

Title: First-aid and concussion knowledge of rugby league team management, administrators and officials in New Zealand.

Running title: First-aid and concussion knowledge in rugby league

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Abstract

Objective: To assess rugby league team management, administrators and officials' knowledge of first-aid, concussion recognition and management and injury prevention.

Methods: A descriptive study was conducted using a first-aid and concussion knowledge questionnaire consisting of two parts: (1) Thirty six multi-choice questions on first-aid assessment and knowledge incorporating five constructs (injury prevention, identification and management, cardiopulmonary resuscitation, and wound care) and, (2) Thirty eight closed- and open-ended questions on concussion recognition, management and prevention knowledge.

Results: Ninety five people from the Wellington district rugby league community completed the questionnaire. Fifty two (55%) of respondents had a current up-to-date first-aid certificate which included cardiopulmonary resuscitation. Only two (2%) participants achieved the 80% passing score in the first-aid and concussion knowledge questionnaire. The mean \pm SD percentages for the first-aid knowledge questions was $56 \pm 13\%$ and for the 16 symptom recognition of concussion questions was $33 \pm 14\%$. Overall sports-related concussion knowledge was low ($42 \pm 20\%$). Loss of consciousness was reported to be incorrectly required for a concussion to have occurred by 39% of respondents. Nearly half the respondents identified that all concussions recover at the same rate. All referees had a refereeing qualification while only 24% of coaches, 7% of managers and 2% of trainer/medics had a rugby league specific qualification.

Conclusion: The first-aid and concussion knowledge results highlighted a lower understanding of sports-related first-aid and concussion than previously reported. Injury prevention and care programs in rugby league at the amateur level in New Zealand should stress first-aid and concussion injury knowledge management to enable knowledge empowerment.

Introduction

Originating in the north of England in the 1890's, rugby league is a full contact collision sport participated in countries throughout the world. The game is played over two halves of 30 to 40 minutes duration depending on whether the level is junior, amateur, sub-elite or elite. Players compete in a physically challenging contest that typically involves bouts of high-intensity activities (e.g. sprinting, running, passing, and tackling) separated by short bouts of low-intensity activities (standing, walking, jogging).¹ As a result of these activities musculoskeletal injuries occur frequently.²

The Accident Compensation Corporation rugby league mean cost per moderate to severe injury entitlement claim (MSC) was NZD\$7,100, and the most common injury entitlement claim was for soft tissue injuries (47.4%) accounting for nearly half of the costs (40.5%).³ Concussions accounted for 1.8% of all MSC's and 6.3% of MSC total costs, but alarmingly were the highest single injury type cost per claim at \$25,347 per concussion MSC.³ The number and costs of injuries in rugby league³ highlights the need for first-aid training in specific areas such as soft tissue injuries and concussion.⁴ Due to this situation it has been recommended that all coaches should be trained in first-aid.⁵

Sports injuries are the single-most commonly reported reason why people withdraw from sporting activity and participation.⁶ This usually occurs where a player gets injured at the amateur level and untrained personnel treat the injured player at the sideline.⁷ Often treatment and advice is via the team coach and this may be beyond their level of knowledge or training.⁷

Studies assessing coaches' first-aid knowledge have shown low knowledge levels (27%⁸ to 38%⁷) despite the majority of coaches (89%⁸ to 93%⁷) having a current first-aid certificate. Unfortunately 16%⁹ to 51%¹⁰ of coaches were unable to correctly identify factors relating to concussion recognition, management and prevention techniques. Of concern was that 42% of coaches thought that a player had to have loss of consciousness for a concussion to occur and 26% would return a player to participation while showing symptoms of a concussion.¹⁰ These studies were conducted in the United States of America where there are state legislated requirements for team management to have a current in-date first-aid qualification as part of their coaching role. To date there are no studies on team management first-aid knowledge outside of the United States of America. Therefore, our study assessed the knowledge of first-aid, concussion recognition and management and injury prevention of local rugby league club administrators, coaches and other team management. first-aid.

Methods

A descriptive questionnaire study was conducted during the rugby league off season (November 2009 to February 2010) to assess rugby league team management, administrators and officials' knowledge of first-aid, concussion recognition and management and injury prevention.

Participant recruitment

Participants were recruited from a New Zealand Rugby League zonal region. Participation was anonymous and voluntary. All procedures were approved by the Health and Disability Central Regional Ethics Committee (CEN/09/56/EXP).

Questionnaire

The first-aid and concussion knowledge questionnaire (see Appendix) consisted of three parts: Part I consisted of general information about the participants in terms of their role in rugby league and their qualifications and experience in first-aid; Part II "first-aid knowledge" consisted of 36 multi-choice questions on first-aid assessment and knowledge incorporating five constructs (injury prevention, identification and management, CPR, and wound care); and Part III "concussion recognition, management and prevention knowledge" consisted of 38 closed- and open-ended questions on concussion recognition, management and prevention knowledge.

