

# Concussion in Youth Soccer: How can you help?

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Concussion Research Centre  
Holland Bloorview Kids Rehabilitation Hospital

Ontario Soccer Association  
**#SocDev15**  
**#concussionHB**

March 21, 2015

# Agenda

- Introductions
- What is a concussion?
- Concussion in kids
- Concussion in sport/soccer
- Concussion management
- Baseline testing
- Role of the coach
- Concussion policy development workshop

# What we hope you get out of this session

1. A better understanding of concussion and concussion in soccer
2. Approaches to managing a concussion
3. What the role of the coach is in concussion management
4. A starting point towards the development of a concussion policy for your team/club
5. A whole lot of resources = build your toolbox
6. A contact if you need it...

# What is a concussion?



Defined:

"Complex pathophysiological process affecting the brain induced by traumatic biomechanical forces"

(McCroly et al., 2009)

# What is a concussion?

What I like to call it: The invisible injury!



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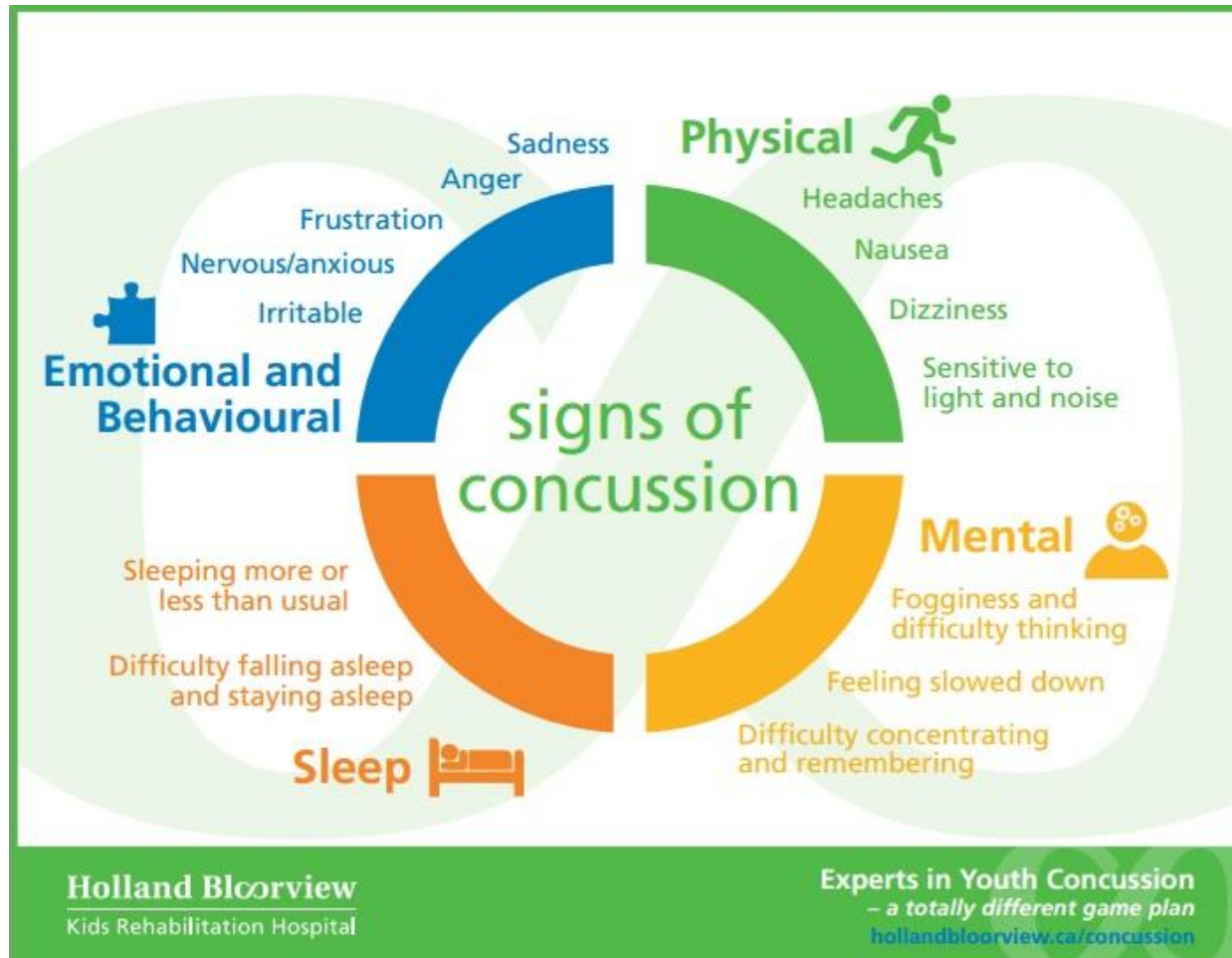


Wikipedia.org (public domain)



Freeimages.com (zoofytheji)

# Signs and Symptoms



Short and long term **functional** implications

# Signs and Symptoms

## Take Home Points:

- Every injury is different!
- Symptoms may not appear right away
- Signs may be missed early on by youth, family members, coaches, trainers, teachers, health care providers  
=Need to work as a team; create an environment where injuries can be reported and respected
- Even if only have one symptom = treat as a concussion

# A few more things...

## 6 things you should know about concussions

1 Concussion is a brain injury.

2 A child's brain is still developing and requires a unique approach to care.

3 You can have a concussion without losing consciousness.

4 Concussion symptoms are more than just physical. They can be mental, emotional or behavioural.

5 Most concussions resolve quickly, however 30% of people have symptoms that last longer than 4 weeks.

6 It's essential for optimal recovery to rest your mind and body.

**Holland Bloorview**  
Kids Rehabilitation Hospital

Experts in Youth Concussion  
– a totally different game plan  
[hollandbloorview.ca/concussion](http://hollandbloorview.ca/concussion)

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# Anecdotal Experience

## Raise your hand if:

- You/your child has experienced a concussion while playing soccer
- Someone you have coached has experienced a concussion while playing soccer
- You know a youth who has experienced a concussion while playing soccer
- You know of a youth who has experienced a concussion while playing soccer

## Bottom Line:

**Concussion are happening in youth soccer**

# Concussion and Kids



**Child/Youth  $\neq$  Adult**

**Physiology - Emotions - Demands - Activities- Goals- Supports - Environments**



# Child/Youth $\neq$ Adult

## Physiology

- **More vulnerable to sustain an injury**
  - Lighter brain = less force required to accelerate brain towards injury
  - Big heads + small necks = lack musculature to control head acceleration
  - Decreased myelination (coating of nerve fibers) = more easily torn apart
  - Softer skull = decreased protective properties (more severe TBI)
- **More vulnerable to prolonged recovery/persisting symptoms (including cognitive symptoms)**
  - Diffuse vs Focal injuries
    - Diffuse injuries = increased impairment
    - Children/youth more susceptible to diffuse injuries
  - Critical periods of cognitive development
    - Sustain injury during these periods = impact on construct/domain developing during that period
  - Metabolic cascade
    - heightened/prolonged in children/youth

# Concussion and Sport/Soccer

- 43% of Canadian youth and adolescents participate in organized sports at least once per week (Clark, 2008)
- Six times more likely to experience a concussion in organized sport than other leisure activities (Browne & Lam, 2006)
- Concussion Incidence in Ontario  
= 754/100,000 boys; 440/100,000 girls (Macpherson et al., 2014)
- 10-15% annual concussion rate in youth athletes  
(BrainFit Lab/Concussion Research Centre)

TABLE 1  
Concussion Rates Among High School Athletes by Sport: High School Sports-Related Injury Surveillance Study,  
United States, 2008-2010 School Years<sup>a</sup>

