An Overview of **Concussion** for Primary Healthcare Professionals

PART 2: The management and education of patients with concussion

He Kaupare. He Manaaki. He Whakaora.
prevention. care. recovery.

bpac nz
better medicine

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Overview: Most patients with concussion can be managed in primary care without referral

1 Make a clinical diagnosis of concussion

- ✓ Plausible brain injury mechanism documented
- ✓ Symptoms and signs consistent with altered brain functioning
- ✓ Symptom severity assessed using a scoring criteria
- ✗ Exclude more serious injury that requires emergency department referral

This process can be supported by using **BIST**

2 Deliver recovery advice and reassurance

Recommend

Mental and physical rest
(24 – 48 hours)

- ✓ In a quiet environment
- ✗ No reading, screen time (e.g. computer, phones, TV) or strenuous activities

Progressive re-engagement

Initial stages → Increase activity as tolerated

- ✓ Low-intensity aerobic activities (e.g. walking, light jogging)
- ✓ Light mental stimulation (e.g. listening to music or reading
- ✓ Gradually resume normal daily activities

If re-engagement exacerbates symptoms, the activity intensity should be temporarily reduced to a more tolerable level

Consider

Managing headache or other pain

- ✓ Prescribe paracetamol if required for short-term relief
- ✗ Avoid NSAIDs and aspirin within first 48 hours, as well as opioids or other sedatives

Managing sleep disturbances: prioritise behavioural and environmental changes over pharmacological interventions

Other self-care techniques

- ✓ Remain hydrated
- ✓ Use an ice/cool pack intermittently, if required
- ✗ Avoid alcohol or recreational drugs, if applicable

3 Schedule follow-up

(7 – 10 days later)

- Repeat symptom scoring and consider further assessments
- Check for any emerging red flags
- Reinforce appropriate recovery advice
- Schedule additional follow-up appointments as needed
- Consider need for referral to ACC Concussion Services

ACC, Accident Compensation Corporation; BIST, Brain Injury Screening Tool; NSAID, non-steroidal anti-inflammatory drug.

1. Ontario Neurotrauma Foundation. Guideline for concussion/mild traumatic brain injury & prolonged symptoms. 3rd edition, for adults over 18 years of age. 2018. Available from: https://braininjuryguidelines.org/concussion/ (Accessed Feb, 2022).

The current approach to concussion management: *"Rest to re-engagement"*

Concussion

Disrupted neurometabolic state

Factors promoting recovery

- **BDNF** (protein that promotes neuronal recovery; production is exercise-dependent)
- **Increased cerebral blood flow** (increases energy available for recovery; naturally recovers with exercise after initial rest)

Factors impairing recovery

- **Lack of initial rest**
- **Initial activity re-engagement too intense**
- **Additional brain injury events**

Recovery

Normal neurometabolic state

Recommend

An initial 24 – 48 hours of rest

- In a quiet environment
- No reading, screen time (e.g. computer, phones, TV) or strenuous activities

Progressive re-engagement

- Start with low-intensity aerobic activities (e.g. walking, light jogging, chores or gardening) and light mental stimulation (e.g. listening to music or reading)
- Increase activity as tolerated
- Gradually resume normal daily activities (see subsequent slides for further information)

If re-engagement exacerbates symptoms, the **activity intensity or duration should be temporarily reduced** to a more tolerable level

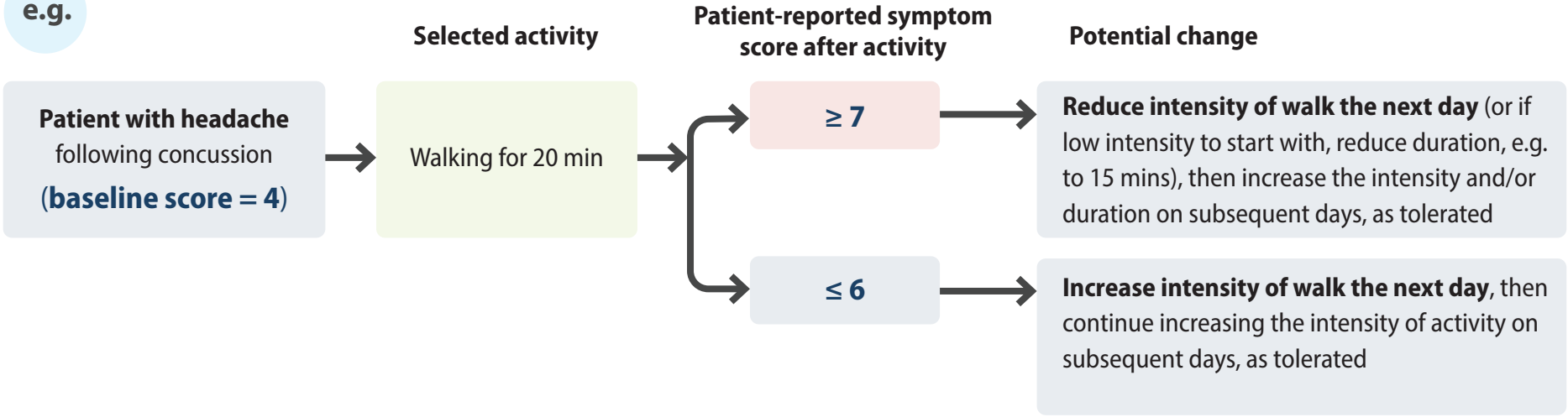
BDNF, brain-derived neurotrophic factor.