The part II questions were based on the New Zealand St John's first-aid, Sports Medicine New Zealand Sports Medic and New Zealand Resuscitation Council CPR exams.^{7, 8} Based on a first-aid knowledge questionnaire initially developed in 1986¹¹, the part I first-aid and assessment and knowledge questions were updated to reflect changes in the American Red Cross first-aid exam and the American Red Cross Cardiopulmonary Resuscitation exams through several studies.^{7, 8, 12}

The part III questions were based on previously published concussion assessment questionnaires relating to concussion recognition, management and assessment and incorporating the latest concussion consensus statement.^{9, 13, 14} The concussion recognition, management and prevention knowledge questions were presented in two sections: (A) Concussion understanding; and (B) Concussion recognition, management and prevention. The concussion understanding questions were from a previously published¹⁴ 22-item questionnaire designed to source information on the participants' knowledge about the signs and symptoms of a concussion, knowledge of return-to-play strategies and protocols, and their beliefs regarding medical follow-up and sport participation after a concussion. The concussion recognition, management and prevention questionnaire was originally developed and validated for use with youth coaches.¹⁰ The recognition questions included a list of 16 signs/symptoms, and the participants were asked to pick those they thought were actual sequelae of concussion. Lastly all participants were asked to respond to four true/false questions regarding concussion management. A check box was included that allowed participants to indicate that they did not know whether the statement was true or false to discourage them from guessing.

The current first-aid and concussion knowledge questionnaire was reviewed and updated by two experienced first-aid instructors to ensure the answers were in alignment with current practice. The pass mark of 80% used by first-aid training organizations was kept to enable comparisons with other studies on first-aid and concussion knowledge.

Cronbach's alpha (α) coefficients¹ determined the reliability/internal consistency of part II first-aid ($\alpha = 0.79$; acceptable to good internal reliability) and part III concussion recognition, management and prevention ($\alpha = 0.86$; good to excellent internal reliability) of the questionnaire.¹⁵

Analysis

The results of the first-aid and concussion questionnaire were entered into an Excel spreadsheet and analysed with SPSS v.16.0 (SPSS Inc, Chicago, Illinois, USA) and the VRP Injury Statistics Software (<http://www.iprc.unc.edu/sportsinjurystatistics.shtml>). Data are reported as means with standard deviations \pm SD.¹⁶ Chi-squared (χ^2) analyses were performed to test for significant relationships between responses (correct or incorrect) for each construct. Significant p values reported in the text are less than 0.001 if they are not specifically stated.

Results

A total of 95 people (50 coaches, 13 managers, 15 trainer/medics, 14 club committee personnel and 3 referees) from the district rugby league community completed the questionnaire. Males (83%) participated more than females (17%) and the mean age was 38 yrs \pm 10 yrs. Fifty two respondents (55%) had a current in-date first-aid certificate which included being certified in cardiopulmonary resuscitation. Only 54% of coaches had a rugby league coaching qualification, 54% of managers had a rugby league manager's qualification, 13% of trainers had a rugby league trainer's qualification and 100% of referees had a rugby league referee qualification.

First-aid knowledge

The mean score for first-aid knowledge was 56 \pm 13% (range 24% to 84%). Only 2% of participants met the 80% pass mark (see Table 1). Significantly more trainer/medics had a current first-aid certificate ($\chi^2=5$, df=1, p=0.020) but they recorded a lower mean first-aid knowledge score (57% vs. 60%) when compared with trainer/medics that did not have a current first-aid certificate.

¹ Cronbach's alpha (α) coefficient is used to estimate the proportion of variance that is systematic or consistent in a set of test scores. It can range from 0.0 (if no variance is consistent) to 1.0 (if all variance is consistent) with all values between 0.0 and 1.0 being possible. For example, if the Cronbach's α for a set of scores turns out to be 0.90, you can interpret this as meaning that the test is 90% reliable, and by extension that it is 10% unreliable (100% - 90% = 10%).

Table 1: Rugby league management role, qualification, first-aid certificate, pass percentages, mean \pm SD first-aid knowledge score for total, current first-aid certificate and no current first-aid certificate.

| Role | Qualification % | First-aid certificate % | First-aid knowledge pass % | First-aid knowledge score % | First-aid knowledge score (first-aid certificate) % | First-aid knowledge score (no first-aid certificate) % |
|-----------------------------------|-----------------|-------------------------|----------------------------|------------------------------|---|--|
| Coach (n=50) | 28 | 48 | 0.0 | 57 \pm 14 | 63 \pm 12 | 52 \pm 13 |
| Manager (n=13) | 7 | 62 | 0.0 | 56 \pm 14 | 49 \pm 15 | 66 \pm 3 |
| Trainer/Medic (n=15) | 2 | 80* | 13 | 57 \pm 15 | 57 \pm 16 | 60 \pm 11 |
| Club committee (n=14) | 3 | 43 | 0.0 | 51 \pm 12 | 54 \pm 12 | 49 \pm 12 |
| Referee (n=3) | 100 | 67 | 0.0 | 57 \pm 2 | 57 \pm 2 | 55 \pm 0 |
| Average \pmSD | | | | 56 \pm13 | 58 \pm14 | 53 \pm13 |
| All respondents (n=95) | 50 | 55 | 2 | | | |

Percentages are of total and individual management or official role. * =Significant difference ($p < 0.05$) when compared with no current in-date first-aid certificate.

The majority of participants were involved in senior rugby league (34%). No managers or trainer/medics were involved in mini-mod or women's rugby league activities (see Table 2).

