Concussions: implications of the new 2017 recommendations on your practice.

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Affiliations / Conflict of interest

* Honorarium from Janssen for conferences on concussion
* Member, Quebec task force on concussions (2014-2015)
* Chair, Canadian Concussion Collaborative (2012-)
* Chair, SEM program committee at the CFPC (2014-)
* Professor, Faculty of Medicine, Laval University
  * Massive Open Online Course (MOOC) on concussion
Learning objective:

Following this session, participants will be able to...

* Apply the **new recommendations** published in 2017 regarding concussions to his/her practice.

* Provide a medical **recommendation about returning to an activity or sport** at risk of concussion.

* **Integrate practical tools** that will facilitate concussion management in his/her practice.
Acknowledgement

This presentation was largely inspired by the work of the Canadian Concussion Collaborative on a document entitled:

The top 5 key messages from the 5th International Consensus Statement on Concussion in Sport.

(released June 6th, 2017)

http://casem-acmse.org/education/ccc/

Self-assessment: can you answer these questions?

Following a concussion:

* In your busy practice, when can advance access be used to provide timely concussion care assessment and care?
* How long should initial rest be recommended before trying to gradually resume cognitive and physical activities?
* When symptoms persist after several days, can you name 3 associated conditions you should be looking for during your assessment?
Plan

* Key messages from Berlin about...
  * Identification and baseline testing
  * Initial rest
  * Return to cognitive activity
  * Progression through recovery
  * Medical clearance
  * Persistent post-concussive symptoms
  * Be a resource for your community!

#1: Identification and baseline testing

* The CRT 5
* The SCAT5
* Computerised neuropsychological testing (CNT)
The CRT 5

* Minor reorganisation compared to previous version.
* Remains the key element to help implement a properly aware environment!

The SCAT 5

* Useful to help health care professionals assess for the possible presence of a concussion immediately after an injury:
  * Not to be used as a stand-alone method.
  * Utility appears to decrease significantly 3–5 days after injury.
* SCAT5 baseline testing is not necessary for interpreting post-injury scores.
Computerised neuropsychological testing (CNT)

* The "widespread routine use" of baseline CNT is **NOT** recommended in children and adolescents.
* CNT may be used **under qualified supervision as an adjunct** to clinical assessment in adolescents with SRC.
* When using CNT, reference to normative data should be done cautiously.
* CNT should be combined with a multimodal clinical assessment (not a stand alone method).
* Further research is required to assess the utility of CNT in SRC.


Bottom line...

* If you don’t have the resources to have a team therapist...
* DON’T use baseline tests!
My experience with CNT as an additional tool within a protocol...

- High school football program.
  - 4 teams
  - Over 4 years
  - Grade 8-12

- Main outcome:
  - Early recurrence of concussion symptoms following RTP

Results

<table>
<thead>
<tr>
<th>Decisions made by</th>
<th>Season</th>
<th>Athletes (N)</th>
<th>Games / practices (N/N)</th>
<th>Concussions (N)</th>
<th>Concussion incidence (per 1000 E x A)</th>
<th>Delayed RTP at first decision (%)</th>
<th>Early recurrence after RTP (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD only</td>
<td>2012</td>
<td>163</td>
<td>33/146</td>
<td>23</td>
<td>3.0</td>
<td>65.2 %</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>171</td>
<td>33/125</td>
<td>32</td>
<td>4.4</td>
<td>69.0 %</td>
<td>0</td>
</tr>
<tr>
<td>MD + Physio</td>
<td>2014</td>
<td>163</td>
<td>33/112</td>
<td>39</td>
<td>6.4</td>
<td>60.0 %</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td>175</td>
<td>30/121</td>
<td>25</td>
<td>3.7</td>
<td>75.0 %</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL 2012-2015</td>
<td></td>
<td>672 athletes x year</td>
<td>27741 E x A</td>
<td>119</td>
<td>4.3</td>
<td>66.7 %</td>
<td>2 of 119 (1.7%)</td>
</tr>
</tbody>
</table>

Source: Frémont et al. BJSM 2017; 51(11): http://bjsm.bmj.com/content/51/11/A42.3
Mandatory initial medical diagnosis in every case? (Personal view; Not from Berlin; Not from the CCC)

* In situations where:
  * A proper protocol is in place
  * No Red Flag is detected (re: CRT 5 or SCAT 5)
  * The presumed presence of a concussion is not challenged
* Initiate the protocol
* Plan for an assessment by a medical doctor with experience in concussion management ASAP
* Beware of the situation where a kid gets a clearance for immediate RTP after consulting for “no more symptoms”:
  * i.e.: Apply the RTL and RTP protocol anyway!

Therefore...

