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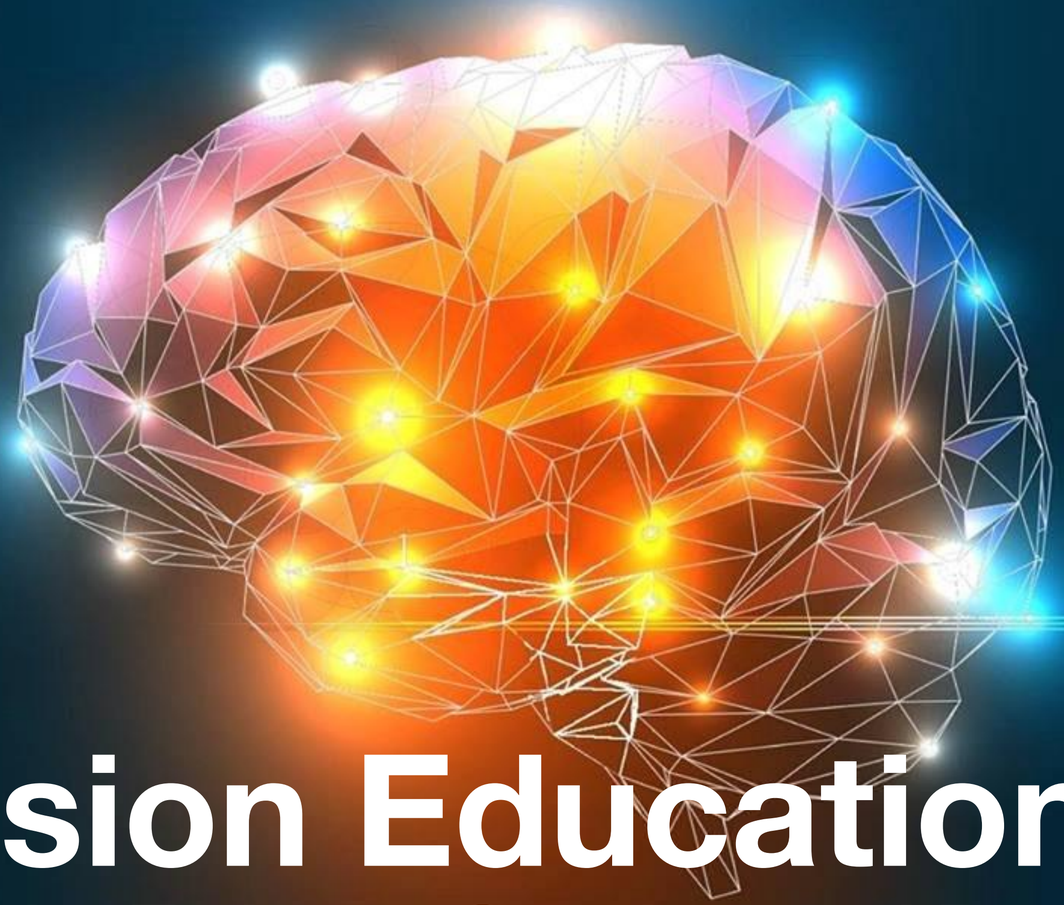