Table 2: Distribution of participation group in rugby league by role in percentages.

| | Mini-Mod | Age Grade | Senior | Women's | Premier | National |
|-------------------------------|-----------|-----------|-----------|----------|-----------|----------|
| Coach (n=50) | 24 | 12 | 30 | 5 | 26 | 3 |
| Manager (n=13) | 0 | 19 | 50 | 0 | 25 | 6 |
| Trainer/Medic (n=15) | 0 | 7 | 43 | 0 | 36 | 14 |
| Club committee (n=14) | 0 | 0 | 36 | 24 | 29 | 0 |
| Referee (n=3) | 13 | 13 | 13 | 13 | 13 | 36 |
| All respondents (n=95) | 14 | 11 | 34 | 8 | 26 | 7 |

Percentage of total and individual management or official role.

When comparing responses of all participants there were significant differences in the percentage of correct responses for the five construct areas of the first-aid questionnaire (injury prevention $\chi^2=155$, df=4; injury knowledge $\chi^2=14$, df=4; injury management $\chi^2=9$, df=4, $p=0.004$; cardiopulmonary resuscitation $\chi^2=9$, df=4, $p=0.003$; wound care $\chi^2=70$, df=4) (see Table 3).

Table 3: Percentage of correct responses by first-aid knowledge construct for total participants, team management and officials.

| | All respondents (n=95) | Coach (n=50) | Manager (n=13) | Trainer/Medic (n=15) | Committee (n=14) | Referee (n=3) |
|-------------------------------|------------------------|--------------|----------------|----------------------|------------------|---------------|
| Construct | | | | | | |
| Injury Prevention | 71* | 69* | 74* | 79* | 72* | 67 |
| Injury Knowledge | 44* | 48 | 49 | 39* | 33* | 52 |
| Injury Management | 45* | 46 | 49 | 46 | 39* | 37 |
| Cardiopulmonary resuscitation | 42* | 47 | 46 | 32* | 36* | 33 |
| Wound Care | 69* | 75* | 65* | 76 | 73* | 93* |

Percentage of total and individual management or official role. * =Significant difference ($p<0.05$) when compared with incorrect responses.

Team management with a current first-aid certificate recorded a higher percentage of correct answers in most, but not all, of the five constructs of the first-aid knowledge section of the questionnaire (see Table 4).

Table 4: Percentages of first-aid knowledge five constructs responses by participants' role and first-aid certificate.

| | Injury Prevention | | Injury Knowledge | | Injury Management | | CPR | | Wound Care | |
|-------------------------------|-------------------|-----------|------------------|-----------|-------------------|-------------|-----------|-----------|------------|-----------|
| | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| First-aid certificate | | | | | | | | | | |
| Coach (n=50) | 69 | 68 | 60 | 50 | 52 | 40 | 63 | 33 | 76 | 58 |
| Manager (n=13) | 78 | 67 | 46 | 56 | 42 | 60 | 28 | 75 | 38 | 83 |
| Trainer/Medic (n=15) | 81 | 70 | 48 | 57 | 46 | 44 | 31 | 33 | 57 | 89 |
| Club committee (n=14) | 69 | 75 | 52 | 39 | 44 | 35 | 38 | 34 | 64 | 56 |
| Referee (n=3) | 67 | 56 | 60 | 50 | 33 | 44 | 25 | 50 | 100 | 67 |
| All respondents (n=95) | 73 | 67 | 53 | 50 | 44 | 44.7 | 37 | 45 | 67 | 71 |

Percentage of total and individual management or official role.

Concussion recognition, management and prevention knowledge

All respondents reported they knew what the term concussion meant and that concussions were more serious than other typical sports injuries, but only 98% responded that sports-related concussion could influence players' social and work activities. Of all respondents, 75% knew how to recognize a concussion in players but only 58% had discussed the consequences of a concussion with players. The majority (85%) identified that playing while recovering from a concussion could lead to long term complications.

The majority of respondents (70%) identified they would insist a concussed player should see a doctor before returning to play or train while 26% of non-coaches would check with the coach before they could return a player to play or training. More than half (54%) of the participants knew of a concussion policy in rugby league but only 8% could identify the three week stand-down requirement. The majority (78%) reported a seven day stand-down as the requirement for recovery from a concussion. More than half (55%) of participants who had had a player with concussion (n=52) had not sought a medical clearance for a concussed player before returning them to match or training activities. Trainer/medics reported more sequale symptoms of a concussion occurring (43 ±20%) than other team management. For all participants there were only 33 ±14% correct responses (see Table 5).

Table 5: Percentages of participants' responses to symptoms they thought were the sequale of a concussion occurring (concussion symptoms are indicated in bold).

