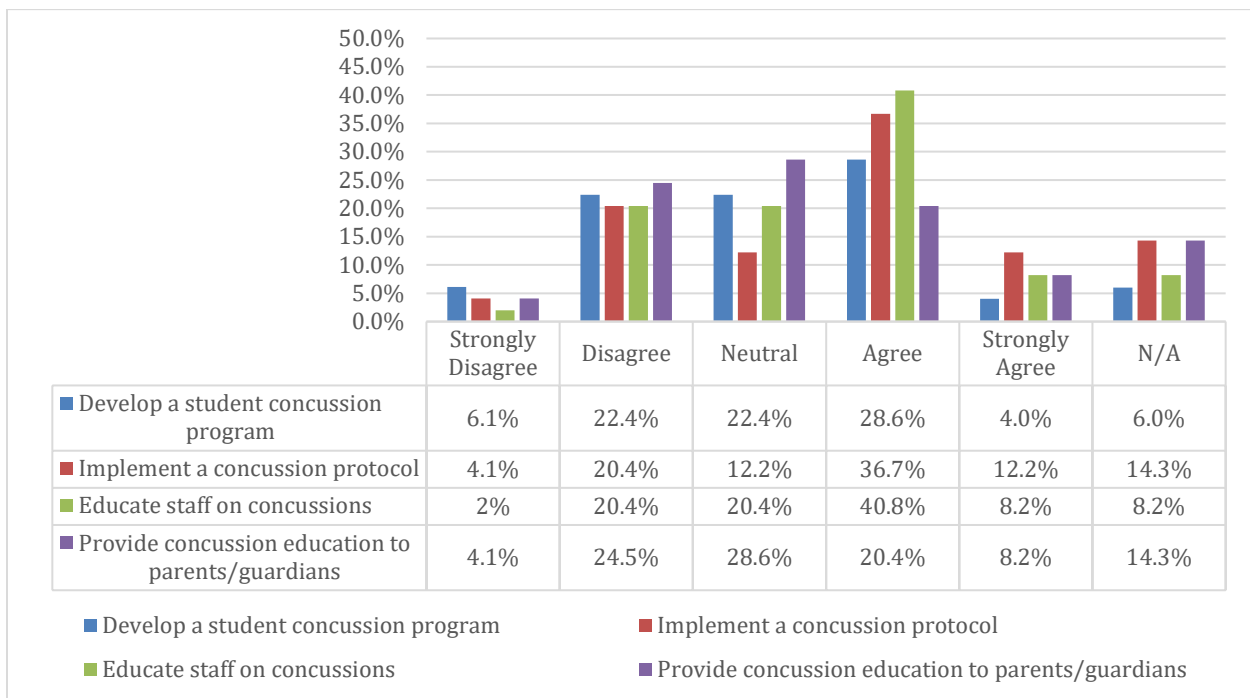


Figure 6. Participant’s responses when asked to what extent they agree with the following statement: “My school has received ample support from our school board and Alberta Education to...” (n=49).

There were slightly more participants who felt their school was supported in developing a student concussion program than those who did not, while support for parent/guardian education was felt to be less supported overall. Nearly half felt supported by their school board or Alberta Education to educate staff or implement a concussion protocol. Approximately a quarter of

respondents felt neutral regarding perceived support for their school by their board or Alberta Education to develop student concussion education or a concussion protocol, educate staff on concussions, or provide concussion education to parents/guardians.

When analyzed by board, respondents in the CCSD agreed or strongly agreed more often than those in the CBE for every question and therefore appear to feel more supported by their board and Alberta Education overall. There were more CCSD respondents who agreed or strongly agreed than those who disagreed or strongly disagreed for every option, while more CBE staff disagreed or strongly disagreed that they felt supported to provide concussion education to parents/guardians. Although more CBE staff reported feeling supported in the other three areas, it is evident this is an area in need of development. For CCSD respondents, 50% chose neutral or N/A in response to this question, which indicates development of concussion education opportunities for parents/guardians is needed among schools in this board as well.

Resource or Support Suggestions

Qualitative capture was used to determine resources and/or supports in addition to those already provided by their school, school board, and Alberta Education that would enhance respondents' school's concussion policy. Just under half of respondents (46.9%) indicated there were additional resources to those being utilized that would serve to be useful, and of those, 56.5% provided further details (Table 10).

Table 10. A sample of participant suggestions for resources or supports not utilized at their school that respondents would find helpful regarding concussion education, prevention, and management. Responses are unedited and in participants' words.

- Parent awareness program.
- Alberta Health Services must get involved.
- Any support available to implement a return-to-play, school, work protocol.
- Perhaps a credit course can be made mandatory for all student athletes, if [such] a course exists.
- A pamphlet should be sent home to all parents of student athletes.
- Connection to medical professionals and sports experts in their field. Baseline testing and understanding.
- Alberta Children Hospital resources

In addition to those listed above, 15.4% of responses indicated they didn't know or knew there were resources available but unaware of what they are or how to access them. Furthermore, 23.1% called for consistency across the province, having a governing body protocol, or standardization of tracking systems. One respondent provided detailed description and contact information for an advocate who has produced short videos on concussion that have begun being shown in Calgary Hockey and who is keen to have them shown in schools. Finally, one respondent discussed how this should be as basic as any other student orientated program:

Most teachers have zero experience when working with students who have had TBI or mTBI.⁶ I coach football – so I get the training and [am] aware it exists and recognize its importance – in our school I'm unaware if any other teachers are accessing it or have access to PD [Professional Development opportunities] for concussion-related issues.