# Concussion Education

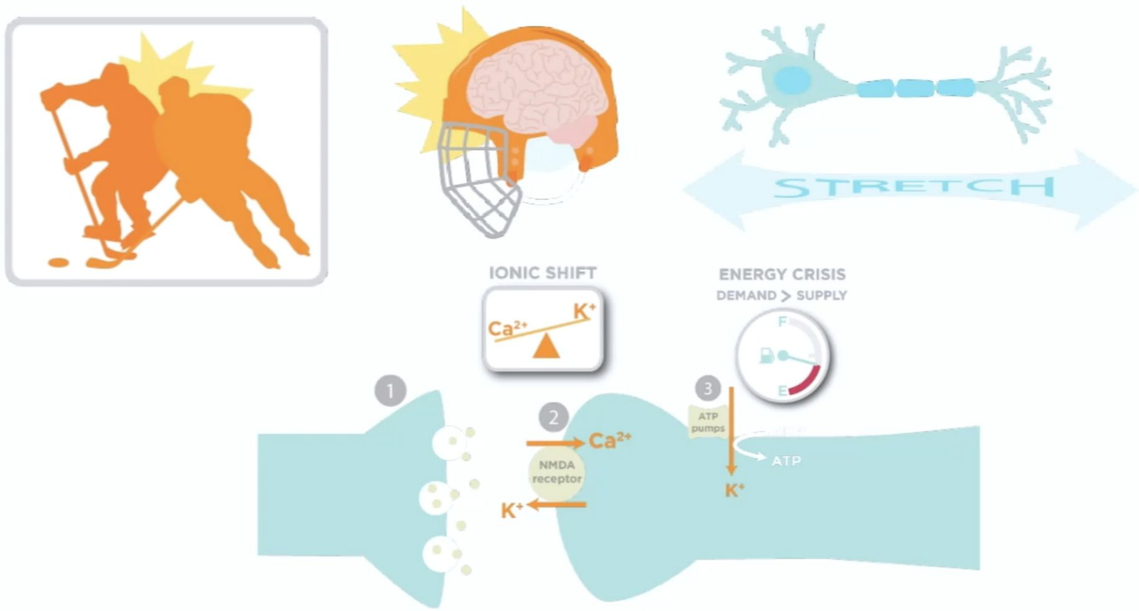
## A Walk-Through for Trainers, Coaches and Parents

# Overview

- Concussion Definition
- Concussion Features
- Why Baseline Testing?
- Rowans Law
- Recognition Tool - CRT6
- GMHA Protocols
- RTL and RTP Protocols

# Concussion Definition

- A concussion is a complex pathophysiological process affecting the brain, induced by biomechanical forces.
- It is an **acceleration, deceleration injury** affecting the brain.



# Concussion Features

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- Loss of consciousness occurs in **less than 10%** of all cases.
- Injury mechanism may not be as an obvious **BIG HIT,** the force of impact is not always proportionate to injury severity.
- **Direct head contact is NOT required to sustain a concussion.**
- **Symptoms may come on immediately, within a few hours or even a few days.**
- Concussion is a brain injury.

# Why Baseline Testing?

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- **Baseline testing is a way of tracking your functioning in a healthy state.** This can include balance, vestibular, neurocognitive and ocular testing.
- Baseline neurocognitive testing measures how your brain functions when it's not injured **(imPACT).**
- Health providers can use the baseline test data to compare with post-injury data to determine the extent of your injury.
- They can also use this data to **help decide when you're back to normal functioning.**

ImPACT® APPLICATIONS, INC.

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- The imPACT test is a computerized test that measures **memory, attention span, as well as visual and verbal problem-solving.**
- ImPACT has two primary uses: before the onset of an activity or season, a **baseline test** and after a suspected concussion, a **post-injury test**.
- In the event of an injury, a post-injury ImPACT test is done to support trained healthcare providers in making sound return-to-activity decisions following concussions.


The clinician's choice for computerized concussion management

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# THE IMPORTANCE OF BASELINE TESTING

- BETWEEN 1.6 AND 3.8 MILLION SPORTS-RELATED CONCUSSIONS OCCUR IN THE U.S. EACH YEAR
- 50% OF ALL CONCUSSIONS GO UNDIAGNOSED
- 1 IN 5 ATHLETES WHO PLAY A CONTACT SPORT WILL SUFFER A CONCUSSION EACH YEAR
- ONLY 21% OF YOUTH CONCUSSIONS HAPPEN ON THE FIELD

# Vestibular, Occulomotor and Balance Testing

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**VOR** 180 bpm, ten revolutions

**If symptoms, provide a rating out of 10 for headache, dizziness, nausea or fogginess**

**Horizontal**

| | |
|---|---|
| Headache | 0 1 2 3 4 5 6 7 8 9 10 |
| Dizziness | 0 1 2 3 4 5 6 7 8 9 10 |
| Nausea | 0 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | 0 1 2 3 4 5 6 7 8 9 10 |

**Vertical**

| | |
|---|---|
| Headache | 0 1 2 3 4 5 6 7 8 9 10 |
| Dizziness | 0 1 2 3 4 5 6 7 8 9 10 |
| Nausea | 0 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | 0 1 2 3 4 5 6 7 8 9 10 |

**VMS** 50 bpm, five repetitions

**If symptoms, provide a rating out of 10 for headache, dizziness, nausea or fogginess**

| | |
|---|---|
| Headache | 0 1 2 3 4 5 6 7 8 9 10 |
| Dizziness | 0 1 2 3 4 5 6 7 8 9 10 |
| Nausea | 0 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | 0 1 2 3 4 5 6 7 8 9 10 |