| Symptom | All respondents (n=95) | Coach (n=50) | Manager (n=13) | Trainer/Medic (n=15) | Committee (n=14) | Referee (n=3) |
|-----------------------------------|------------------------|--------------|----------------|----------------------|------------------|---------------|
| | % | % | % | % | % | % |
| Abnormal sense of smell | 58 | 50 | 62 | 67 | 71 | 67 |
| Abnormal sense of taste | 33 | 30 | 46 | 33 | 29 | 33 |
| Amnesia (loss of memory) | 37 | 30 | 46 | 53 | 36 | 33 |
| Blurred vision | 44 | 52 | 23 | 73 | 7 | 33 |
| Black eye | 19 | 20 | 8 | 27 | 21 | 0 |
| Chest pain | 26 | 26 | 15 | 53 | 14 | 0 |
| Confusion | 46 | 54 | 54 | 40 | 7 | 100 |
| Dizziness | 45 | 54 | 23 | 67 | 14 | 33 |
| Headache | 48 | 54 | 23 | 67 | 36 | 33 |
| Loss of consciousness | 39 | 54 | 15 | 33 | 14 | 33 |
| Nausea | 40 | 36 | 54 | 47 | 29 | 67 |
| Nosebleed | 17 | 16 | 15 | 27 | 7 | 33 |
| Numbness/Tingling upper extremity | 18 | 20 | 8 | 7 | 21 | 67 |
| Sharp burning pain in neck | 19 | 18 | 31 | 20 | 7 | 33 |
| Sleep disturbances | 26 | 26 | 46 | 27 | 7 | 33 |
| Weakness of neck range of motion | 13 | 12 | 8 | 20 | 14 | 0 |

Percentage of total and individual management or official role.

Wearing of headgear was reported to aide in preventing concussion by more than half of all respondents (53%). More trainers (80%) supported this statement than coaches (62%) and managers (54%). Loss of consciousness was reported to be required for a concussion to have occurred by 39% of responses (see Table 6).

Table 6: Responses of team management to the true false questions on concussion by percentage.

| | A concussion only occurs when the athlete loses consciousness (blacks out). (False) % | | | A concussion requires immediate removal from the game or practice. (True) % | | | A player who reports having a headache after a concussion will likely demonstrate other signs. (True) % | | | A player who displays any sign or symptom of concussion should not be allowed to return to play. (True) % | | |
|------------------------|---|-------|----|---|-------|----|---|-------|----|---|-------|----|
| | True | False | DK | True | False | DK | True | False | DK | True | False | DK |
| All respondents (n=95) | 39 | 54 | 7 | 62 | 26 | 12 | 54 | 32 | 15 | 68 | 21 | 11 |
| Coaches (n=50) | 42 | 50 | 8 | 62 | 26 | 12 | 58 | 32 | 10 | 62 | 22 | 10 |
| Managers (n=13) | 15 | 77 | 8 | 39 | 39 | 23 | 23 | 54 | 23 | 69 | 23 | 8 |
| Trainer/Medics (n=15) | 53 | 47 | 0 | 93 | 7 | 0 | 73 | 13 | 13 | 93 | 7 | 0 |
| Committee (n=14) | 36 | 50 | 14 | 50 | 43 | 7 | 43 | 36 | 21 | 36 | 36 | 29 |
| Referee (n=3) | 33 | 67 | 0 | 67 | 0 | 33 | 43 | 36 | 21 | 100 | 0 | 0 |

Percentages round and may not equal 100. DK= don't know.

Overall sports-related concussion knowledge was low at 42 ±20% (see Table 7). Trainers/medics recorded the highest overall sports-related concussion knowledge (51 ±26%).

Table 7: Percentage \pm SD of concussion knowledge overall, concussion recognition, management and prevention questions reported correctly by all respondents, team management, administration and official's.

| | Overall % | Recognition % | Management % | Prevention % |
|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Coach (n=50) | 46 \pm 20 | 59 \pm 21 | 40 \pm 16 | 38 \pm 17 |
| Manager (n=13) | 33 \pm 23 | 41 \pm 31 | 28 \pm 18 | 29 \pm 18 |
| Trainer/Medic (n=15) | 51 \pm 26 | 71 \pm 25 | 49 \pm 21 | 34 \pm 20 |
| Club committee (n=14) | 26 \pm 21 | 42 \pm 40 | 27 \pm 29 | 10 \pm 12 |
| Referee (n=3) | 47 \pm 37 | 71 \pm 41 | 50 \pm 31 | 20 \pm 17 |
| All respondents (n=95) | 42 \pm20 | 56 \pm23 | 38 \pm14 | 32 \pm15 |

Percentage of total and individual management or official role.

Discussion

The purpose of this study was to assess rugby league team management, administrators and officials' knowledge of first-aid, concussion recognition and management and injury prevention. No coaches were able to achieve the pass score in first-aid knowledge which could have serious consequences for safety of players if a medical situation should occur. Nearly a quarter of coaches (24%) were involved in the mini-modified rugby league level of participation. The knowledge of these coaches would ideally be higher than identified as they are often the only team management at matches should first-aid decisions be required.

First-aid knowledge of team management, administrators and officials was lower than previously reported for high school coaches (27%⁸ to 38%⁷) in the United States of America. Only 55% of respondents had a current, in date, first-aid certificate which was less than in some (89%¹² to 93%⁷) but not all (12.4%⁸) previously published studies. Given that only half the participants had formal first-aid training it was expected that knowledge on the various constructs in the first-aid knowledge questionnaire would be 55% at best, and this was indeed the case for most constructs. Previous experience, participant occupation or exposure to first-aid type environments may have influenced the results reported and these data should be included in any subsequent studies on first-aid knowledge.

Having first-aid certification did not mean that there was greater knowledge of first-aid. In many areas participants without a first-aid certificate had a higher percentage of correct responses than those with a first-aid certificate. Not recorded in this study were the participant's experiences with first-aid situations or whether they had been exposed to environments where first-aid or similar activities occur frequently. In a similar study⁸ participants undertaking the first-aid knowledge questionnaire were observed to be nervous. A possible consequence of this nervousness is transference resulting in a lowered first-aid knowledge score.⁸ Although this is a possible situation for the resulting low scores in our study it does not account for 98% of participants not achieving the 80% pass mark.