Additional comments and suggestions on how to enhance concussion education and management protocols at individual schools were also provided and can be seen in Table 11 below.

⁶ Concussion can also be referred to as traumatic brain injury (TBI) or mild traumatic brain injury(mTBI). Often in literature on the subject the terms are used interchangeably. For the purposes of this study, the term concussion was used, however, participants use of mTBI and TBI are acceptable.

Table 11. Additional comments and suggestions for enhancing concussion education, prevention, recognition and/or management. Responses are unedited and in participants' words.

- More non-physical type teachers should be aware of concussion education and recognition.
- As far as I know, all education has been aimed at teacher coaches. Perhaps educating the parents and students would also be a good step.
- Mandatory PD for the Return to Learn protocols
- It would be helpful to have a simple protocol in place.
- We need to implement more education awareness around this subject. I would recommend to create workshops and visit schools and also inviting parents for workshops too. We do have parents who are very concerned of missing school and not having a good understanding of what is a concussion.
- It should not just be coaches of sports that need this training. Classroom teachers need more information and need to be informed if a student has been concussed, as behaviour often changes and ability to focus and learn in the classroom.
- It just needs to be ubiquitous.
- A proper concussion testing system needs to be encouraged to give athletes a proper baseline for which possible concussions can be compared to. There are computer programs available for athletes to do. Any tests after the baseline would need to be analyzed by professionals in order to guide the return to play protocol.

Multiple respondents discussed the importance of youth returning to the classroom following concussion and the need for awareness for all staff, and one respondent discussed how RTL protocols should be mandatory:

Many teachers who do not coach or engage in physical activities often do not consider that a student may be impacted by a concussion for long periods of time. This is especially true in traditional schools where students are on a schedule and adjustments must be made.

Discussion

This capstone project is a unique investigation into the current state of concussion education and management protocols and policy in some Calgary high schools. It is important to note that with only four high schools in the CCSD and five in the CBE, it is not possible to generalize results across all Alberta high schools. Although respondents generally felt supported by their school, district, and Alberta Education (as evidenced by the Likert scale questions) to

develop multiple tenets of concussion policy, the findings indicate there is a lack of consistency and continuity within individual schools as well as an overall deficiency of structure across districts in the absence of mandated policy.

Current Landscape – Individual School and Board/District Level Policy and Protocol

Currently, the landscape in Alberta is a patchwork of policies and protocols and appear to be at the discretion of individual schools. Analysis indicates that although at the aggregate level there were concussion education opportunities present in the majority of respondents' schools (67.3%), recipients and facilitators were less defined and responses spanned the gamut of available categories. That's not to say there is a complete void of opportunity or education, but there is room for improvement as effectiveness and consistency are questionable when so ill-defined. When considered in the context of the current state of concussion policy in Alberta, this points to imbalanced opportunities that could be harmful to student recovery.

When we combine the fragmented education opportunities in the current system with the findings that overall RTP and RTL management are split between various staff or absent altogether, the inconsistency points to a need for a unified policy mandate. As the findings indicate, within schools there are vastly different levels of knowledge and conflicting and unclear assignment of responsibility. Even if responsibility is assigned or intervention is warranted, the current status of concussion management has a lack of formality which is likely to create issues for the concussed student when returning to the classroom or to cognitive activity. In addition, the absence of standardization effectively eliminates the opportunity for research and comparison to allow for continuous improvement in the consideration of an evolving field of knowledge.

Survey-wide, “I don’t know” was a popular response to many of the questions. For questions that required participant feedback or were open-ended, this was also a prevalent response offered up by participants. While disappointing, the fact that many respondents didn’t know if their schools had specific policies, or who was in charge of them, is in itself a piece of very valuable information. Ultimately, many of the people responsible for helping our youth achieve their cognitive potential are unaware of how or when to protect them. This translates into a serious issue for concussed students.

Specific to RTL, there was significant variability in responses on overall RTL management with the majority not knowing details of, or if, protocols existed (34.7%). One in five respondents reported coaches as holding overall control of RTL protocols. While it makes sense for coaches to be heavily involved in RTP protocols, especially when the concussion occurs during the sport they coach, their involvement in RTL makes little sense as their day-to-day involvement with students is typically limited. Furthermore, coaches often have little information on the student’s history of learning or other factors that may affect academic progress. As a student’s cognitive functioning can be heavily impacted, and thus negatively impact their academic performance, a student’s RTL protocol should be in the hands of someone who has more oversight and ability to manage or make appropriate accommodations in all areas (McGrath, 2010). As such, this study aligns with Hachem et. al. (2016) in recommending that overall management, responsibility, and monitoring should be placed on the principal or vice principal.