**Convergence** 3 trials, distance in cm

Trail 1:_____

Trail 2:_____

Trial 3:_____

**BESS or Modified BESS (Balance Error Scoring System)**

Foot Tested? non-dominant (nd) R L

| **Condition** | **Errors** |
|---|---|
| Double leg stance (firm) | _____ /10 |
| Single leg stance (nd, firm) | _____ /10 |
| Tandem (nd foot behind, firm) | _____ /10 |
| Double leg stance (foam) | _____ /10 |
| **TOTAL (40)** | _____ |

---

**Gait**

**10 steps forward and five steps backward**, keep your eyes up and do heel-toe

Count errors /10

**NEUROCOGNITIVE ASSESSMENT (ImPACT)**

Neurocognitive Assessment Completed and Validated: ☐ Yes ☐ No

NOTES:

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# Example - Baseline

**VOR** 180 bpm, ten revolutions

**If symptoms, provide a rating out of 10 for headache, dizziness, nausea or fogginess**

**Horizontal**

| | |
|---|---|
| Headache | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |
| Dizziness | 0 1 ~~2~~ 3 4 5 6 7 8 9 10 |
| Nausea | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |

**Vertical**

| | |
|---|---|
| Headache | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |
| Dizziness | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |
| Nausea | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |

**VMS** 50 bpm, five repetitions

**If symptoms, provide a rating out of 10 for headache, dizziness, nausea or fogginess**

| | |
|---|---|
| Headache | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |
| Dizziness | 0 ~~1~~ 2 3 4 5 6 7 8 9 10 |
| Nausea | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | ~~0~~ 1 2 3 4 5 6 7 8 9 10 |

**Convergence** 3 trials, distance in cm

Trail 1: 5

Trail 2: 5

Trial 3: 5

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# Post Injury

**VOR** 180 bpm, ten revolutions

**If symptoms, provide a rating out of 10 for headache, dizziness, nausea or fogginess**

**Horizontal**

| | |
|---|---|
| Headache | 0 1 (2) 3 4 5 6 7 8 9 10 |
| Dizziness | 0 1 2 (3) 4 5 6 7 8 9 10 |
| Nausea | (0) 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | (0) 1 2 3 4 5 6 7 8 9 10 |

**Vertical**

| | |
|---|---|
| Headache | 0 1 (2) 3 4 5 6 7 8 9 10 |
| Dizziness | (0) 1 2 3 4 5 6 7 8 9 10 |
| Nausea | (0) 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | 0 (1) 2 3 4 5 6 7 8 9 10 |

**VMS** 50 bpm, five repetitions

**If symptoms, provide a rating out of 10 for headache, dizziness, nausea or fogginess**

| | |
|---|---|
| Headache | 0 1 (2) 3 4 5 6 7 8 9 10 |
| Dizziness | 0 (1) 2 3 4 5 6 7 8 9 10 |
| Nausea | (0) 1 2 3 4 5 6 7 8 9 10 |
| Fogginess | (0) 1 2 3 4 5 6 7 8 9 10 |

**Convergence** 3 trials, distance in cm

Trail 1: 5

Trail 2: 5

Trial 3: 5

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# Example - Baseline

**BESS or Modified BESS (Balance Error Scoring System)**

Foot Tested? non-dominant (nd) R (L)

| Condition | Errors |
|---|---|
| Double leg stance (firm) | 0 /10 |
| Single leg stance (nd, firm) | 0 /10 |
| Tandem (nd foot behind, firm) | 1 /10 |
| Double leg stance (foam) | 0 /10 |
| **TOTAL (40)** | 1/40 |

**Gait**

**10 steps forward and five steps backward**, keep your eyes up and do heel-toe

Count errors 0/10

**NEUROCOGNITIVE ASSESSMENT (ImPACT)**

Neurocognitive Assessment Completed and Validated: ☑ Yes ☐ No

NOTES:

# Post Injury

**BESS or Modified BESS (Balance Error Scoring System)**

Foot Tested? non-dominant (nd) R (L)

| Condition | Errors |
|---|---|
| Double leg stance (firm) | 0 /10 |
| Single leg stance (nd, firm) | 1 /10 |
| Tandem (nd foot behind, firm) | 3 /10 |
| Double leg stance (foam) | 0 /10 |
| **TOTAL (40)** | 4 |