The findings of our study highlight some of the misconceptions that are common in the population generally regarding concussion. needed given Of all participants, 53% reported that head-gear aids in the prevention of

concussion, 22% reported that mouth-guards prevented concussion, 39% reported that concussion only occurred when a player loses consciousness, 26% reported that removal from the field with a concussion was not required, 20% would let a symptomatic player return to play, 40% reported a 21 day stand down period while 45% reported all players recover at the same rate from a concussion. A similar study¹⁰ reported 42% of coaches thought that loss of consciousness was required for a concussion to occur, 32% would not remove a concussed player from the field of play and 26% would let a symptomatic player return to play. It is generally acknowledged in the concussion literature that loss of consciousness is not required for a concussion to occur and this symptom has a limited value in assessing concussion severity.^{13, 17} Additionally it is recommended that any player with a concussion be removed from play and evaluated further.^{13, 17} Signs such as headache, dizziness, nausea, brief amnesia, drowsiness feelings of being in a fog and visual disturbances are symptoms of a possible concussion and should be looked for in a suspected concussed player.¹⁰ It is consensus amongst concussion recommendations that players should never return to play while still symptomatic.¹³ Our findings highlight a lower understanding of sports-related concussion than previously reported (42% vs. 62%¹⁰ vs. 84%⁹) and highlight the need for concussion education to occur for all people involved in rugby league at the management level of participation, and for sport in general.

Of concern is the finding that nearly half of the participants identified that concussions recover at the same rate as other injuries. Recent literature has identified that the criteria for adults returning from a concussion should be different from children and adolescents.^{13, 18, 19} In the Zurich concussion consensus statement,¹³ it was identified that adolescents (less than 18 yrs old) and children down to the age of 10 yrs old should be managed more conservatively than adults. This includes the use of the return to play guidelines which may require a longer period of rest and non contact activities than adults with a concussion.¹³ Children under the age of 10 yrs old should be assessed and managed medically as they require more age-appropriate assessments and should not commence any return to play until clinically symptom free from a concussion.¹³ Females have a more prolonged post-concussion reaction time and greater symptom severity than males^{18, 20, 21} and are at a greater risk for a concussion to occur.^{22, 23} Evidence is limited but suggestive that gender variations in the management of concussion is important.¹⁸ There is also evidence in the paediatric population that concussed girls report a significantly higher mean symptom score than boys on initial presentation.²⁴ These findings support the recommendation that a "one-size fits all" policy for the management of concussion should not be undertaken and the need for an individualized approach is important.²⁵

Although this study was conducted at the amateur level of rugby league participation where it is totally reliant on volunteers, there is still a requirement for people in this role to undertake and complete knowledge empowerment courses in regards to sports-related concussion programs. Volunteers involved in any level of sports in any role have a responsibility to ensure that the decisions they make in regards to injuries and concussion enable the most appropriate care to be provided. In the case of sports-related concussion it is better to stand the player down than to risk them further by allowing them to participate in activities where they could be further harmed. A sideline concussion card tool developed for assisting people involved in sports where concussions may occur

has been produced by the Accident Compensation Corporation. The sideline concussion card is designed to provide temporary interim management guidelines for a suspected concussion, encouraging players to seek medical treatment.²⁶ The sideline concussion card is based on a similar card utilised by the University of Pittsburgh that incorporates 'Maddocks questions',²⁷ as well as 'anterograde' and 'retrograde' questions shown as another way of assessing concussion.²⁸ Aspects of the sideline concussion card have been incorporated into the recently produced Sports Concussion Assessment Tool, developed for trained medical personnel.¹⁷ It is recommended that injury prevention programs, incorporating concussion recognition, management and prevention, should be provided to all team management, administrators and officials on a regular basis with a requirement for them to update regularly as part of their role in the sport.

Conclusion

The first-aid and concussion knowledge results highlighted a lower understanding of sports-related first-aid and concussion than previously reported. Injury prevention and care programs in rugby league at the amateur level in New Zealand should stress first-aid and concussion injury knowledge management to enable knowledge empowerment.

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Appendix

The 74 questions in the first-aid and concussion knowledge questionnaire consisted of two parts: (1) Thirty six multi-choice questions on first-aid assessment and knowledge incorporating five constructs (injury prevention, identification and management, cardiopulmonary resuscitation, and wound care) and, (2) Thirty eight closed- and open-ended questions on concussion recognition, management and prevention knowledge. The questions were:

1. Water should be:
 - a. Withheld during practices, available during games
 - b. Withheld during games, available during practices
 - c. Available only on hot days
 - d. Available at all times

2. The behaviour of the first aid provider:
 - a. Should be calm and reassuring
 - b. Should be hurried and tense
 - c. Does not matter because it has no effect on the injured player
 - d. Both a and b

3. Ice should always be used _____ after an injury occurs unless otherwise directed by a doctor or senior medic:
 - a. After the first 48 hours
 - b. During the first 48 hours
 - c. During the first 24 hours only
 - d. During the first 12 hours only