Study Limitations

Comparison of survey response rates by Nulty (2008) indicates that online surveys generally result in lower response rates as compared to paper/in-person surveys and response rates in the 20%-47% range are common. Considering the context of this study, a response rate of 20.5% of schools contacted is adequate. The methodology of this study was dictated largely by the school boards involved. As a result, the multi-tiered process combined with the timing in the academic year and short data collection period saw a limited sample size. Nulty (2008) has suggestions for increasing response rates including repeat reminder emails and incentives. This survey used repeat reminder emails but the restricted timeline and the structural limitations introduced by district ethics processes presented barriers to incentivizing responses. A longer timeline and more strategic placement in the academic year would have resulted in a larger sample size which may impact results.

In addition, the survey was answered by staff in various roles, although analysis of the level of knowledge corresponding with the role wasn't possible. As ethics requirements for one board required complete anonymity it was impossible to determine if one category of staff were champions in the area of concussion management or if there was a staff category in desperate need of education across all schools. This was addressed through analysis within the non-restricted board where possible.

Finally, although responses were anonymous, as with any self-reported survey there is the potential for response bias, self-reporting bias, and sampling error. The nature of this study, and the process dictated by school boards, created a multi-step process that perhaps dissuaded potential participants. The survey was not easily diffused among potential participants and required multiple permissions before access was granted. The requirement of a signed consent

for one of the boards prior to participation, rather than a built-in consent, presents the potential to only recruit motivated participants who feel strongly about the topic rather than a sample of all staff.

Despite these limitations, this study provides new and valuable information on the current landscape of concussion policy and RTP and RTL protocols and presents useful data for consideration in Alberta. Follow-up to this study using a more rigorous design, additional variables, and a larger sample size is warranted.

Options

To improve consistency in Alberta in terms of concussion education and management, there are different options at the provincial or state level that have been implemented. One option is the development of a mandated concussion policy as was done in Ontario. A second option is the development of legislation, as has been done in many American states. Each of these options is explored below in terms of RTP and RTL protocols.

Lessons from Ontario – Mandated Provincial Concussion Policy

Ontario saw significant increases in both their RTP and RTL management protocols post-PPM, two areas this study found are in need of attention. Post-PPM, Ontario reported 92% of schools had RTP protocols in place and 77% had a RTL protocol (Hachem et. al., 2016). In Alberta, only 45.8% indicated students are given details of RTP protocols and 28.6% RTL. With nearly a third of respondents indicating their schools had over 10 concussions last year, the apparent lack of appropriate support and protocols for sufferers could prove disastrous. The fact

that Ontario saw a significant increase post-PPM is promising in the consideration of policy implementation in Alberta.

In terms of staff training, not a single respondent indicated all staff at their school received concussion training, although many respondents reported a need for enhanced training opportunities. As outlined in Table 11, respondent's comments were focused on the need for more formal and focused protocols, with many respondents stressing the importance of concussion training for all staff. When considering how to best educate all staff, professional development (PD) opportunities should not only be offered, they should be supported and prioritized. In addition, utilization rates of available resources as provided by schools and boards should be further studied to explore the relatively low awareness rates and determine root causes. One respondent indicated there were PD sessions available, but that they (staff) could rarely attend. Prioritizing the availability and accessibility of concussion training to staff should be given attention in high schools in Alberta. Moreover, the lack of resources in schools is another issue that should be addressed, as although not directly questioned in relation to concussion education or management, resources were cited as reasons why some schools declined participation in this study. If there is a resource limitation for a short, non-invasive survey, appropriate resources for concussion education and management opportunities are unlikely to be a reality at this point.

The Ontario study concluded that schools have significant student concussion education and RTP guidelines one-year after policy implementation, but that staff training requires further development (Hachem et. al., 2016). This aligns with what was seen in this study and draws attention to the fact that guidelines or policy implementation without sufficient added resource allocation is unlikely to result in a significant increase in staff education and training. Unless

driven by the board or by Alberta Education in a bid to standardize, regulate, and share costs and resources, already stretched budgets and overutilized resources will not do justice to the recovery process that youth require and deserve in schools.

Comparative Analysis of Legislation and RTP and RTL Protocols: Selected American States

Legislation is another way to ensure more consistency within a jurisdiction. Analysis of legislation for Illinois, Massachusetts, Maryland, Maine, Nebraska, New York, Virginia, and Vermont found that while all states shared extensive requirements in protecting youth from concussions, the laws are inconsistent in their legal requirements and vary considerably in terms of management for both RTP and RTL protocols (Table 12). As previously mentioned, in Ontario, there is currently nothing regarding reintegration, RTP or RTL legislated or mandated in Rowan's Law (Bill 149). Across Canada, there have been other attempts at concussion legislation in recent years in British Columbia and Nova Scotia. In British Columbia, failure to gain government support for the private member's bill (Bill M 206) saw it perish before fruition, and in Nova Scotia the Concussion Awareness Act (Bill 63) has been stalled after its first reading in 2011 and is still awaiting debate (Office of Legislative Counsel, Nova Scotia House of Assembly, 2011; Shaw, 2015).