**Gait**

**10 steps forward and five steps backward**, keep your eyes up and do heel-toe

Count errors 1 /10

**NEUROCOGNITIVE ASSESSMENT (ImPACT)**

Neurocognitive Assessment Completed and Validated: ☐ Yes ☐ No

NOTES:

# Rowans Law

- Rowan Stringer, a high school rugby player from Ottawa, passed away from Second Impact Syndrome.
- **Second Impact Syndrome** is the result of suffering two concussions in a short period.

Any athlete with a suspected concussion should be immediately removed from play and not return to the game the same day.

# CRT6™

## Concussion Recognition Tool

### To Help Identify Concussion in Children, Adolescents and Adults

## What is the Concussion Recognition Tool?

A concussion is a brain injury. The Concussion Recognition Tool 6 (CRT6) is to be used by non-medically trained individuals for the identification and immediate management of suspected concussion. It is not designed to diagnose concussion.

## Recognise and Remove

### Red Flags: CALL AN AMBULANCE

If **ANY** of the following signs are observed or complaints are reported after an impact to the head or body the athlete should be immediately removed from play/game/activity and transported for urgent medical care by a healthcare professional (HCP):

- **Neck pain or tenderness**
- **Seizure, 'fits', or convulsion**
- **Loss of vision or double vision**
- **Loss of consciousness**
- **Increased confusion or deteriorating conscious state (becoming less responsive, drowsy)**
- **Weakness or numbness/tingling in more than one arm or leg**
- **Repeated Vomiting**
- **Severe or increasing headache**
- **Increasingly restless, agitated or combative**
- **Visible deformity of the skull**

## Remember

- In all cases, the basic principles of first aid should be followed: assess danger at the scene, check airway, breathing, circulation; look for reduced awareness of surroundings or slowness or difficulty answering questions.
- Do not attempt to move the athlete (other than required for airway support) unless trained to do so.
- Do not remove helmet (if present) or other equipment.
- Assume a possible spinal cord injury in all cases of head injury.
- Athletes with known physical or developmental disabilities should have a lower threshold for removal from play.

**If there are no Red Flags, identification of possible concussion should proceed as follows:**

Concussion should be suspected after an impact to the head or body when the athlete seems different than usual. Such changes include the presence of **any one or more** of the following: visible clues of concussion, signs and symptoms (such as headache or unsteadiness), impaired brain function (e.g. confusion), or unusual behaviour.



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## 1: Visible Clues of Suspected Concussion

Visible clues that suggest concussion include:

- Loss of consciousness or responsiveness
- Lying motionless on the playing surface
- Falling unprotected to the playing surface
- Disorientation or confusion, staring or limited responsiveness, or an inability to respond appropriately to questions
- Dazed, blank, or vacant look
- Seizure, fits, or convulsions
- Slow to get up after a direct or indirect hit to the head
- Unsteady on feet / balance problems or falling over / poor coordination / wobbly
- Facial injury

## 2: Symptoms of Suspected Concussion

| Physical Symptoms |
|---|
| Headache |
| "Pressure in head" |
| Balance problems |
| Nausea or vomiting |
| Drowsiness |
| Dizziness |
| Blurred vision |
| More sensitive to light |
| More sensitive to noise |
| Fatigue or low energy |
| "Don't feel right" |
| Neck Pain |

| Changes in Emotions |
|---|
| More emotional |
| More Irritable |
| Sadness |
| Nervous or anxious |

| Changes in Thinking |
|---|
| Difficulty concentrating |
| Difficulty remembering |
| Feeling slowed down |
| Feeling like "in a fog" |

**Remember,** symptoms may develop over minutes or hours following a head injury.

## 3: Awareness

**(Modify each question appropriately for each sport and age of athlete)**

Failure to answer any of these questions correctly may suggest a concussion:

**"Where are we today?"**

**"What event were you doing?"**

**"Who scored last in this game?"**

**"What team did you play last week/game?"**

**"Did your team win the last game?"**

## Recognise and Remove

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- **Loss of vision or double vision**
- **Loss of consciousness**
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- **Weakness or numbness/tingling in more than one arm or leg**
- **Repeated Vomiting**
- **Severe or increasing headache**
- **Increasingly restless, agitated or combative**
- **Visible deformity of the skull**