Sport <sup>b</sup>	Concussions			Rate per 10,000 AEs			
	Competition	Practice	Total	Competition	Practice	Total	Rate Ratio (95% CI) <sup>c</sup>
Football	548	364	912	22.9	3.1	6.4	7.4 (6.5-8.4)
Boys' ice hockey	69	11	80	14.6	1.1	5.4	13.2 (7.0-25.0)
Boys' lacrosse	75	18	93	10.4	1.1	4.0	9.5 (5.5-15.5)
<u>Girls' soccer</u>	133	26	<u>159</u>	9.2	0.8	<u>3.4</u>	11.6 (7.6-17.6)
Girls' lacrosse	45	15	60	8.6	1.3	3.5	6.6 (3.8-12.1)
Girls' basketball	85	22	107	5.5	0.6	2.1	9.2 (5.5-14.1)
<u>Boys' soccer</u>	88	15	<u>103</u>	5.3	0.4	<u>1.9</u>	13.5 (7.8-23.3)
Boys' wrestling	63	49	112	4.8	1.3	2.2	3.6 (2.5-5.2)
Girls' field hockey	29	22	51	4.1	1.4	2.2	2.9 (1.7-5.1)
Boys' basketball	71	25	96	3.9	0.6	1.6	6.8 (4.3-10.7)
Girls' softball	36	22	58	2.9	0.9	1.6	3.2 (1.9-5.4)
Girls' gymnastics <sup>d</sup>	2	1	3	2.4	0.3	0.7	8.5 (0.8-93.9)
Cheerleading <sup>e</sup>	2	21	23	1.2	1.4	1.4	1.2 (0.3-5.1)
Boys' baseball	19	4	23	1.1	0.1	0.5	11.0 (3.0-26.1)
Girls' volleyball	16	15	31	1.0	0.5	0.6	2.1 (1.04-4.3)
Girls' swim/dive <sup>d</sup>	2	2	4	0.4	0.1	0.2	4.1 (0.6-29.2)
Girls' track/field <sup>d</sup>	3	5	8	0.4	0.1	0.2	4.1 (0.6-10.9)
Boys' track/field	3	8	11	0.3	0.2	0.2	1.5 (0.4-6.2)
Boys' swim/dive <sup>d</sup>	0	2	2	—	0.1	0.1	—

## REVIEW

# Concussions and heading in soccer: A review of the evidence of incidence, mechanisms, biomarkers and neurocognitive outcomes

Monica E. Maher<sup>1,2</sup>, Michael Hutchison<sup>3,4</sup>, Michael Cusimano<sup>3,5</sup>, Paul Comper<sup>6,7</sup>, & Tom A. Schweizer<sup>2,8</sup>

<sup>1</sup>Institute of Medical Sciences, University of Toronto, Toronto, Ontario, Canada, <sup>2</sup>Keenan Research Centre of the Li Ka Shing Knowledge Institute, <sup>3</sup>Injury Prevention Office, St. Michael's Hospital, Toronto, Ontario, Canada, <sup>4</sup>David L. MacIntosh Clinic, University of Toronto, Toronto, Ontario, Canada, <sup>5</sup>Division of Neurosurgery, St. Michael's Hospital, Toronto, Ontario, Canada, <sup>6</sup>Faculty of Kinesiology and Physical Education, <sup>7</sup>Graduate Department of Rehabilitation Sciences, and <sup>8</sup>Department of Surgery, Division of Neurosurgery, Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada

- Player to player contact = ↑ concussions
- Female = ↑ concussions
- Goalkeepers and defenders = ↑ concussions

# Scenario: Sara

- 14 year old female
- Pre-season soccer game
- Headed ball with contact from opponent
- End of half, reports slight headache and being dizzy

## What happens now?

# What to do if you have (think you have) a concussion?

I think I have a concussion, how can I get better?

- Stop:** studying, using electronic devices and playing
- Get Help:** get immediate medical attention, ask your doctor for advice
- Rest:** take time to rest your mind and your body
- Take it slow:** slowly get back to studying, working and playing

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**Experts in Youth Concussion**  
– a totally different game plan  
[hollandbloorview.ca/concussion](http://hollandbloorview.ca/concussion)



# Returning to Sport

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Complete physical and cognitive rest.	Recovery
2. Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity < 70% MPMR No resistance training.	Increase HR
3. Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities.	Add movement
4. Non-contact training drills	Progression to more complex training drills e.g. passing drills in football and ice hockey. May start load progressive resistance training)	Exercise, coordination, and cognitive
5. Full contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	

## GRADUAL

=do not rush  
=at least 24 hours/stage

## STEPWISE

=one stage at a time

## NO SYMPTOMS

=progress to next stage

## SYMPTOMS

=stop activity and rest for at least 24 hours  
=re-enter at previous successful stage

# Returning to Sport

## Resources:



L'Hôpital de Montréal pour enfants  
The Montreal Children's Hospital  
Centre universitaire de santé McGill  
McGill University Health Centre

**TRAUMA**

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**RETURN TO SOCCER  
FOLLOWING A CONCUSSION**

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[www.thechildren.com](http://www.thechildren.com)

**GUIDELINES FOR RETURN TO PLAY  
AFTER A CONCUSSION**



[www.parachutecanada.org](http://www.parachutecanada.org)

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# Return to daily activities

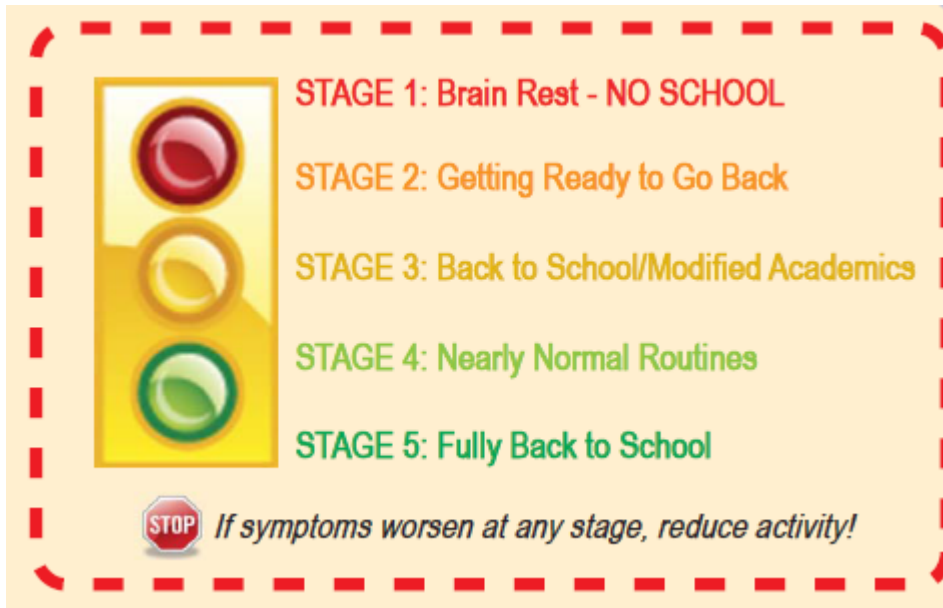
- Sport isn't the only thing that can tire out our brains



- Gradual approach to returning to **ALL** activities
  - school/life → sport

# Return to daily activities

Resources:



[www.canchild.ca](http://www.canchild.ca)

# If managed properly ...

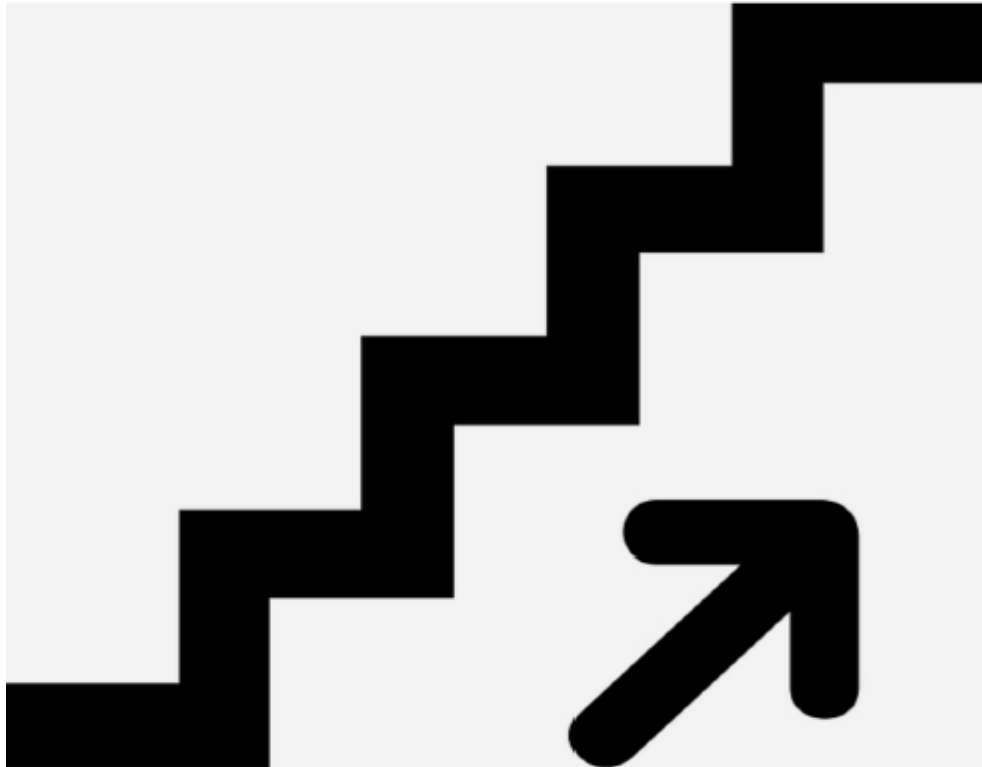
- The brain wants to heal!
  - Only ~20% report symptoms longer than 2-4 weeks following a concussion
  - Can't heal without rest (physical and cognitive)