4. A player who is knocked unconscious may return to play if they:
 - a. Regains consciousness within 2 minutes
 - b. Presents no signs and symptoms of a head injury
 - c. Is cleared by a Doctor
 - d. Feels capable of returning to play

5. Twisting or stretching a joint beyond its normal range of motion is the most common cause of:
 - a. Sprains
 - b. Fractures
 - c. Strains
 - d. Contusions

6. Heat stroke can result from:
 - a. Too little salt
 - b. Too high carbohydrates
 - c. Dehydration
 - d. Hyper hydration

7. A musculotendinous tissue injury is a:
 - a. Fracture
 - b. Sprain
 - c. Strain
 - d. Contusion

8. Contusions occur most frequently to the:
 - a. Chest
 - b. Quadriceps
 - c. Abdomen
 - d. Shin

9. The greatest danger for a player who has mononucleosis (glandular fever) is:

- a. Seizures
 - b. A punctured liver
 - c. A ruptured spleen
 - d. Shock
10. Proper treatment for chronic problems, such as shin splints is:
- a. Ice before activity, ice after activity
 - b. Heat before activity, heat after activity
 - c. Ice before activity, heat after activity
 - d. Heat before activity, ice after activity
11. Standard first aid for a sprained ankle does not include:
- a. Ice
 - b. Compression
 - c. Percussion
 - d. Elevation
12. Pre-game meals should contain foods:
- a. High in carbohydrates
 - b. High in protein
 - c. Low in carbohydrates
 - d. Balanced in protein and carbohydrates
13. Mouthguards help to protect the player against:
- a. Tooth fractures and tongue lacerations
 - b. Jaw fractures
 - c. Concussions
 - d. Both a and c
14. Characteristics of heat exhaustion include:
- a. Slow pulse
 - b. Pale, cool, clammy skin
 - c. Red, hot, sweaty skin
 - d. Bounding pulse
15. Heat stroke is:
- a. Preventable
 - b. Unpreventable
 - c. Not life threatening
 - d. Seldom seen in players
16. Heat stroke is best prevented by:
- a. Limited salt intake
 - b. Limited water breaks
 - c. Unlimited water breaks
 - d. No way to prevent it
17. Dressings and bandages are used to:
- a. Reduce pain
 - b. Reduce internal bleeding
 - c. Help control bleeding and prevent infection
 - d. Make it easier to move the injured player
18. How can you reduce the risk of disease transmission when caring for open bleeding wounds?
- a. Wash your hands immediately after giving first aid
 - b. Avoid direct contact with blood and other body fluids

- c. Use protective barriers such as gloves or plastic wrap
 - d. All of the above
19. Which is the first step in caring for bleeding wounds?
- a. Apply direct pressure on the wound with a clean or sterile dressing
 - b. Apply pressure at the pressure point
 - c. Apply bulk bandages to reinforce blood soaked bandages
 - d. Elevate the wound above the level of the heart
20. What should you do if you think a player has internal bleeding?
- a. Apply heat to the injured area
 - b. Call the local emergency phone number for assistance
 - c. Place the player in a sitting position
 - d. Give fluids to drink to replace the blood loss
21. What should be part of your care for a severely bleeding open wound?
- a. Allow the wound to bleed in order to cleanse it and minimise infection
 - b. Apply direct pressure and elevate the injured area, if no broken bones
 - c. Use a tourniquet to stop all blood flow
 - d. Both b and c
22. After being tackled, a player does not get up. The conscious player is face down and appears badly hurt. First you send someone for help then you:
- a. Roll the player onto his side into the recovery position, in case he starts to vomit
 - b. Roll the player onto his back and elevate the head and neck
 - c. Position the player so he is comfortable
 - d. Have the player remain still
23. What should you do when caring for someone who is having a seizure?
- a. Remove nearby objects that might cause injury
 - b. Place small object, such as a rolled up piece of cloth between the players teeth
 - c. Try to hold the player still
 - d. All of the above
24. Generally a splint should be:
- a. Loose, so that the injured player can still move the injured limb
 - b. Snug, but not so tight that it slows circulation
 - c. Tied with fasteners directly over the injured area
 - d. None of the above
25. A player who is a diabetic is drowsy and appears confused. He is not sure if he took his insulin today. Should you:
- a. Suggest they rest for an hour or so
 - b. Tell them to go and take their insulin
 - c. Give them some sugar
 - d. Both a and b
26. Two players collide on the field. Although there is no visible bleeding, the upper leg of one player is very red and swelling fast. They probably have what type of injury?
- a. Abrasion
 - b. Contusion / Bruise
 - c. Strain
 - d. Sprain
27. When caring for a player with hypothermia, you should:
- a. Re-warm the body gently