Legislation is an effective tool for society to protect its citizens, but issues with enforcement and consistency can be observed across the United States. As outlined by the Sport Concussion Library (2017), legislation in the United States has been built upon the main principles in the Zackery Lystedt Law (Washington) and include the following major tenets:

- Inform and educate youth athletes, their parents and guardians and require them to sign a concussion information form;

- Removal of a youth athlete who appears to have suffered a concussion from play or practice at the time of the suspected concussion; and
- Requiring a youth athlete to be cleared by a licensed health care professional trained in the evaluation and management of concussions before returning to play or practice.

As can be seen in Table 12, all states require immediate removal from play after suspected concussion and medical clearance prior to returning to play, however the professional required to provide this clearance varies by state. Education requirements are also varied, with many states requiring some form of concussion education be provided or distributed to parents and student athletes, however, there is a lack of clarity on the mechanisms involved. In addition, the scope of education provision to students not involved in sport is unclear in the states examined. According to Tator (2012), concussion legislation should include steeply escalating penalties and consistent enforcement in order to best protect youth.

Table 12. Analysis of legislation in terms of requirements, RTP and RTL policy and responsibility, and inclusivity. *Source:* Thompson et. al. (2016), National Conference of State Legislatures (2015) and Network for Public Health Law (2016).

State/ Province	Required training for coaches	Education (parent/ guardian)	Education (student)	RTP protocol	RTL Protocol	Does legislation apply to all students?
Illinois	Yes	Yes	Yes	Yes Requires medical clearance	Yes Established by schools Based on peer-reviewed evidence consistent with Centre for Disease Control (CDC) guidelines	Yes Applies to all students regardless of concussion mechanism or setting
Massachusetts	Yes	Yes	Yes	Yes Requires medical clearance	Yes Established by schools and school district Must include rest (physical and cognitive) as well as information sharing between family, school, and health care providers	No Scope is student athletes
Maine	Yes	Yes	Yes	Yes Requires medical clearance	Yes Established by state Commissioner of Education	Scope is unclear
Maryland	Yes	Yes	Yes	Yes Requires medical clearance	Yes Established by State Department of Education	Yes

Nebraska	Training available but not required	Yes	Yes	Yes Requires medical clearance	Yes Established by schools Protocol must recognize that concussed students may need formal or informal accommodations and monitoring by medical or academic staff	Scope is unclear
New York	Yes	Materials developed and made accessible but does not ensure receipt	Materials developed and made accessible but does not ensure receipt	Yes Requires medical clearance	Yes Established by state Commissioners of Education and Health	Yes Applies to all students regardless of concussion mechanism or setting
Ontario ⁷	No	No	No	No	No	No
Virginia	No	No	Yes	Yes Requires medical clearance	Yes Established by districts and state Board of Education Protocol must require schools to accommodate a gradual reentry on the basis of medical recommendation	No Scope is student athletes
Vermont	Yes	Yes	Yes	Yes Requires medical clearance	Yes Established by schools	No Scope is student athletes

⁷ It is important to note that Rowan’s Law out of Ontario does not legislate RTP or RTL or other requirements, it calls for a committee whose mandate is to review best practices and make recommendations to the Minister.

In terms of RTL specific policies and protocols, several things require mention. First, nearly half of the laws apply only to student athletes, leaving students who suffer concussions from other means unprotected. In terms of RTL protocol this effectively creates two-tiers of support. Second, only Illinois, Massachusetts, Nebraska, and Virginia included any standard requirements for their RTL policy while the others lack this standard altogether. Moreover, Illinois is the only state to incorporate evidence-based standard consistent with the Centre for Disease Control and Prevention (CDC) guidelines into their policies. This is important as the utilization of evidence-based standards will increase accountability while also ensuring the efficacy and effectiveness of policies and programs (Flay et. al., 2005).

In addition, legislated responsibility for the development of RTL policy varies: in Illinois, Nebraska, and Vermont responsibility lies with individual schools; Massachusetts requires school and district cooperation; in Maine, Maryland, and New York the state is in control; in Virginia, the boards must cooperate with the state; and in Ontario the specifics of RTL are not legislated. Evaluation into the efficacy of policy development at the differing levels may provide further insight into RTL policies, and protocols. Many states did not have RTL considerations as part of the original legislation, with academic accommodations an after-thought. For example, Illinois legislation was originally implemented in 2011 but was amended in 2015 to include RTL (State of Illinois, 2011). As RTL considerations are latecomers in the area of concussion management, it is possible the limitations in legislation are due in part to their infancy.

Recommendations

It has been shown that detection of a concussion is three to six times more likely to occur in an environment with a protocol in place (Hall, n.d.). With a higher likelihood of detection, there is a better chance of proper RTP and RTL progression and safer recovery for youth. While the findings of this study indicate there is a level of concussion awareness, education, and management already taking place in some Calgary high schools, the fragmented and diverse responses from within the same schools indicates there needs to be formalization across the ministry. Based on the results of this study and analysis of Ontario's PPM and state legislation, the Ministry of Education in Alberta is urged to implement policy that will require school boards to develop and institute baseline concussion policy and RTP and RTL protocols, rather than take the lengthy and arduous route of introducing, passing, and implementing legislation. Through provincial policy, awareness and education can be distributed throughout the schools consistently and protect and respect student learning needs post-concussion.