**IN ADULTS**

## When does it take longer to recover?

- Repeated injury (concussion history)
- Return too early to activities
- Severity of injury (prolonged LOC and amnesia)
- Co-morbidities: depression, ADHD, sleep disorders

# Returning to activities (sport, school, life)



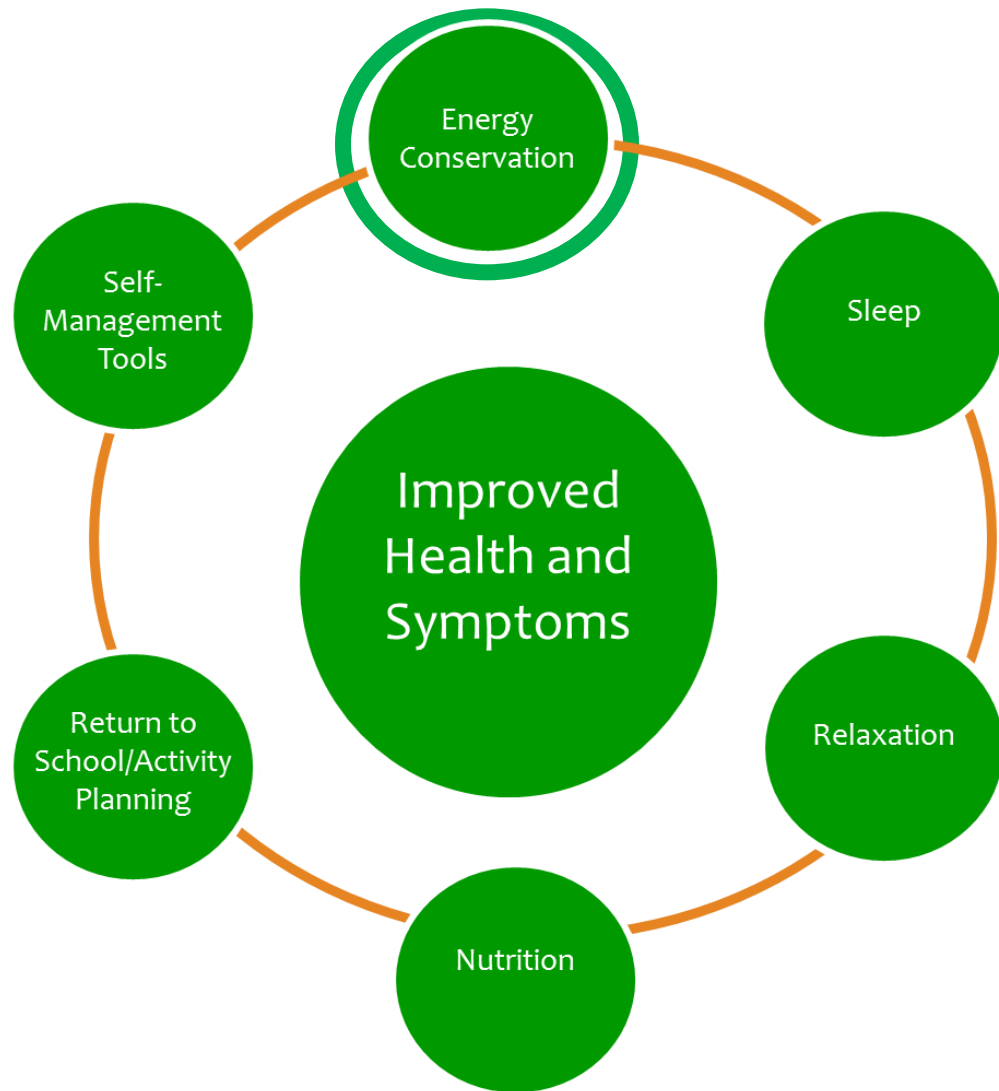
Follow return to activity stages = get back sooner

# Gas Tank Analogy!



- Everything we do in our day uses fuel
- When concussed, need to **conserve** this fuel to:
  - allow for proper healing
  - avoid exacerbation of symptoms

**NEED TO KEEP THE TANK FULL!**

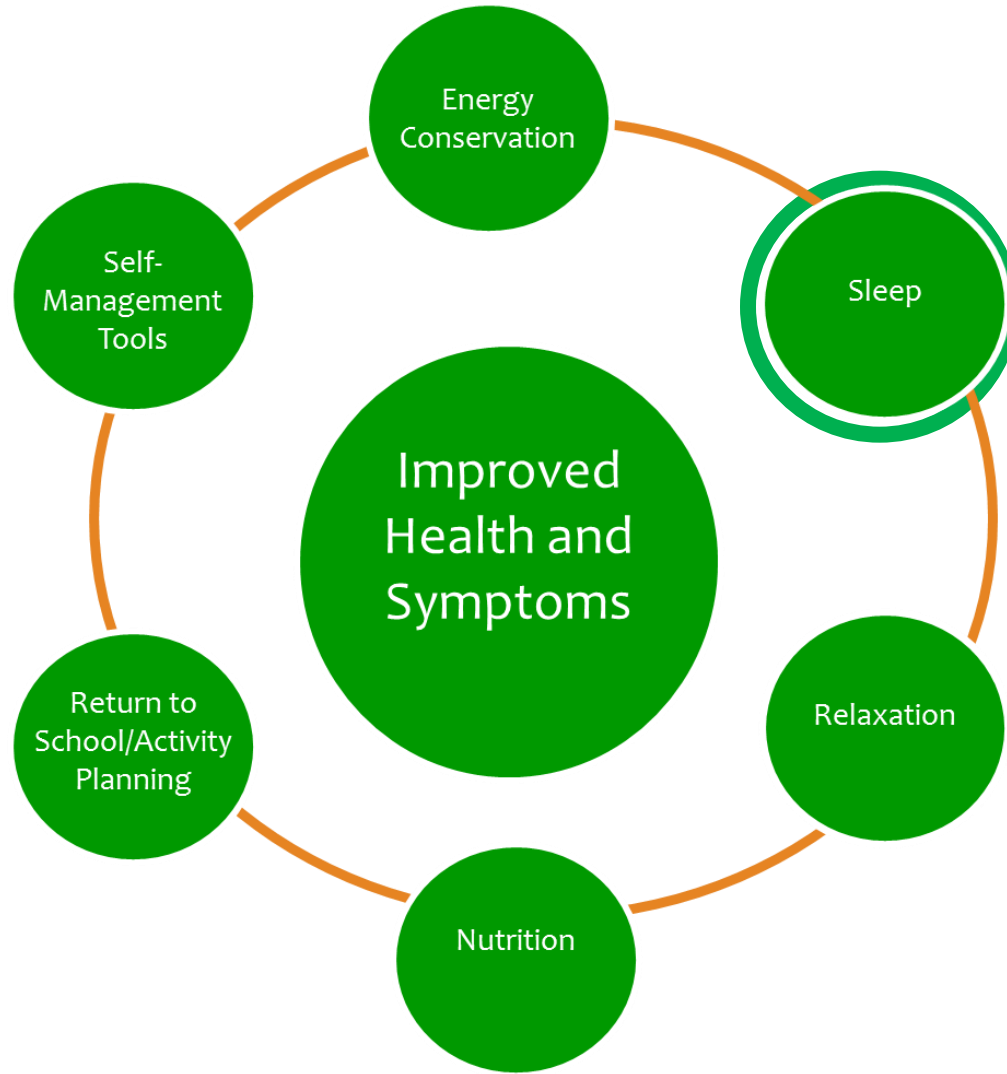




# Energy Conservation

How can we keep the tank from hitting empty?