**If any red flags are present, that is an immediate 911 call.**

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## Remember

- In all cases, the basic principles of first aid should be followed: assess danger at the scene, check airway, breathing, circulation; look for reduced awareness of surroundings or slowness or difficulty answering questions.
- Do not attempt to move the athlete (other than required for airway support) unless trained to do so.
- Do not remove helmet (if present) or other equipment.
- Assume a possible spinal cord injury in all cases of head injury.
- Athletes with known physical or developmental disabilities should have a lower threshold for removal from play.



## If there are no Red Flags, identification of possible concussion should proceed as follows:

Concussion should be suspected after an impact to the head or body when the athlete seems different than usual. Such changes include the presence of **any one or more** of the following: visible clues of concussion, signs and symptoms (such as headache or unsteadiness), impaired brain function (e.g. confusion), or unusual behaviour.

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- Dazed, blank, or vacant look
- Seizure, fits, or convulsions
- Slow to get up after a direct or indirect hit to the head
- Unsteady on feet / balance problems or falling over / poor coordination / wobbly
- Facial injury

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# 2: Symptoms of Suspected Concussion

| Physical Symptoms |
| --- |
| Headache |
| “Pressure in head” |
| Balance problems |
| Nausea or vomiting |
| Drowsiness |
| Dizziness |
| Blurred vision |
| More sensitive to light |
| More sensitive to noise |
| Fatigue or low energy |
| “Don’t feel right” |
| Neck Pain |

| Changes in Emotions |
| --- |
| More emotional |
| More Irritable |
| Sadness |
| Nervous or anxious |

| Changes in Thinking |
| --- |
| Difficulty concentrating |
| Difficulty remembering |
| Feeling slowed down |
| Feeling like “in a fog“ |

**Remember,** symptoms may develop over minutes or hours following a head injury.

## 3: Awareness

**(Modify each question appropriately for each sport and age of athlete)**

Failure to answer any of these questions correctly may suggest a concussion:

**"Where are we today?"**

**"What event were you doing?"**

**"Who scored last in this game?"**

**"What team did you play last week/game?"**

**"Did your team win the last game?"**

**Any athlete with a suspected concussion should be - IMMEDIATELY REMOVED FROM PRACTICE OR PLAY and should NOT RETURN TO ANY ACTIVITY WITH RISK OF HEAD CONTACT, FALL OR COLLISION, including SPORT ACTIVITY until ASSESSED MEDICALLY, even if the symptoms resolve.**

Athletes with suspected concussion should **NOT**:

- Be left alone initially (at least for the first 3 hours). Worsening of symptoms should lead to immediate medical attention.
- Be sent home by themselves. They need to be with a responsible adult.
- Drink alcohol, use recreational drugs or drugs not prescribed by their HCP
- Drive a motor vehicle until cleared to do so by a healthcare professional

# Remove - Sideline

- **Any** suspicion of concussion requires immediate removal from play and comprehensive evaluation off-ice (quiet environment).
- Maddocks' Questions for brief sideline screen for athletes > 12 years of age.
    - What venue are we at? Which half/period is it? Who scored last? Who won the last game?
- **CRT6**

# GMHA Trainer's Concussion Kit

- If an injury occurs, perform a sideline assessment, and update the parents on the outcome.

- **Once a passport is issued, it needs to be uploaded onto the GMHA portal;** the player is not allowed to return until cleared by a doctor; this **clearance also needs to be updated on the portal**.

- If no concussion is diagnosed, the player resumes play; once a player is diagnosed with a concussion, follow the return to play protocol.

# GMHA Concussion Passport

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## GMHA Concussion Passport

**Players Name: _____**

**Dear Physician,**

Thank you for seeing our athlete. Your assessment is critical to the safe recovery of our players.
GMHA has adopted a Return to Play Protocol for any athlete suspected of having a concussion.

**This form is given to player/parents after ANY injury in which a concussion is suspected or the trainer is unsure and want a medical opinion.**

A player is not allowed back on the ice until they have been cleared of a concussion by a medical doctor once the passport is given to a player.