While legislation has had positive effects in the United States, a study by Carroll-Alfano (2015) indicates it may not be entirely effective. The study showed that a significant number of athletes in Illinois reported not receiving training, even after the 2011 passage of concussion legislation. In addition, the study also showed no evidence of improved outcomes in the identification of concussion among those who reported training (Carroll-Alfano, 2015). Another study showed increased health care utilization rates are both directly and indirectly related to concussion legislation, with the increase in utilization also attributable to increased overall awareness (Gibson et al., 2015). As a result, legislation may not be the most efficient route for

consideration at this time. Given that Ontario had promising results taking the path of policy, Alberta is urged to follow.

In addition to being a logical step in protecting the physical and cognitive needs of the student, this policy will also protect boards and schools. Maddie Axelrod (2017) of law firm Borden Ladner Gervais furthers:

Schools and school boards should be aware of the standard of care that a court will apply in negligence cases: whether or not the school or school board exercised supervision, care, and control in the manner of a prudent or careful parent in the circumstances. In most cases, this means developing, implementing and providing training on an appropriate concussions protocol.

After careful consideration of current research, evidence and best practices, it is recommended that these protocols include, at minimum, components spanning prevention, awareness, identification, and management and monitoring protocols (Table 13).

Table 13. Consolidation of current research, evidence, and best practices in concussion management and protocols.

<p><u>Prevention</u></p> <p>An effective concussion policy should:</p> <ul style="list-style-type: none">• Include sport-specific modifications based on evidence-informed research to avoid injury.• Ensure that coaches and other training staff be up-to-date with any and all certifications related to managing head injury, and undergo concussion training at the beginning of each academic year/season.• Include strategies on how to prevent and minimize injury both in school and at off-site school-sponsored activities.
<p><u>Awareness</u></p> <p>An inclusive concussion policy should:</p> <ul style="list-style-type: none">• Include strategies to increase and develop awareness on concussions in adolescents.• Require all staff to undergo concussion training.• Provide resources to all parents/guardians to be able to learn about and be able to identify concussions with required receipt of said resources.• Institute mandatory awareness sessions onsite for parents/guardians of students in all sports teams.

- Encourage the transmission of knowledge and best practices regarding concussions between schools and boards.
- Work to dispel stigma associated with concussions that see many youth not reporting their injuries.
- Require schools to incorporate new evidence and learnings as required.

Identification

A comprehensive concussion policy should:

- Require that all staff be able to detect possible concussion using initial assessment strategies, with coaches undergoing more intensive training.
- Ensure staff can identify possible concussions that may have occurred outside school hours or not on school grounds (i.e. awareness of initial symptoms as well as those that typically manifest over the short term).
- Include information on the safe removal from activity should injury occur.
- Require all youth athletes to undergo baseline testing at the beginning of the academic year/season to determine if cognitive functioning deviates from pre-season norm.
- Require all youth athletes to undergo testing mid-way during the academic year/season to ensure all instances, where possible, are diagnosed and treated.

Management and Monitoring Protocols

A complete concussion policy should:

- Require school boards to develop and use a formal standardized tracking form in the identification, management, and monitoring of concussions.
- Require development and maintenance of intensive RTP protocols based on current research and evidence pertaining to returning to physical activity. Initially, boards are recommended to use ACA's six step Concussion Management Return to Play guidelines (Sport Medicine Council of Alberta, n.d.a).
- Require development and maintenance of intensive RTL protocols based on current research and evidence pertaining to returning to learning/the classroom. Initially, boards are recommended to use ACA's six step Concussion Management Return to Learn guidelines (Sport Medicine Council of Alberta, n.d.b).
- RTP and RTL protocols to include all youth in their management and monitoring requirements, not just student athletes or youth who experienced concussion during school hours or on school grounds.
- Require the appointment of an individual or small team of individuals to monitor student's activities while undergoing RTP/RTL protocols.
- Require medical clearance from a certified medical professional trained in concussion management prior to returning to physical activity or sports.
- Ensure that academic or other accommodations be responsive to student's needs.

In addition, it is recommended that the policy be fortified with structural enforcement and feedback mechanisms to ensure compliance as well as monitor and evaluate effectiveness – two

important components for legislation should that be sought in the future. According to Fullan (2007), implementation is a multidimensional process that requires consideration of critical factors such as local characteristics and external factors when implementing policy. This is more support for the baseline policy requirement as laid out by Ontario, which provides allowances for district and community specifications provided policy meets a minimum requirement.