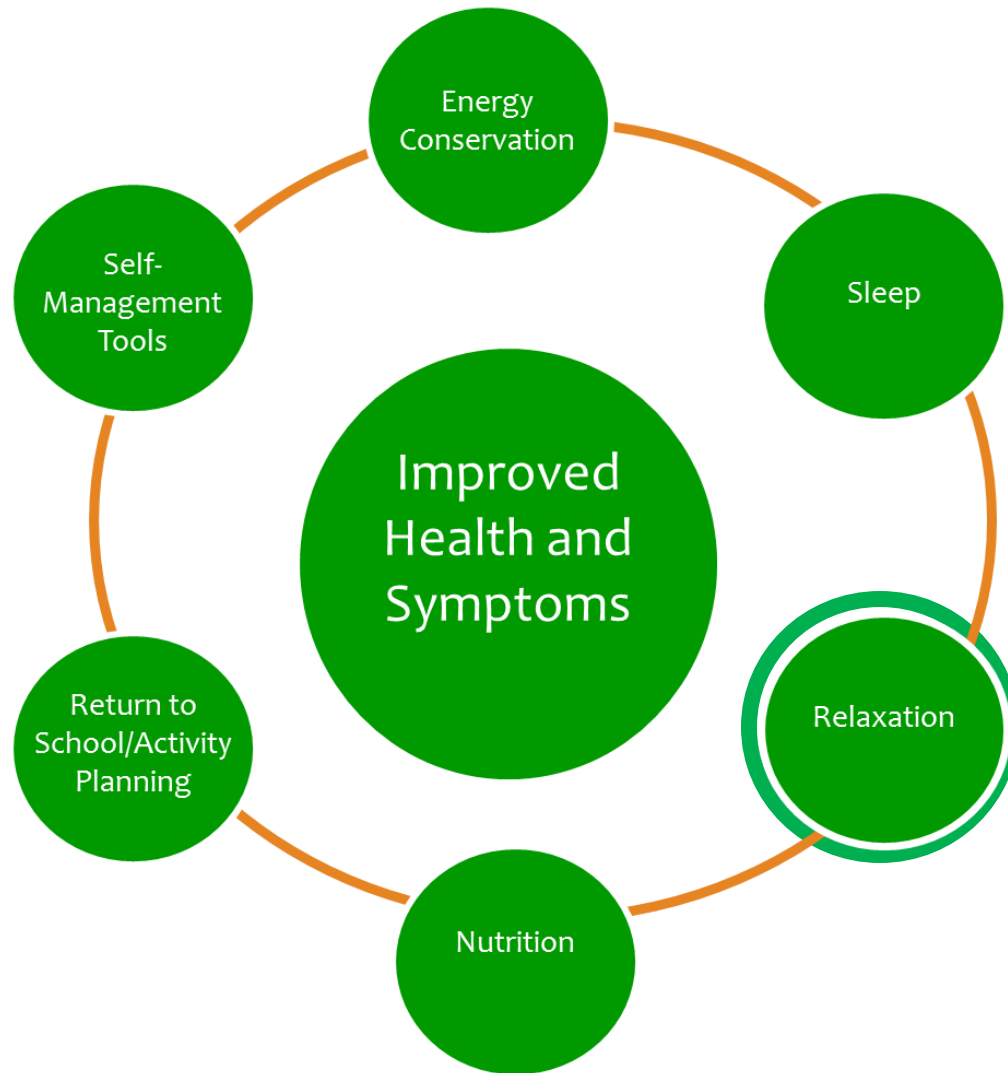
- The 4P's:
  - Prioritizing – what am I going to do?
  - Planning – when am I going to do it?
  - Pacing – how am I going to do it?
  - Positioning – where am I going to do it?



# Sleep

A good sleep = keeps the tank full!

- How to get a good sleep:
  - Create a sleep routine
  - Regular bedtime and awakening time
  - Use bedroom only for sleep
  - Avoid technology, eating and caffeine/sugar before bedtime
  - Relaxation exercises before bed



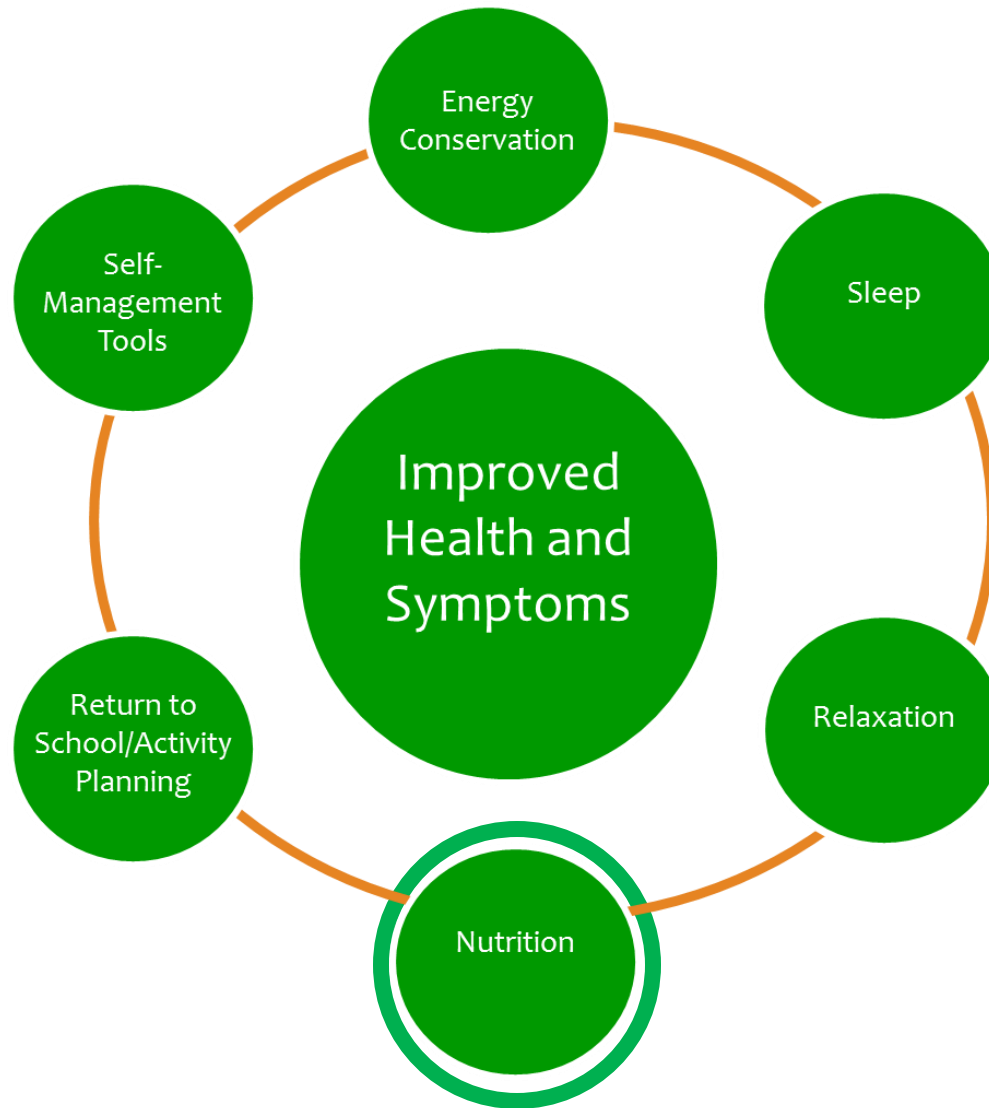
# Relaxation

**Taking time to relax = keeps the tank full!**

- Everyone is different = how do you relax?
- Need to do it regularly and practice!
  - E.g., 10 minutes; 3 times per day

## Ways to relax:

- Deep breathing exercises
- Smartphone Apps (e.g. Breathing Zone)
- Visualization
- Handout
- Think of things that make you happy