**Physician Clearance**

It is my opinion that medically, this player is able to return to play

**Physician Name: _____**

**Date: _____**

**Signature: _____**

**Trainer is responsible to upload signed form into the GMHA Concussion Conclusion page.**

**Team:_____ Trainer _____**

# GMHA Concussion Report

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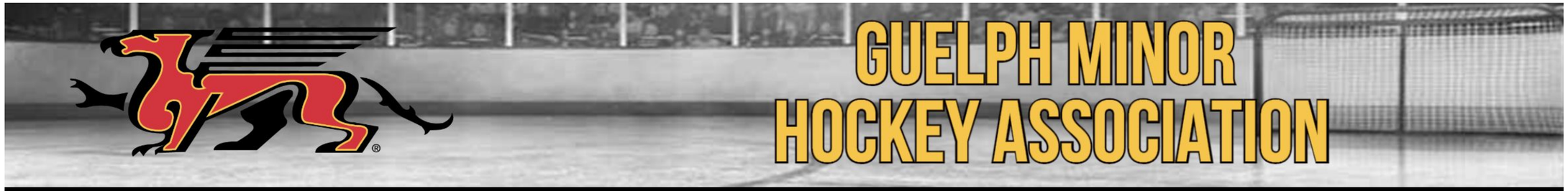