Conclusion

This study is the first in Canada to explore the current state of concussion policy in a province lacking formal Ministry of Education policy. When compared to Ontario, who mandated policy in 2014, Alberta reported much lower levels of concussion education, awareness and RTP/RTL protocols. Following their policy mandate, Ontario high schools experienced a significant increase in student concussion education programs and RTL and RTP management protocols. However, they report that staff training and parent/guardian education still require further development. This study resulted in similar categorical results, however, many of the respondents in Calgary were unaware of at least one component of their school's concussion policy. In addition to an overwhelming amount of "I Don't Know" responses to various questions, the lack of formal tracking and understanding of integrated RTP and RTL protocols points to a need for unified provincial baseline policy. Analysis of legislation and policy from the United States and Ontario shows that while RTP and RTL legislation and protocols are in need of integration, they provide a baseline upon which unmandated provinces like Alberta can build, so as to reflect existing best-practices.

As rates of concussion continue to rise, the proper management and monitoring of youth recovery needs to be prioritized within Alberta schools. As the findings of this study indicate,

there is an overall lack of concussion awareness and knowledge among staff in some Calgary high schools. In addition, formal RTP and RTL policy and protocols are fragmented within and across boards, and a distinct inconsistency within individual schools is apparent. The physical dangers of premature RTP are well known, while a premature return to the classroom (RTL) can have negative repercussions on a student's cognitive functioning, recovery, and overall academic performance. As a result, the lack of mandated minimum concussion policy in Alberta high schools needs to be rectified. It is imperative that school staff are engaged appropriately and that consistency be achieved in the RTL process. Policy should be developed at the provincial level to aid stakeholders involved not only in policy implementation, but also in concussion education, prevention, awareness, and management. Future research should focus on the best way to implement policy ministry-wide while staying focused on effective evaluation and monitoring.

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APPENDIX A

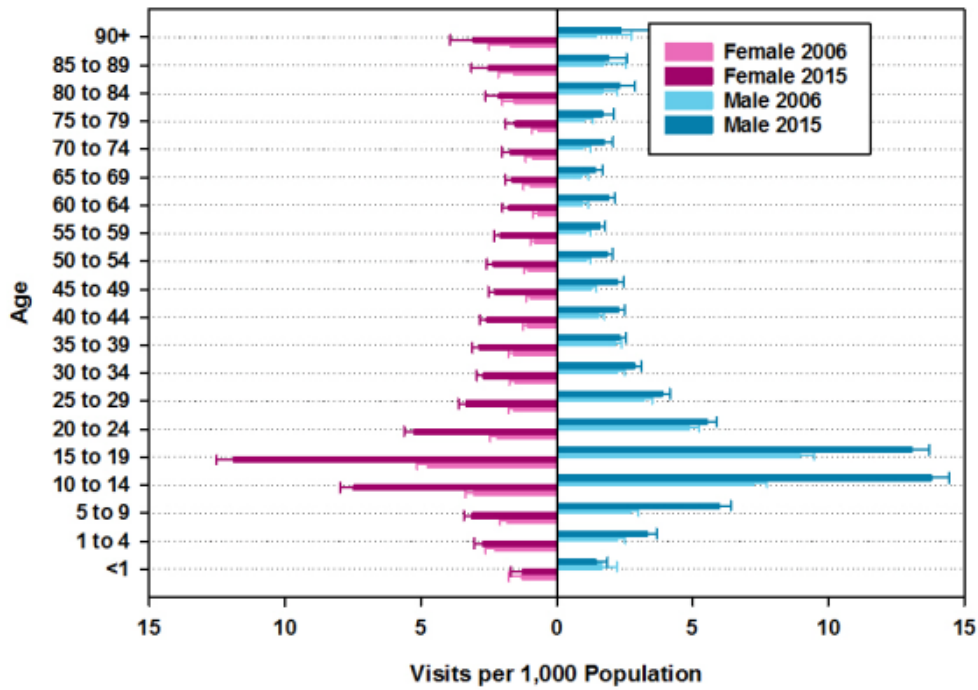


Figure 1. Comparison of the 2006 and 2015 rates at which Alberta residents visited an emergency room for a concussion-related head injury. Rates are shown for males and females, by five-year age groups. *Source:* Government of Alberta, 2017.

APPENDIX B
Concussions Education Programs and Policies Survey

PART A: General Information

1. Number of years in current position (please choose one, and please round up):

- <1 year
- 1-3 years
- 4-7 years
- 8-10 years
- 10-15 years
- >15 years

2. Approximately how many students (between grades 10-12) attend your school?

- <600
- 600-800
- 800-1000
- >1000

3. Approximately how many staff are at your school?

- <10
- 11-30
- 31-50
- 51-74
- >75

PART B: Student Concussion Education

The following questions relate to your school's current concussion education program (as of March 1, 2017).

4. Do students at your school receive any concussion education?

- Yes
- No
- I don't know

5. Which students at your school receive concussion education? (Please check all that apply)

- Students do not receive concussion education.
- All students.
- Students enrolled in a physical education/gym class.
- Student athletes participating in teams.
- Student athletes participating in "high risk" (eg. football, rugby and hockey) teams.
- I don't know

Other:

6. Who delivers the concussion education program to students? (Please check all that apply)

Our school does not have a concussion education program for students.

Physical and/or health educator

Teacher coach

I don't know

Other:

7. Do students receive education on the details of a “return-to-play” protocol?

Yes

No

I don't know.

Other:

8. Do students receive education on the details of a “return-to-learn” protocol?

Yes

No

I don't know.