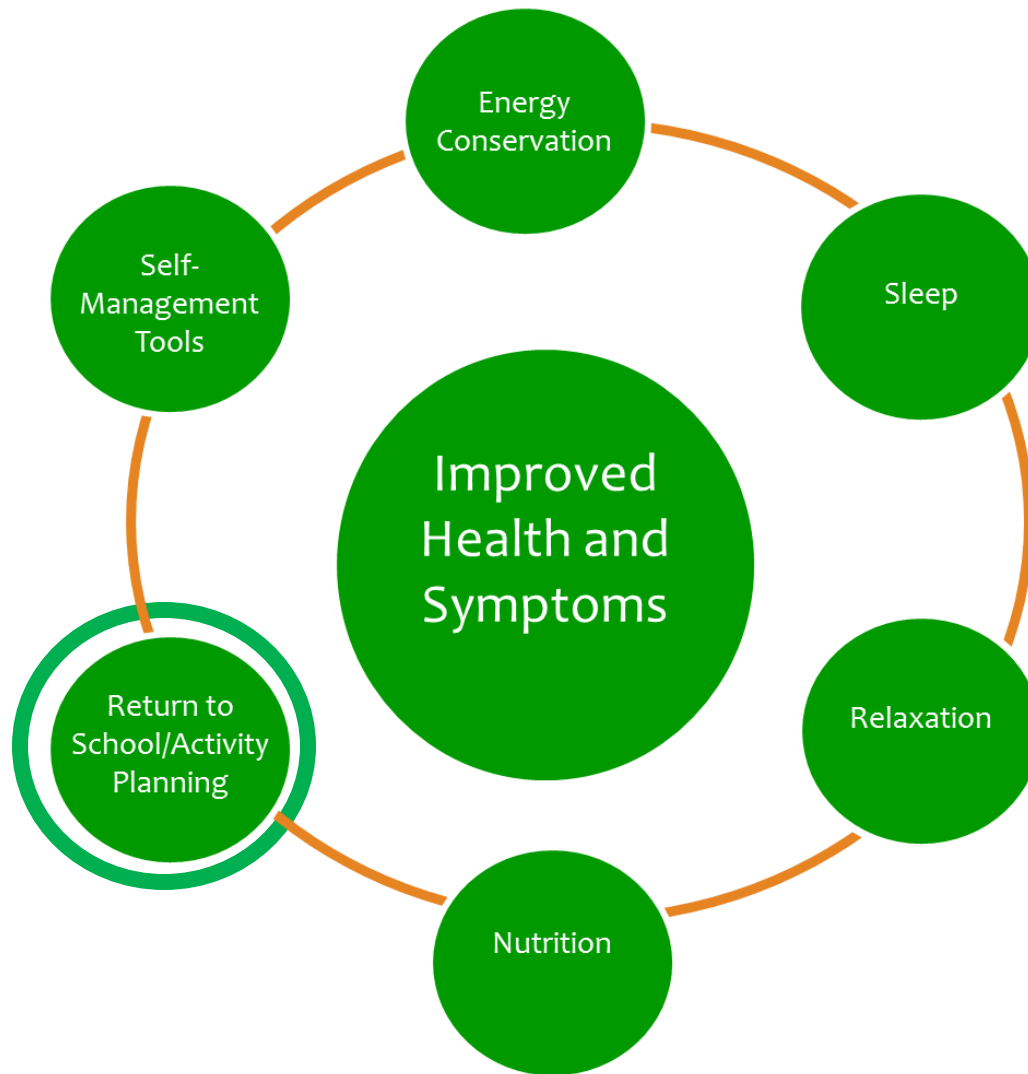
# Nutrition

**Good food and hydration = keeps the tank full!**

- What we put in our body gives us the energy we need to heal injuries and take part in daily activities

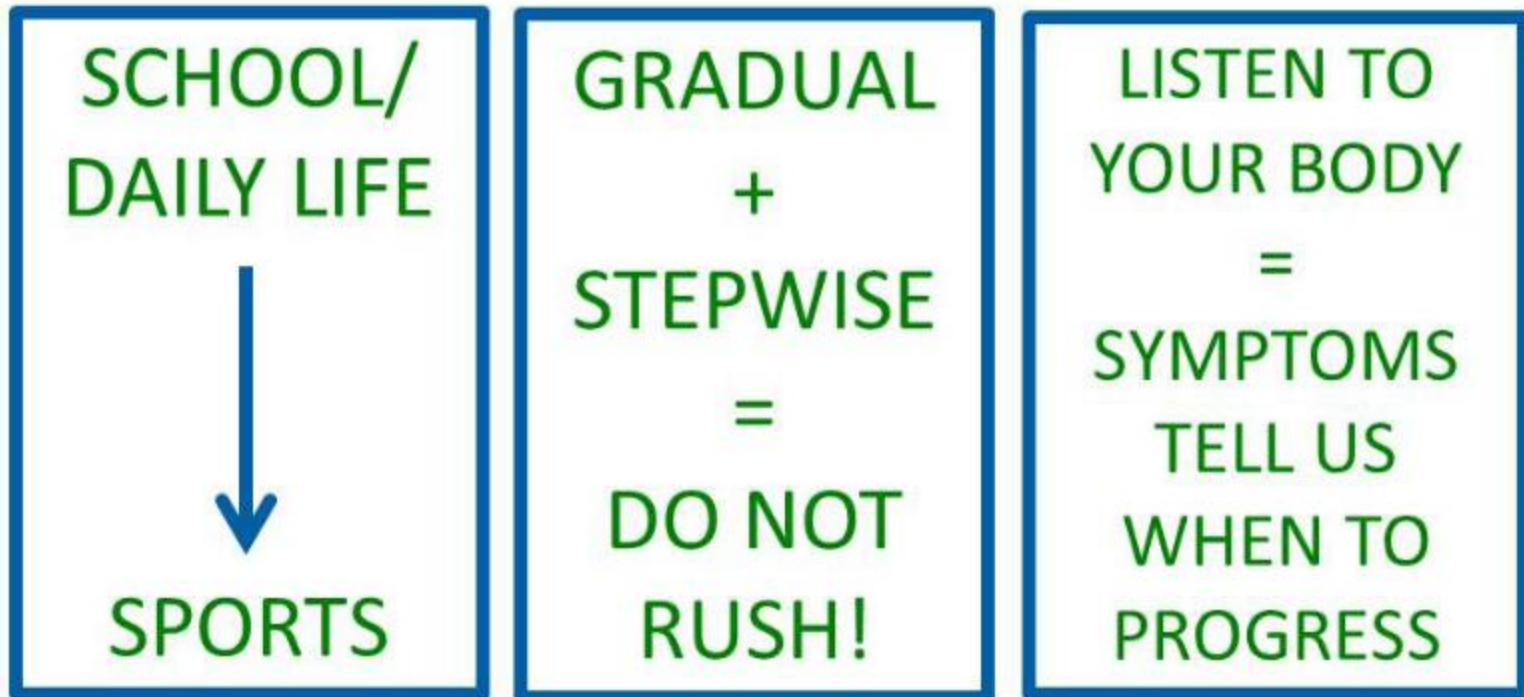
## Take home points:

- Balanced diet
- Regular meals and snacks
- Carbohydrates power the brain
- Water, water and more water!
- Consider the Canada Food Guide