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HOME / MANAGE CONCUSSION (INITIAL REPORT) SITEMA

## Manage Concussion (Initial Report)

### CONCUSSION RECIPIENT

Please complete the information requested in this section

First Name *

Last Name *

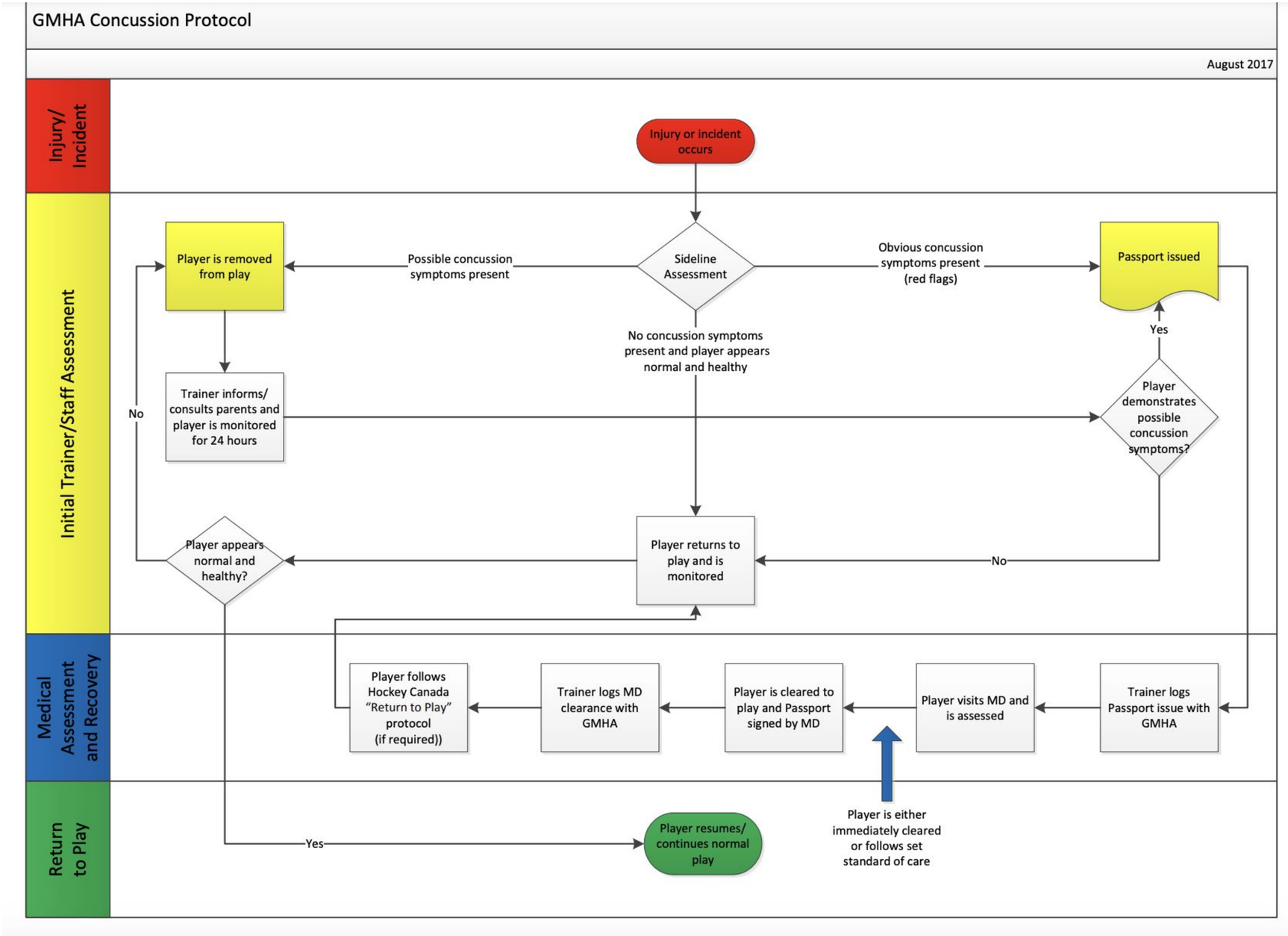
Team Age Group *

Select One...

Team Level *

Select One...

# GMHA Concussion Protocol

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Concussion Diagnosed

# Early Recommendations

- The ‘Darkroom’ approach is no longer recommended.
- **Relative rest** for the first 2 days after injury then progressive return to daily activities.
- Reduced **screen use** in the first 48 hours after injury is warranted but may not be effective beyond* - use symptoms as a guide.
- Early return to **light-intensity physical activity** (walking) that does not more than mildly increase symptoms can be initiated during initial 24-48 hours.

# Return-to-Learn Strategy

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## Table 1

**Return-to-learn (RTL) strategy**

| Step | Mental activity | Activity at each step | Goal |
|---|---|---|---|
| 1 | Daily activities that do not result in more than a mild exacerbation* of symptoms related to the current concussion | Typical activities during the day (eg, reading) while minimising screen time. Start with 5–15 min at a time and increase gradually. | Gradual return to typical activities |
| 2 | School activities | Homework, reading or other cognitive activities outside of the classroom. | Increase tolerance to cognitive work |
| 3 | Return to school part time | Gradual introduction of schoolwork. May need to start with a partial school day or with greater access to rest breaks during the day. | Increase academic activities |
| 4 | Return to school full time | Gradually progress in school activities until a full day can be tolerated without more than mild* symptom exacerbation. | Return to full academic activities and catch up on missed work |

- **Following an initial period of relative rest (24–48 hours following an injury at Step 1), athletes can begin a gradual and incremental increase in their cognitive load. Progression through the strategy for students should be slowed when there is more than a mild and brief symptom exacerbation.**
- ***Mild and brief exacerbation of symptoms is defined as an increase of no more than 2 points on a 0–10 point scale (with 0 representing no symptoms and 10 the worst symptoms imaginable) for less than an hour when compared with the baseline value reported prior to cognitive activity.**

# Return-to-Sport Strategy

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## Table 2

**Return-to-sport (RTS) strategy—each step typically takes a minimum of 24 hours**

| Step | Exercise strategy | Activity at each step | Goal |
|---|---|---|---|
| 1 | Symptom-limited activity | Daily activities that do not exacerbate symptoms (eg, walking). | Gradual reintroduction of work/school |
| 2 | Aerobic exercise<br>**2A—Light** (up to approximately 55% maxHR)<br>**then**<br>**2B—Moderate** (up to approximately 70% maxHR) | Stationary cycling or walking at slow to medium pace. May start light resistance training that does not result in more than mild and brief exacerbation* of concussion symptoms. | Increase heart rate |
| 3 | Individual sport-specific exercise<br>Note: If sport-specific training involves any risk of inadvertent head impact, medical clearance should occur prior to Step 3 | Sport-specific training away from the team environment (eg, running, change of direction and/or individual training drills away from the team environment). No activities at risk of head impact. | Add movement, change of direction |
| Steps 4–6 should begin after the resolution of any symptoms, abnormalities in cognitive function and any other clinical findings related to the current concussion, including with and after physical exertion. | | | |

| | | | |
|---|---|---|---|
| 4 | Non-contact training drills | Exercise to high intensity including more challenging training drills (eg, passing drills, multiplayer training) can integrate into a team environment. | Resume usual intensity of exercise, coordination and increased thinking |
| 5 | Full contact practice | Participate in normal training activities. | Restore confidence and assess functional skills by coaching staff |
| 6 | Return to sport | Normal game play. | |