1. Ontario Neurotrauma Foundation. Guideline for concussion/mild traumatic brain injury & prolonged symptoms. 3rd edition, for adults over 18 years of age. 2018. Available from: https://braininjuryguidelines.org/concussion/ (Accessed Feb, 2022);
2. Gustafsson D, Klang A, Thams S, et al. Int J Mol Sci. 2021;22:3582

Expert opinion: consider applying the "**+3 rule**" to guide activity re-engagement

- For any given activity, get the patient to rate their baseline symptom score on a 0 – 10 scale
- If the activity:
  - **Worsens their reported symptom score by three or more:** advise that the patient temporarily reduces the intensity or duration of engagement to a more tolerable level
  - **Worsens their reported symptom score by less than three (or it remains the same or improves):** advise that the patient increases the intensity or duration of engagement on subsequent days

e.g.



Other management factors to consider

Patient education and reassurance is key; actively involving patients in the recovery planning process reduces their risk of experiencing a prolonged recovery

A "*one-size-fits-all*" approach does not work

While the overall principles of concussion management apply, it is important to tailor education and treatment to the individual, their level of health literacy and any relevant cultural factors

e.g.

- For **Māori**, consider the Whānau Ora model, i.e. addressing individual needs in the context of their whānau
- ACC now funds **Rongoā Māori** (this term encompasses a range of techniques related to the traditional Māori approach to care and healing). For further information, see: https://www.acc.co.nz/im-injured/what-we-cover/using-rongoaa-maaori-services/

Advise patients to not drive until cleared by a heath professional

If transport assistance is required, contact a local Brain Injury New Zealand branch to discuss support options, or a disability allowance may be available through ACC

For further information on head injuries and driving, see: https://www.nzta.govt.nz/assets/resources/factsheets/36/docs/36-head-injuries.pdf

Recommend that patients avoid alcohol and recreational drugs, if applicable

ACC, Accident Compensation Corporation.

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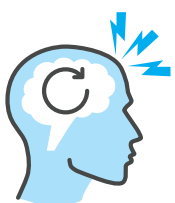
Managing specific symptoms

Headache

Use **simple analgesia**, e.g. paracetamol, along with rest and adequate hydration

Avoid: NSAIDs and aspirin within 48-hours, as well as opioids, alcohol and other sedatives



Ongoing headache?

- Reconsider structural causes, e.g. cervical spine-related, or differential diagnoses, e.g. mood-related
- Consider need for referral
- Consider TCA use (see expert advice box)

Sleep disturbances

Prioritise behavioural and environmental changes before considering pharmacological options (see below)

- **Brief naps** (< 40 minutes) **are acceptable** during the day

Avoid: hypnotics and sedatives

There are anecdotal reports of **melatonin** being effective for managing sleep disturbances (however, clinical trial evidence in the context of concussion recovery is limited)

Expert opinion – TCAs should not be used routinely in patients with concussion, however, selected patients with persistent concussion-related headache or sleep disturbance may find them beneficial (unapproved indication)

Low dose,
e.g. Amitriptyline
10 – 20 mg daily*

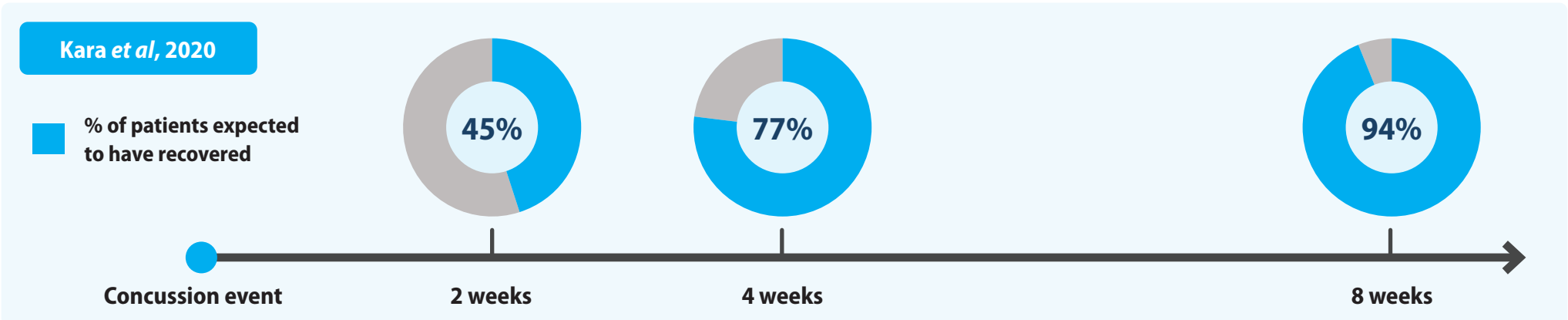
Short-term only
Have an **"exit-strategy"** from the beginning

* Lower doses, e.g. 5 mg daily, can be considered (i.e. by halving the 10 mg tablets) for patients who experience sedation or other adverse effects with 10 mg daily doses.