# Returning to Activities



# Return to Play/Learn Guidelines

## Resources:

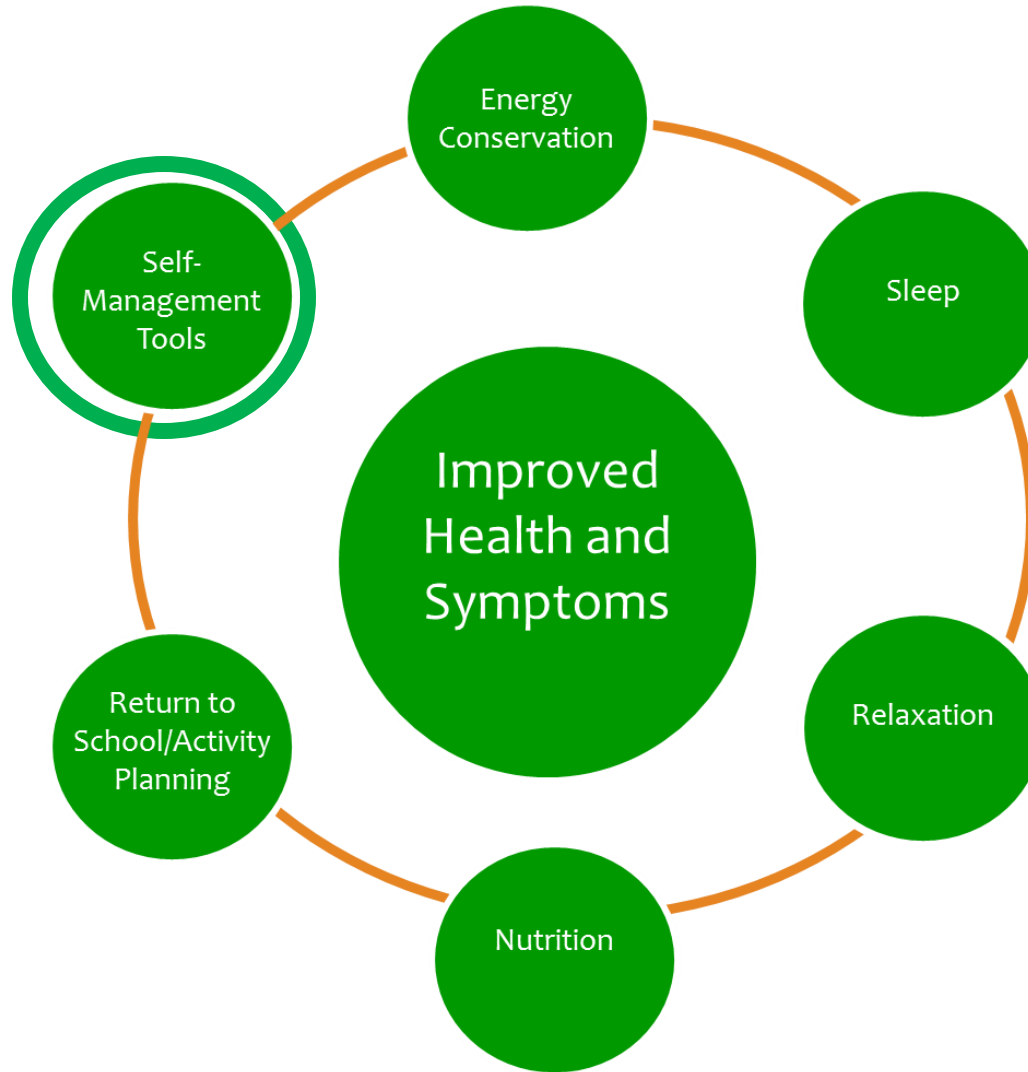
### Return to Play

- Parachute Canada  
→ [parachutecanada.org](http://parachutecanada.org)
- Montreal Children's Hospital  
→ [thechildren.com](http://thechildren.com)

### Return to Learn

- CanChild/McMaster University  
→ [canchild.ca](http://canchild.ca)
- *ONF Pediatric Concussion Guidelines*

<http://onf.org/documents/guidelines-for-pediatric-concussion>



# Self-Management Tools

Can help patients take control over their recovery

## Activity Log

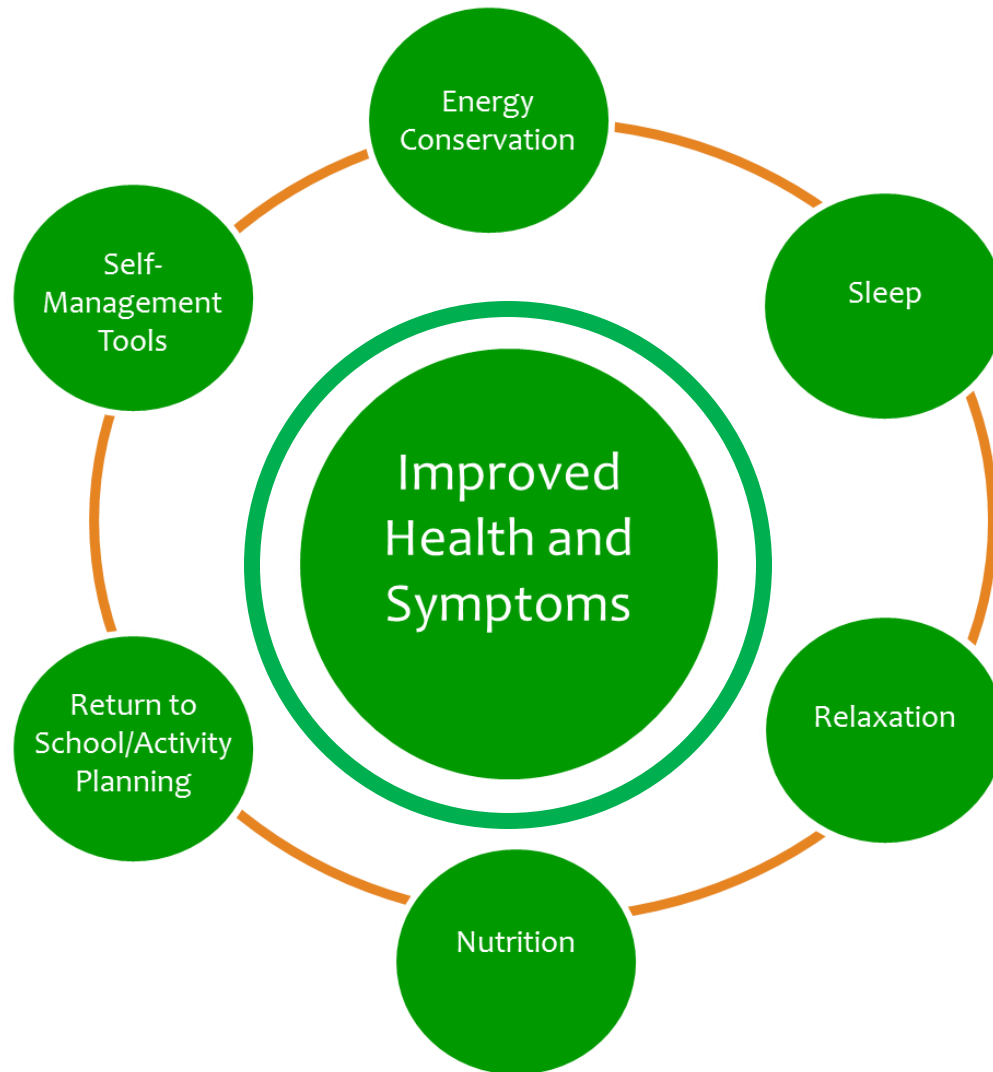
- Plan out your day (our 4 P's!) and record what you actually did
- How did your symptoms respond?

## Post-concussion Symptom Scale

- Keep track of your symptoms (daily or weekly)

## Return To Play – Physical Activity Log

- Keep track of your exercise
- Can help your doctor with return to play decision making

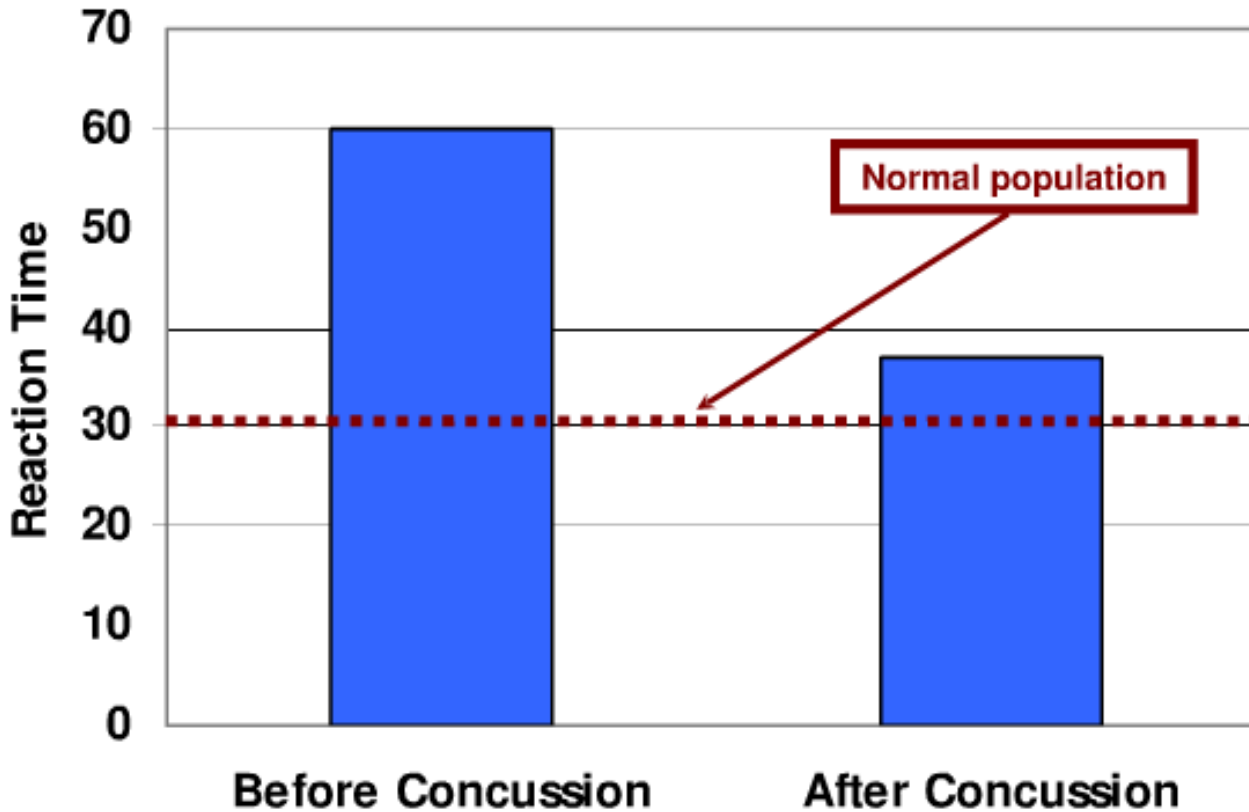


# The great debate...

- **Baseline Testing**

- A method used to assess pre-injury performance in order to compare it to post-concussion performance
- Can be used as one tool in making informed return to play/activity decisions
- Important to not return to sport/activity until performance has returned to pre-injury levels
- Helps inform brain recovery = one piece of the puzzle
- “Garbage in...garbage out”
- The baseline test is the easy part...