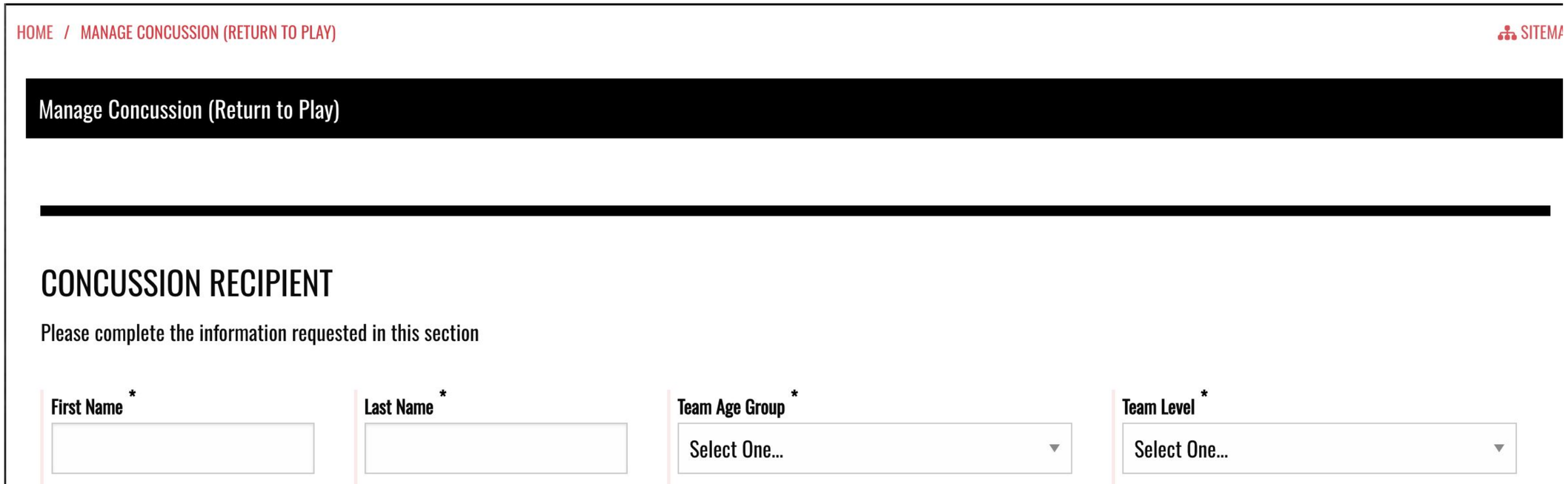
- *Mild and brief exacerbation of symptoms (ie, an increase of no more than 2 points on a 0–10 point scale for less than an hour when compared with the baseline value reported prior to physical activity). Athletes may begin Step 1 (ie, symptom-limited activity) within 24 hours of injury, with progression through each subsequent step typically taking a minimum of 24 hours. If more than mild exacerbation of symptoms (ie, more than 2 points on a 0–10 scale) occurs during Steps 1–3, the athlete should stop and attempt to exercise the next day. Athletes experiencing concussion-related symptoms during Steps 4–6 should return to Step 3 to establish full resolution of symptoms with exertion before engaging in at-risk activities. Written determination of readiness to RTS should be provided by an HCP before unrestricted RTS as directed by local laws and/or sporting regulations.
- HCP, healthcare professional; maxHR, predicted maximal heart rate according to age (ie, 220-age).

# Recovery Timelines

- Recovery can vary.
- **The majority of concussions resolve within a few weeks.**
- Early concussion assessment and guidance have been shown to speed recovery.
- A small **percentage of individuals may experience persistent symptoms requiring targeted treatment and rehabilitation.**

# Full Return to Play

- Clearance Letter needed from player's doctor, as per Hockey Canada guidelines.
- The trainer or coach shall complete the concussion conclusion form, and the player may resume on-ice activities.



# Refer

- If ongoing symptoms refer to clinicians with specialized knowledge and skills in concussion management for:
  - Cervicogenic symptoms
  - Migraine and headache
  - Cognitive and psychological difficulties
  - Balance disturbances
  - Vestibular and oculomotor signs

# Thank-you!

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