Other:

PART C: School Concussion Protocol

The following questions relate to your school's current concussion protocol (as of March 1, 2017).

9. Does your school have a formal concussion management or tracking system to track the incidence and progress of concussed students?

Yes

No

I don't know

10. If you answered yes to question 10, please briefly describe the formal concussion/injury tracking system to track the incidence and progress of concussed students at your school.

11. If you answered no to question 10, please describe any informal processes that may be used in managing concussed students.

12. Does your school currently have a formal protocol for tracking or managing students who experienced a concussion while outside school hours, programs, and facilities (e.g. occurring on a family trip)?

Yes

No

I don't know

Other:

13. If you answered yes to question 13, please briefly describe the formal protocol for tracking or managing students who experienced a concussion while outside school hours, facilities, and programs. If you answered no, please describe any informal processes or protocols used.

14. Who is in control of or holds overall responsibility for the management of "return-to-play" protocol at your school? (Please only select one option)

Our school does not have a return-to-play protocol.

School principal

School vice principal

Guidance counselor

Physical and health educator

Teacher

Coach

Parent/Guardian

Team-based

I don't know

Other:

Comments:

15. Who is involved in monitoring the student's progress through the "return-to-play" protocol? (Please check all that apply)

Our school does not have a return-to-play protocol.

School principal

School vice principal

Guidance counselor

Physical and health educator

Teacher

Coach

All teachers of the student

Parent/Guardian

I don't know

Other:

Comments:

16. Who is in control of or holds overall responsibility for the management of "return-to-learn" protocol at your school? (Please only select one option)

Our school does not have a return-to-learn protocol.

School principal

School vice principal

Guidance counselor

Physical and health educator

Teacher

Coach
Parent/Guardian
Team-based
I don't know
Other:
Comments:

17. Who is involved in monitoring the student's progress through the "return-to-learn" protocol? (Please check all that apply)

Our school does not have a return-to-learn protocol.

School principal
School vice principal
Guidance counselor
Physical and health educator
Teacher
Coach
All teachers of the student
Parent/Guardian
I don't know
Other:
Comments:

PART D: Staff Concussion Training

The following questions relate to your school's current staff training on concussions (as of March 1, 2017).

18. Are staff at your school recommended to complete any concussion training? (Please check all that apply).

Yes, all staff receive concussion training.
Yes, physical and health educators receive concussion training.
Yes, teacher coaches of teams receive concussion training.
Yes, teacher coaches of "high risk" (i.e. football, rugby and hockey) teams receive concussion training.
Yes, school administrators receive concussion training.
No, staff do not receive any concussion training.
I don't know
Other:

19. Are you aware of any online training tools used for concussion awareness and training, such as the Parachute Canada Online Concussion Course or the Concussion Awareness Training Tool (CATT) for staff at your school to learn more about concussions?

Yes
No

20. If you answered yes to question 20, please list the online training tools you are aware of.

PART E: Parent/Guardian Concussion Education

The following questions relate to parent/guardian concussion education at your school (as of March 1, 2017).

21. Do parents/guardians at your high school have an opportunity to receive concussion education? (Please check all that apply)

Yes, all parents/guardians receive concussion education.

Yes, parents/guardians of students who are enrolled in a physical education/gym class receive concussion education.

Yes, parents/guardians of students who participate in teams receive concussion education.

Yes, parents/guardians of students who participate in “high risk” (i.e. football, rugby and hockey) teams receive concussion education.

No, parents/guardians do not receive concussion education.

I don’t know.

Other:

22. How is concussion education delivered to parents/guardians of students at your school? (Please check all that apply)

Parents/guardians do not receive concussion education.

Parents/guardians receive a link to an online video on concussions.

Parents/guardians are encouraged to attend information nights on concussions.

Parents/guardians are provided a pamphlet or other resource.

I don’t know.

Other:

PART F: General Questions

23. To what extent do you agree with the following statement: "My school has received ample support from our school board and Alberta Education to ..."

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Develop a student concussion education program.					
Implement a concussion protocol.					
Educate staff on concussions.					
Provide concussion education to parents/guardians.					

24. In addition to the resources already provided by your school, school board, and Alberta Education, are there any resources and/or supports that you think would help enhance the following aspects of your school's concussion policy?

	Yes	No
Student concussion education program		
Concussion protocol		
Staff training on concussions		
Parent/guardians concussion education		

25. If you answered yes to any portion of question 25, please list or name any resources you think may be useful and are not currently being utilized.

26. Approximately, how many students in your school had a concussion last year (either in school during school hours, activities, or facilities or outside of school hours, facilities, and activities)?

None

1 -5

5-10

>10

I don't know.

If you have any additional comments or suggestions for enhancing concussion education, prevention, recognition and/or management at your school please let us know below:

APPENDIX C

Table 4. Responsibility in managing overall RTP and RTL protocols and individuals involved in their monitoring as indicated by survey respondents (n=49).