# Baseline Testing



# Baseline Testing

- Concussion can result in deficits in physical and cognitive performance
  - Cognition
  - Balance
  - Strength and agility
  - Emotions
- Best baseline assessment is one that considers **ALL** of these possible deficits
- The brain is complex
  - = Want someone trained in brain injury to complete and interpret pre and post injury testing



# NeuroCare Study

## Baseline → Testing

- pre + post injury testing
- ~900 youth
- Which tests are best to use in KIDS?
- How do we best manage KIDS with concussion?
- More work needed...



cognition/  
thinking



balance



strength



Neurophysiological



# Role of the coach

1. Make concussion education available and part of team orientation/training camp
  - get everyone on the same page!
2. Be aware of the signs and symptoms of concussion and recognize them in your athletes
3. Be aware of the return to play protocol and not allow players to return to team training (contact practice) without medical clearance
4. Create a safe environment where players can report symptoms to coaching/training staff
5. Contribute to concussion policy development/adherence
  - If your club has one = follow it; If your club doesn't have one = make it
  - Make this policy available; Refer to this policy often

**Diagnosing a concussion = NOT YOUR ROLE!!**

# Questions

## Contact us:

Nick Reed - **[nreed@hollandbloorview.ca](mailto:nreed@hollandbloorview.ca)**  
**@DrNickReed**

James Murphy – **[jmurphy@hollandbloorview.ca](mailto:jmurphy@hollandbloorview.ca)**

# Stop Listening... Start Doing



# Concussion Policy Development Workshop

## Agenda:

1. Outline current OSA concussion guidelines
  - OSA team actions
  - SCAT 3 walk through
2. CCES Active & Safe Self-Assessment Tool
3. Play Safe Initiative Concussion Policy Guide
4. Build toolbox to create own concussion policy



**Building Our Game.  
Uniting Ontario.**



ABOUT

GOVERNING DOCUMENTS

COMPETITIONS

PLAYER

COACH

REFEREE

CLU

## Concussions

The OSA sees itself as an integral piece of the puzzle in offering Coach Education, raising awareness to Parents, Players and Match Officials and in providing the most relevant information to its membership on concussions. Having a Concussion Protocol that includes two key parts; 1. a Sport Concussion Assessment Tool (SCAT) and 2. a Return to Play (RTP) procedure is expected of any organization offering athletes programs.

[www.ontariosoccer.net](http://www.ontariosoccer.net)

@OSA\_Tweeter

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[www.cces.ca/en/activeandsafe](http://www.cces.ca/en/activeandsafe)  
@EthicsInSPORT



## Play Safe Resources: Developing a Concussion Policy

Information for Recreation and Sport Leaders & Organizations



[www.playsafeinitiative.ca](http://www.playsafeinitiative.ca)

@\_playsafe

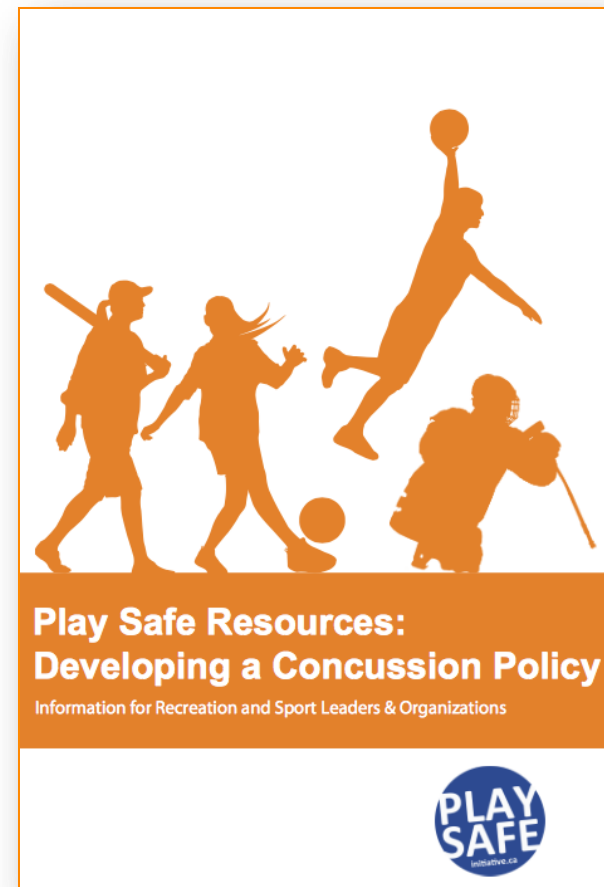
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# Concussion Policy Development Guide

- Free download
- Developed in collaboration with Canadian partners
- Based on CDC “*Get a heads up on Concussion in Sport Policies*”
- Topics include:
  - Emergency planning
  - Ensure safe play
  - Build the science
  - Focus on education
  - Manage return to play/learn



Download from: <http://www.playsafeinitiative.ca/resources.html>

# Play Safe Initiative

## Be ready for an emergency

- Create, communicate and practice an emergency medical plan. These plans often include contact information for local emergency medical responders and the location of trauma centres, if available.
- Identify appropriately trained health care professional(s) for games and practices to help assess and manage concussion and other injuries.



# Ensure Safe Play

- Be aware of emergency protocols
  - When is it an emergency?
  - Who has what role?
  - Where is closest (preferred) emergency department/hospital?
  - Are these protocols documented and made available to all that may need them?
- Does your team have the proper personnel to deal with injuries?
  - Training AND abilities AND confidence
- There is an app for that!
  - <https://itunes.apple.com/ca/app/playsafe/id550601316?ls=1&mt=8>

# Play Safe Initiative

## Ensure safe play

- Limit contact during practices and games, in particular for younger participants
- Modify rules to limit the use of certain drills or techniques to help reduce the risk of injury.
- Check equipment often. Make sure equipment fits well, is in good condition, is stored properly, and is replaced according to manufacturers' instructions

# Ensure Safe Play

- RESPECT: For self, for teammates, for opponents
- Be ready to play!
  - FIFA 11+ : <http://f-marc.com/11plus/home/>
- Change how you practice/play?
  - Sports Legacy Institute: Safer Soccer Initiative
    - <http://www.sportslegacy.org/policy/safer-soccer/>
- Equipment
  - Don't forget the soccer balls!