- b. Remove wet clothes
 - c. Give warm fluids if fully conscious
 - d. All of the above
28. What should you do for a player who is experiencing heat exhaustion?
- a. Force the player to drink lots of cool water
 - b. Get the player into a cooler environment
 - c. Have the player rest until the feeling passes
 - d. All of the above
29. A player has a severe muscle cramp in the calf. Proper care would be to:
- a. Bend the knee and point the toes and foot
 - b. Bend the knee and flex the toes and foot
 - c. Straighten the knee and point the toes and foot
 - d. Straighten the knee and flex the toes and foot
30. A player's front tooth is knocked out during a practice session. The tooth should be:
- a. Washed in water and replaced in the player's tooth socket
 - b. Stored in saline until a dentist can replace it
 - c. Stored in milk until a dentist can replace it
 - d. Any of the above is acceptable
31. A player comes to you after being stepped on by an opponent's boot sprig. The type of injury you suspect is a(n):
- a. Abrasion
 - b. Puncture
 - c. Avulsion
 - d. Laceration
32. Before attempting to resuscitate a player using CPR, which of the following conditions must exist?
- a. Dilated pupils
 - b. Absence of breathing
 - c. Unconsciousness
 - d. Irregular respirations
33. At what rate should chest compressions be performed during CPR efforts on an adolescent?
- a. 50-70 compressions per minute
 - b. 80-100 compressions per minute
 - c. 100-120 compressions per minute
 - d. 60-80 compressions per minute
34. What is the breath (ventilation) to compression ratio when performing CPR on an adolescent?
- a. 12 compressions to 2 ventilations
 - b. 5 compressions to 1 ventilations
 - c. 15 compressions to 2 ventilations
 - d. 30 compressions to 2 ventilations
35. The first action that should be taken when approaching a collapsed, injured player is to:
- a. Move the player off the playing surface
 - b. determine responsiveness
 - c. Check for breathing
 - d. Check for pulse
36. Complications which may occur as a result of external chest compressions when performed properly include:
- a. Rib and sternum fractures

- b. Punctured lungs and liver lacerations
- c. Both a and b
- d. None of the above

Concussion

From time to time injuries do occur in matches and at training sessions. Some of these are serious and require medical attention; others are not serious and require only minimal treatment. The following questions are in regards to one such injury that may occur and this is concussion

2.1 Have you ever heard of the term concussion?

Yes No

If you have not heard the term concussion have you heard of a head knock?

Yes No

2.2 Do you know how to recognise a concussion in any of the players you look after?

Yes No

3.1 In your opinion, is a concussion more serious than other typical sports injuries (e.g. bruises)

Yes No

3.2 Do you think that a concussion can influence the person's school, work, study or sporting activities?

Yes No

If Yes, for how long? _____ weeks or _____ days

3.3 Have you ever discussed the consequences of a concussion with your players?

Yes No

3.4 Do you think that continuing to play while recovering from a concussion can lead to any serious health consequences?

Yes No

3.5 Would it bother you if the player continues to play / train while they are recovering from a concussion?

Yes No

3.6 If the player reported headaches and/or feeling a bit dizzy sometime after they were concussed, would you let them play and/or train?

Yes No

3.7 Does wearing headgear help prevent a concussion?

Yes No

Please only give **ONE** response to this question:

4.1: If you were aware or suspected that a player had been concussed – would you allow them to:

- a. Continue to play / train
- b. Forbid them to play / practice until they felt better
- c. Check with their coach before allowing them to return to play
- d. Insist they see a Doctor before returning to play / train
- b. Other (please specify)

4.2 Do you know of any rules or guidelines that suggest when a player with a concussion should return to play?

Yes No

If **Yes**, please can you specify the rule or guideline:

and/or indicate what you understand about these:

5.1 If you were aware or suspected that a player had been concussed, from whom or where would you seek advice? (Tick all that apply)

- a. I would not seek advice
- b. Family Doctor
- c. Hospital emergency department or after hours clinic
- d. Coach
- e. Ambulance Officer
- f. Family friends
- g. The World Wide Web(specify: _____)
- h. Other (specify: _____)

5.2 Have you ever sought information on concussion to help you understand more about this injury?

Yes No

If **Yes** – where did you seek the information from?

5.3 Have any of your players been concussed during the current season

Yes No

If **Yes**, did they visit a medical doctor to see if they were OK or needed more attention following their injury

Yes No

5.4 Do you, or any one in the team management get written clearance for any of your players that have been concussed?

Yes No

If Yes – where do the written clearances go, and what is done with them?

6.1 Which of the following symptoms are results of a playing having suffered a concussion?

| Symptom | Yes | No | Don't Know |
|--------------------------------------|--------------------------|--------------------------|--------------------------|
| a. Abnormal sense of smell | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Abnormal sense of taste | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Amnesia (loss of memory) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Blurred vision | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Black eye | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Chest pain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Confusion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. Dizziness | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i. Headache | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j. Loss of consciousness | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| k. Nausea | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| l. Nosebleed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| m. Numbness/Tingling upper extremity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| n. Sharp burning pain in neck | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| o. Sleep disturbances | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| p. Weakness of neck range of motion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

6.2 Which of the following statements are true in regards to concussion and concussion management?

| | True | False | Don't Know |
|--|--------------------------|--------------------------|--------------------------|
| 1 A concussion only occurs when a player loses consciousness (blacks out). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 A simple concussion requires immediate removal from the game or training. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 A player who reports having a headache after a concussion will likely demonstrate other signs. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 A player who displays any signs or symptoms of concussion should not be allowed to play. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