	Number of Responses	Percent
<i>Responsible for overall RTP management</i>		
Do not have RTP protocol	8	16.3
Principal	10	20.4
Vice-Principal	2	4.1
Guidance Counselor	0	0
Physical and health educator	7	14.3
Teacher	6	12.2
Coach	18	36.7
Parent/Guardian	12	24.5
Team-based	3	6.1
I don't know	14	28.6
Other	6	12.2
<i>Involved in RTP monitoring</i>		
Do not have RTP protocol	8	16.3
Principal	2	4.1
Vice-Principal	1	2.0
Guidance Counselor	0	0
Physical and health educator	8	16.3
Teacher	8	16.3
Coach	21	42.9
Parent/Guardian	11	22.4
Team-based	3	6.1
I don't know	14	28.6
Other	7	14.3
<i>Responsible for overall RTL management</i>		
Do not have RTL protocol	8	16.3
Principal	5	10.2
Vice-Principal	2	4.1
Guidance Counselor	1	2.0
Physical and health educator	5	10.2
Teacher	7	14.3
Coach	10	20.4
Parent/Guardian	8	16.3
Team-based	2	4.1
I don't know	17	34.7
Other	7	14.3
<i>Involved in RTL monitoring</i>		
Do not have RTL protocol	7	14.3
Principal	2	4.1
Vice-Principal	2	4.1
Guidance Counselor	6	12.2
Physical and health educator	2	4.1
Teacher	6	12.2
Coach	9	18.4
Parent/Guardian	13	26.5

Team-based	3	6.1
I don't know	17	34.7
Other	7	14.3

Table 7. Analysis of six unique participant responses to select questions from within the same school in the Calgary Board of Education.

	Respondent #46	Respondent #47	Respondent #48	Respondent #51	Respondent #53	Respondent #54
Which students at your school receive concussion education?	None	Other	None	Other	None	None
Do students receive details on RTP protocol?	No	Yes	No	Yes	I don't know	No
Do students receive details on RTL protocol?	No	I don't know	No	Yes	I don't know	No
Who manages RTP protocols?	Other	Other	School does not have RTP protocol	Other	I don't know	Team-based Other
Who monitors RTP protocols?	Other	Other	School does not have RTP protocol	Physical/health educator Other	I don't know	Team-based Other
Who manages RTL protocols?	Other	Other	School does not have RTL protocol	Other	I don't know	Team-based Other
Who monitors RTL protocols?	Other	Other	School does not have RTL protocol	Physical/health educator Other	I don't know	Team-based Other
Which staff are required to complete concussion training?	None	Physical/health educator	None	None	I don't know	I don't know
How many concussions last year?	I don't know	I don't know	I don't know	I don't know	1-5	I don't know

Table 9. Analysis of six unique participant responses to select questions from within the same school in the Calgary Catholic School District.

	Respondent #2	Respondent #5	Respondent #10	Respondent #18	Respondent #23	Respondent #27
Which students at your school receive concussion education?	Students on teams Students in physical education classes Other	Students on teams Students in physical education classes	None	Students on “high risk” teams	Students on teams Students in physical education classes Other	Other
Do students receive details on RTP protocol?	Yes	No answer	No	Yes	Yes	Yes
Do students receive details on RTL protocol?	I don’t know	Yes	No	I don’t know	Yes	Yes
Please describe your formal concussion tracking system.	District based	Conversations between athlete, parent, coach and doctor	Students expected to provide medical clearance from doctor following concussion	School does not have a formal concussion tracking system	Student athletes to provide adequate documentation from doctor before returning to play	School does not have a formal concussion tracking system
Who manages RTP protocols?	Principal Physical/health educator Teacher Coach Parent/Guardian	Physical/health educator Teacher Parent/Guardian	Principal Coach Parent/Guardian	Team-based	Our school does not have an RTP protocol	Parent/Guardian Other
Who monitors RTP protocols?	Physical/health educator Teacher Coach Parent/Guardian	Physical/health educator Coach Parent/Guardian	Coach	Team-based	Our school does not have an RTP protocol	Parent/Guardian Other
Who manages RTL protocols?	I don’t know	Principal	Parent/Guardian	Coach	Our school does not have	Teacher Parent/

		Vice-principal Physical/health educator Coach Parent/Guardian Team-based			an RTL protocol	Guardian Other
Who monitors RTL protocols?	I don't know	Principal Vice-principal Physical/health educator Coach Parent/Guardian Team-based	Guidance counsellor Teacher	Coach	Our school does not have an RTL protocol	Teacher Parent/Guardian Other
Which staff are required to complete concussion training?	Teacher coaches of teams	Teacher coaches of teams	Physical/health educator Teacher coaches of teams	Teacher coaches of "high risk" teams	Physical/health educator Teacher coaches of teams	Physical/health educator Teacher coaches of teams Vice-principal
Which parents/guardians have an opportunity to receive concussion education?	Parents/guardians of students in "high risk" teams	Parents/guardians of students on teams	I don't know	I don't know	All parents/guardians	None
How is concussion education delivered to parents/guardians?	Encouraged to attend information nights on concussions	I don't know	I don't know	I don't know	Parents/guardians do not receive concussion education	I don't know
How many concussions last year?	>10	I don't know	>10	I don't know	>10	>10