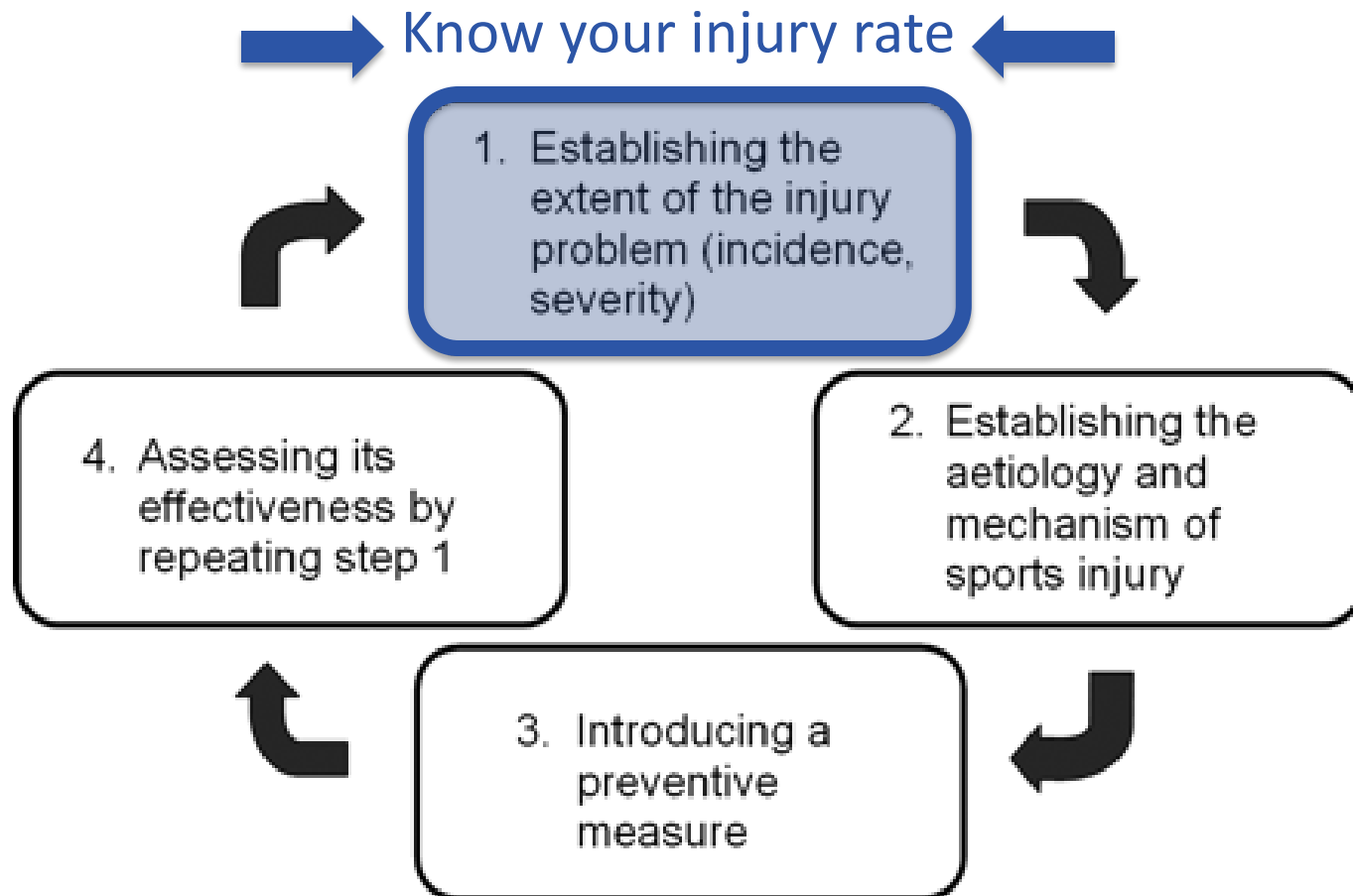
# Play Safe Initiative

## Build the science

- Collect and analyze data from the number of concussions reported by participants during the season or program.
- Study or evaluate changes in concussion knowledge, awareness and action among coaches, parents and participants before and after policies are instituted or changed.



# Concussion Prevention 101



Sequence of prevention in four steps, adapted from Van Mechelen et al.

# Introducing the Play Safe Injury Tracker™

- Yes, it's **free!**
- Built on a robust platform using cloud technology to store collected data on secure servers in Canada in **compliance** with all privacy legislation
- Data collected by an organization is owned **wholly** by the organization and cannot be accessed by any other organization
- Try the demo today:

## **Injury report form:**

[http://playsafe.fluidsurveys.com/s/\\_demo/](http://playsafe.fluidsurveys.com/s/_demo/)

## **Injury Summary Report:**

<https://playsafe.fluidsurveys.com/share/0ae9646ba23633f40a96/>





# Start tracking injuries in your organization

## Contact Play Safe Initiative:

Brandy Tanenbaum,

Program Coordinator

[brandy.tanenbaum@sunnybrook.ca](mailto:brandy.tanenbaum@sunnybrook.ca)

416.480.4846

@\_playsafe



# Play Safe Initiative

## Focus on education

- Post information for all participants in sport and recreation facilities. Posted information may include concussion signs and symptoms, as well as what to do if concussion occurs.
- Host or mandate regular education sessions and invite participants, parents, coaches, officials, leaders, school and healthcare professionals.

# Focus on Education

- Materials

- Montreal Children's Hospital

- <http://www.thechildren.com/health-info/trauma/mch-trauma-concussion-kit>

- Parachute Canada

- <http://www.parachutecanada.org/injury-topics/topic/C9>

- CanChild/McMaster University

- [http://www.canchild.ca/en/ourresearch/mild\\_traumatic\\_brain\\_injury\\_concussion\\_education.asp](http://www.canchild.ca/en/ourresearch/mild_traumatic_brain_injury_concussion_education.asp)

- Ophea

- <http://safety.ophea.net/concussion-protocols>

- Centres for Disease Control

- <http://www.cdc.gov/headsup/index.html>

- ONF Pediatric Concussion Guidelines

- <http://onf.org/documents/guidelines-for-pediatric-concussion>

# Focus on Education

- Courses/Sessions

- Online

- NCCP (free):

- <http://coach.ca/making-head-way-concussion-elearning-series-p153487>

- Concussion Awareness Training Tool (free):

- <http://ppc.cattonline.com/learning-tool>

- Parachute (cost): <https://elearning.parachutecanada.org/course/parachute-concussion-awareness-for-parents>

- In-Person

- Holland Bloorview Concussion Research Centre

- Team/club education talks – email [nreed@hollandbloorview.ca](mailto:nreed@hollandbloorview.ca)

- ‘Concussion & You’ – weekly concussion education and support session

- <http://fluidsurveys.com/s/ConcussionAndYouAtHollandBloorview/>

# Education and Support

Keep the messaging simple and sticky!

Dr. Mike Evans – Concussion videos

[https://www.youtube.com/results?search\\_query=mike+evans+concussion+videos](https://www.youtube.com/results?search_query=mike+evans+concussion+videos)

## WORD SEARCH

Find these words related to concussion

Concussion	Headache	Contact
Baseline	Relaxation	Fogginess
Sleep	Brain	Activity
Rest	Doctor	Sports
Balance	Injury	School
Nutrition	Rehabilitation	Parents
Dizziness	Research	
Fatigue	Education	

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Centre

### Concussion Tip

After a concussion it's important to pay attention to how your brain and body feels. Even after you feel better, your brain can still be healing.

I Z O H C R A E S E R I G N V  
R Q R K T S E R K H E Y O T I  
B K O A R E L A X A T I O N N  
P Z T L O O H C S W S Z O U B  
A A C T I V I T Y S F I T A K  
R H O Q M W H A U C T R L P Y  
E L D L T I U C C A I A E N M  
N T K R G B N B C T N E B X P  
T C A T N O C U I C L A T J H  
S Y G O C T D O E S D F W Q R  
C P S S S E N I G G O F I X H  
C R E H A B I L I T A T I O N  
B D I Z Z I N E S S T R O P S  
A B R A I N H E A D A C H E B  
U N P H E U G I T A F V O D T

## BRAIN MAZE

Can you find your way through the brain?

Did you know?

"Our brain is made up of different pathways. Each pathway works together at the same time and affects what we say and do."

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Centre

# Play Safe Initiative

## Manage return to play

- Provide information on the step-wise process to returning to physical activities and school learning.
- Adopt the International Concussion Consensus graduated return to play protocol and reference Ophea's Safety Guidelines to align with school process.

# Manage Return to Play

- Keep it specific to soccer!
- Montreal Children's Hospital
  - <http://www.thechildren.com/sites/default/files/return-to-soccer-following-concussion.pdf>

# Putting it all together

- Written/documented
- Available
- Distributed widely = everyone on same page!
- Identification of roles
  - What will club do?
  - What will coach do?
  - What will parent do?
  - What will player do?
- Example:
  - <http://kusc.ca/Downloads/KUSC/Governence/KUSC%20Head%20Injury%20and%20Concussion%20Policy.pdf>



# Putting it all together

- Make it official = sign a contract
  - Let all involved be a part of the solution
  - Inform them of what they need to do and have them sign off that they will do it
  - Example:
    - <http://www.cces.ca/files/pdfs/CCES-Active&Safe-Pledge-E.pdf>

# What we hope you **GOT** out of this session

1. A better understanding of concussion and concussion in soccer
2. Approaches to managing a concussion
3. What the role of the coach is in concussion management
4. A starting point towards the development of a concussion policy for your team/club
5. A whole lot of resources = build your toolbox
6. A contact if you need it...

Thank you for listening!

Have a safe and successful season

Play Hard - Play Fair - Have Fun

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