#2: Prolonged rest until all symptoms resolve is no longer recommended

* No evidence supporting prolonged rest until symptoms resolve.
* Some evidence that early sub-threshold activity might improve recovery.
* It can certainly reduce anxiety!
* *After an initial short rest period lasting 24-72 hours*, light cognitive and physical activity can be initiated as long as the activity does not exacerbate symptoms (sub-threshold activities).

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The notion of « sub-threshold activity ».  

Adapted from: Lisa Fisher, [http://fowlerkennedy.com/](http://fowlerkennedy.com/) and [www.sphc.london.on.ca](http://www.sphc.london.on.ca)
#3: A gradual return to cognitive activity has been detailed:

- A 4-step graduated return to cognitive activity (school) strategy has been proposed by Berlin.
- **Parallel progression:**
  - Initiation of low risk physical activity can occur prior to a complete return to cognitive activity.
- However: complete return to normal cognitive activities **without symptoms** before returning to sports (or activities at risk of concussion).

**For each step, you should identify the closest equivalent...**

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Graduated return-to-school strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage</td>
<td>Aim</td>
</tr>
<tr>
<td>1</td>
<td>Daily activities at home that do not give the child symptoms</td>
</tr>
<tr>
<td>2</td>
<td>School activities</td>
</tr>
<tr>
<td>3</td>
<td>Return to school part-time</td>
</tr>
<tr>
<td>4</td>
<td>Return to school full time</td>
</tr>
</tbody>
</table>

What is the closest equivalent in my reality?

Suggestions:

* Return-to-school (RTS) is the standard whenever available.
* If RTS not available:
  * Reading/studying?
  * Gaming?
  * Sport video analysis (with data extraction)?
* If using Impact or equivalent, select repeated symptom scale assessment after the test:
  * This could be useful from the medico-legal perspective...

#4: Progression through the recovery process should be guided by the symptom exacerbation threshold:

* Gradual return to cognitive activities and low risk individual physical activity can progress as long as they don’t increase symptoms (sub-threshold activities).
* HOWEVER, complete symptom resolution before activities at risk of concussive (ex: non-contact multi-player training drills).
* A minimum of 24 hours between each step of the return to sport protocol.
* Medical clearance increasingly important!

Not clearly stated by Berlin
Recurrent entry in the « symptom zone » will impair recovery.

The symptom exacerbation threshold should guide recovery!

Duration and intensity can increase as the threshold increases.

Danger!!! Symptom zone

Symptom exacerbation threshold

Activity

Time

Intensity

#5: Expect more legal requirements related to medical clearance in the future:

* Increasingly important requirement!
  * Berlin reiterates the need for a medical clearance before high risk activities such as hockey.
  * Possible legislation in Ontario and Manitoba
* Use a form that documents achievement of all required criteria.
* Competitive high risk sports should have timely access to a qualified SEM doctor!

Step 1: Document a normal physical and neurological evaluation and **DOCUMENT** the following criteria:

- Did all the symptoms that initially suggested the presence of a concussion completely resolve?
- Was a complete and unrestricted return to normal cognitive activity achieved without recurrence of symptoms?
- Were vigorous endurance and resistance physical activities performed without recurrence of symptoms?

Consider clearance only if the answer to these 3 basic questions is **YES**

Step 2: Consider possible **MODIFYING FACTORS**

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<tr>
<th>Temporal</th>
<th>Frequency (repeated concussions over time)</th>
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<tr>
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<td>Timing (injuries close together in time)</td>
</tr>
<tr>
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<td>‘Recency’ (recent concussion)</td>
</tr>
<tr>
<td>Threshold</td>
<td>Repeated concussions occurring with progressively less impact force</td>
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<tr>
<td></td>
<td>Slower recovery after each successive concussion</td>
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<tr>
<td>Comorbidities</td>
<td>Migraine</td>
</tr>
<tr>
<td></td>
<td>Depression or other mental health disorders</td>
</tr>
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<td>ADD / ADHD or Learning disabilities</td>
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<td>Sleep disorders</td>
</tr>
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<td>Sport and behaviour</td>
<td>High-risk activity (combat sport)</td>
</tr>
<tr>
<td></td>
<td>Dangerous style of play</td>
</tr>
<tr>
<td>Medication:</td>
<td>Psychoactive drugs, anticoagulants</td>
</tr>
<tr>
<td>Age:</td>
<td>Child and adolescent (&lt;18 years old)</td>
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Did shared decision with the team physiotherapist affect safety?

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#6: Persistent post-concussive symptoms should be reassessed to identify associated conditions:

* The value of symptoms to track recovery
* The definition of “persistent post-concussive symptoms”
* What should you be looking for?
The strongest and most consistent predictor of slower recovery from concussion is symptom severity in the initial few days after injury.

* The symptom checklist demonstrates clinical utility in tracking recovery.