7. Recognition

- 7.1. What is the minimum time a player has to be knocked out to have a sport-related concussion?
- Players do not have to be knocked out
 - Less than 30 seconds
 - 1 to 2 minutes
 - 5 minutes
- 7.2. Which sign would a player with a concussion present with (excluding other injuries)?
- Bleeding from the nose or mouth
 - Excessive sweating
 - Inability to move head in one or more directions
 - Slow to answer questions
- 7.3. Which of the following situations is most likely to result in a sport-related concussion?
- Body checking in men's lacrosse
 - Heading a ball in soccer
 - Setting a pick in basketball
 - Contact with the head in a tackle
- 7.4. How important is the proper recognition of a sport-related concussion?
- It's not very important. They just need time to walk it off.
 - It's a minor injury. They should put ice on their head after training or matches.
 - It's a normal injury. They should go see the trainer after the practice or game.
 - It's a serious injury. They need immediate attention.
- 7.5. What sports can a player get a concussion playing?
- Sports where a ball is being thrown or hit
 - Sports where collisions are common
 - Sports where protective equipment is required
 - All sports
- 7.6. You might suspect a player has a concussion if they complain of which of the following symptoms?
- Excitement or happiness
 - Feeling "in the zone"
 - Headache or dizziness
 - Hunger or thirst
- 7.7. What sign may indicate that a player's concussion is getting worse?
- Acting extremely hyper
 - Developing a rash around the head and neck
 - Fading in and out of consciousness
 - Clammy skin
- 7.8. Which of the following is true of a player in the hours or days following an initial sport-related concussion?
- They can begin to sweat excessively
 - They can develop extreme hunger or thirst
 - They can experience new or different symptoms of a concussion
 - They can get a rash around the head and neck

8. Management

- 8.1. When a player has sustained a concussion, what should your immediate action be?
 - a. Activate the club's emergency action plan
 - b. Send to a doctor or hospital
 - c. Give the player medicine and let him rest
 - d. Let the athlete walk it off
- 8.2. Coaches and other appropriate staff should be trained in a concussion action plan that includes which of the following components?
 - a. Phone numbers of the club administrators and other coaches
 - b. Signed progress reports and permission to treat forms
 - c. Step-by-step directions for assessing a concussion
 - d. Ways to recognize a concussion and emergency contact numbers
- 8.3. Before returning to play following a concussion and being cleared by qualified medical personnel, a player should meet which of the following criteria?
 - a. Able to pass a written test
 - b. Free of symptoms during rest and activity
 - c. Given time to walk it off
 - d. Prescribed medication
- 8.4. Should every level of player be allowed to return to competition at the same rate of return?
 - a. Yes, all player's recover at the same rate.
 - b. No, junior player's take longer to return than other player's.
 - c. No, premier player's take longer to return than other player's.
 - d. No, professional player's take longer to return than other player's.
- 8.5. What is the least amount of time a player should stay out of sports after having a sport-related concussion?
 - a. 12 hours
 - b. 1 day
 - c. 7 days
 - d. 21 days
- 8.6. When should a player's parents or next-of-kin be contacted after a sport-related concussion?
 - a. If you think the player needs to see a doctor or go to hospital
 - b. The player can tell their parents or next-of-kin when they get home
 - c. After the player has been cleared to return by medical personnel
 - d. When you suspect a player has a concussion
- 8.7. What activities should a player NOT participate in if they are still symptomatic (showing sport-related concussion symptoms)?
 - a. Any level of sport activity
 - b. Games
 - c. Practice
 - d. Warm-up
- 8.8. What is the most effective kind of treatment for a player with a concussion?
 - a. Exercise without contact to the head
 - b. Medicine from a doctor
 - c. Time to rest
 - d. Radiographs and imaging performed by doctors

9. Prevention

- 9.1. Who should be in the targeted group of individuals that need to participate in an education program concerning concussion awareness?
 - a. Athletes, parents, and coaches
 - b. Hospital staff and emergency services personnel
 - c. Referees, league directors, and sports administrators
 - d. Sports equipment makers and retailers
- 9.2. Which of the following should an education program designed to increase awareness about sport-related concussion include?
 - a. Medical definition and terminology
 - b. Preseason testing and physical
 - c. Symptoms and care instructions
 - d. Team policies and procedures
- 9.3. What components should preseason testing for concussion include?
 - a. Baseline testing (balance and mental tests) and medical history
 - b. Magnetic resonance imaging and radiographs
 - c. Nothing. It is already included in the physical examination.
 - d. Pulse and blood pressure
- 9.4. What technique is most effective in helping prevent concussions while a player is out playing on the field?
 - a. Avoiding plays where head contact may occur
 - b. Playing on artificial turf
 - c. Reminding athletes to play fair
 - d. Wearing properly fitting mouthguard
- 9.5. When should a plan for concussion management (ie, screening, education) be in effect?
 - a. During preseason
 - b. After the season starts
 - c. In the off-season
 - d. Year-round
- 9.6. What is one major concern about returning a player to play before completely recovering from an initial concussion?
 - a. Blind spots in vision
 - b. Inability to hear coaching instructions
 - c. Lack of concentration in game or practice
 - d. Second impact syndrome
- 9.7. Which of the following puts a player more at risk to experience another concussion?
 - a. Having a poor sense of balance
 - b. Having had a previous sport-related concussion
 - c. Having poor neck muscle strength
 - d. Participating in preseason conditioning
- 9.8. What action is most effective in reducing the risk of repeated sport-related concussions and the associated cumulative effects?
 - a. Being educated about concussion
 - b. Developing strong neck muscles in athletes
 - c. Having injured athletes attend workshops about concussion
 - d. Proper stretching before and after exercise