Document the evolution of symptoms

SUGGESTION: use the SCAT5 « Symptom Evaluation » section to document MAXIMAL and CURRENT symptoms. Calculate symptom number and score.

http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf
The faces of concussion

The concussion with a favourable evolution:
7-10 days in 80-90% of cases

The concussion with a less favourable evolution:
Little or no improvement after 7-10 days

Post-concussion syndrome:
Persistent symptoms after several weeks; often complicated by anxiety-depressive problems

CTE
Potentially related neuro-degenerative disorder occurring several years after repeated exposure to TBI.

The first 7-10 days will tell you a lot!

The Berlin definition of “persistent post-concussive symptoms”

* Based on the evolution of most concussions, the notion of “persistent concussion symptoms” has been re-defined as:
  * greater than 2 weeks for adults
  * greater than 4 weeks for children
* When symptoms persist beyond this expected timeframe, medical re-evaluation should be obtained to develop an individualised treatment plan.

Berlin identified minimal evidence to assess for the following problems in the presence of persistent symptoms:

* mood problems,
* cervical spine problems,
* autonomic system dysfunction,
* vestibular dysfunction.

In high level sport, this should be an ongoing process starting in the acute phase.


What should you be looking for?

* Use SYMPTOM SCALE to assess recovery
* Normal physical and neurological status
  * In the presence abnormal findings consider investigation
* Verify compliance with protocol and SYMPTOM EXACERBATION THRESHOLD principle
  * THE most common factor contributing to persistent symptoms in my experience
What should you be looking for? (continued)

* Anxious or depressive signs or symptoms?
  * Early anxious components are often present
  * Simple education can go a long way!
* Cervical spine problem
  * Cervicogenic headache
  * Other cervical symptoms
* Autonomic dysfunction
  * Exercise intolerance?
* Oculo-vestibular problems...

Oculo-vestibular screening

* Look for potential oculo-vestibular cluster of symptoms:
  * Typical increase of symptoms in 3D visual analysis (ex: driving, riding a bike)
* Signs:
  * You can integrate some simple screening tests in your assessment.
Examples of oculo-vestibular screening tests with good sensitivity

* **Saccade test:**
  * Doctor generates sudden movement.
  * Positive if a correction saccade is present.

* **Active horizontal oculo-vestibular test:**
  * Active R and L rotations (20-30°) fixing a static target about 1 meter away.
  * Positive if symptoms increase.

One key study about cervical and vestibular rehabilitation following concussions.

BJSM

Cervicovestibular rehabilitation in sport-related concussion: a randomised controlled trial
Kathryn J Schneider, Willem H Meeuwisse, Alberto Nettel-Aguirre, Karen Banov, Lara Boyd, Jian Kang and Carolyn A Emery

« Intention to treat »:
3/16 (18%)
3.91x plus de RAJ (IC95% 1.34 to 11.34)

11/15 73%
1/14 7%

Figure 1 Proportion of patients medically cleared over time.

Schneider et coll. BJSM 2014; 48 (17): 1294-8

About individualised multidisciplinary concussion management...

* Athletic therapy
* Chiropractic
* Kinesiology
* Neuropsychology
* Occupational therapy
* Physiotherapy
* Psychology
* Sport medicine

Adapted from Collinset al. 2014
#7 Be a resource for your community


Also endorsed by the CMA

Key message from the joint statement...

* « ...key aspects of concussion prevention, detection and management occur prior to as well as after the initial medical intervention. »

* « **Family physicians can contribute** ... by working in conjunction with families, schools, sports organizations, employers and governments to educate, support and empower the implementation of proper concussion prevention, detection and management protocols. »

### In summary

<table>
<thead>
<tr>
<th>Remove – Maintain - Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial rest (up to 72 hours)</td>
</tr>
<tr>
<td>Return to light cognitive and physical activities at home</td>
</tr>
</tbody>
</table>

- **Limited period of initial rest**
- **Parallel progression of sub-threshold cognitive and physical activity**
- **Not specifically defined by Berlin...**
- **Increasing legal requirements related to medical clearance: DOCUMENT your decisions**

<table>
<thead>
<tr>
<th>Gradual return to cognitive activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light sub-threshold exercise</td>
</tr>
<tr>
<td>Gradual increase of low risk sub-threshold physical activity</td>
</tr>
<tr>
<td>Moderate intensity physical activity with introduction of low risk sport-specific technical exercises</td>
</tr>
</tbody>
</table>

- **No symptom beyond that point!!!**

<table>
<thead>
<tr>
<th>High intensity endurance and resistance exercises including multi-player sport-specific technical exercises WITHOUT CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical clearance before return to unrestricted training</td>
</tr>
<tr>
<td>Unrestricted training at least 24h prior to RTP</td>
</tr>
<tr>
<td>RTP if no symptom following unrestricted training</td>
</tr>
</tbody>
</table>

### Last comment...

The knowledge and skills necessary for concussion assessment and management are 100% achievable by the family physician.
Thank you!!!

Pierre.fremont@fmed.ulaval.ca