NSAIDs, non-steroidal anti-inflammatory drugs; TCA, tricyclic antidepressants.

1. Ontario Neurotrauma Foundation. Guideline for concussion/mild traumatic brain injury & prolonged symptoms. 3rd edition, for adults over 18 years of age. 2018. Available from: https://braininjuryguidelines.org/concussion/ (Accessed Feb, 2022);
2. The Australian Institute of Sport, Australian Medical Association, Australasian College of Sport and Exercise Physicians and Sports Medicine Australia. Concussion in Sport Australia. Position Statement. 2019. Available from: https://www.concussioninsport.gov.au/__data/assets/pdf_file/0005/683501/February_2019_-_Concussion_Position_Statement_AC.pdf (Accessed Feb, 2022).

Full recovery may take longer than two weeks



Expert opinion

Clinical recovery = Minimal symptoms that not worsen with "normal activity" + Resolution of any abnormal findings on clinical examination + Exercise tolerance (exercise to 85% max HR which is 220 minus age) with no symptoms + Return to pre–injury "activities"

Risk factors for a prolonged recovery:

- Pre-existing **mental health conditions***
- Being **female**
- **Previous concussions***
- Greater initial **symptom burden***
- Presence of **migraine-like symptoms** or a **history of migraines or chronic headaches**

Other potential risk factors:

- Predominance of vestibular symptoms
- Younger and older age groups (e.g. < 18 years and > 65 years)
- People with alcohol and substance misuse issues

* Strong predictor of prolonged recovery.

HR, heart rate

1. Kara S, Crosswell H, Forch K, et al. Clin J Sport Med. 2020;30:96–101
2. Silverberg ND, Gardner AJ, Brubacher JR, et al. J Neurotrauma. 2015;32:517–26.

Returning to "normal" activities: work and education

Work

- Consider the following factors:
  - **Gradual work re-entry** – e.g. flexible hours or reduced hours; building back up to fulltime work, as tolerated
  - **Job placement** – tasks should be matched to the person's ability and tolerance post-injury; computer-based work may initially need to be limited
  - **Ensure the workspace is appropriate for recovery** – e.g. quiet, supportive and supervised
  - **Driving/transportation requirements** to and from work
- Complete ACC45 claim-associated medicated certificate (for the first 24 – 48 hours when they are fully unfit, up to 14 days, as needed) and ACC18/eACC18 form as required (if they are only fit for selected work, or if continued limitations are required beyond 14 days)

Education

1. **Perform regular daily home-based activities** (i.e. not school-related) if they do not aggravate symptoms
2. **Begin to incorporate school-related activities**, e.g. homework or other cognitive tasks, while remaining at home
3. **Gradually return to school**, guided by symptoms; partial days with lighter subjects or additional break times may be needed initially
4. **Full return to school** activities when tolerated

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2. Ontario Neurotrauma Foundation. PedsConcussion. Living guideline for paediatric concussion care. 2021. Available from: https://pedsconcussion.com/ (Accessed Feb, 2022).

Returning to "normal" activities: sport

People who sustain a sports-related concussion should **immediately be removed from play** and advised to complete 24 – 48 hours rest

Complete return to sport should not occur until there is **clinical recovery** and **return to work or education** (if applicable)

- Individual sporting authorities differ in timeframes and criteria for a graduated return to sport (see below)
- **Most advise avoidance of contact sport for at least 2 – 3 weeks**

Generalised graduated return to play protocol:

- **Stage 1:** players should initially undertake 24 – 48 hours of physical and mental rest
- **Stages 2 – 4:** during the 2 – 13 days post-injury, players can progressively re-engage in normal daily activities, increase their tolerance for physical and mental activities, before returning to work/study and types of sport-specific training that do not risk head impact. The progression through these stages and the intensity of re-engagement should be guided by symptoms.
- **Stage 5:** after at least 14 days, players can re-engage in full contact-based sport specific training if they are asymptomatic. Players must have fully returned to school or work before returning to contact-based training.
- **Stage 6:** a minimum of 21 days should have elapsed before players can return to full competition, they should be symptom free during sports training and they should have received medical clearance from a qualified medical practitioner (strongly recommended)

N.B. Guidance updated based on 2023 ACC sports concussion guidelines (https://www.acc.co.nz/preventing-injury/sport-recreation/concussion-in-sport/)

For examples of **sport-specific return to play guidance**, see:

Rugby – https://www.nzrugby.co.nz/about-nzr/policies-regulations-and-rules/safety-and-welfare/concussion/recover-and-return/

N.B. New Zealand Rugby has a mandatory stand-down period of 23 days for people aged 18 years and under, and 21 days for people aged over 18 years. This includes a 14-day stand-down period before returning to moderate-to-high intensity exercise, regardless of the patient's age.

Netball – https://netballsmart.co.nz/images/netball-smart/pdf/NetballSmart_Concussion_Community.pdf

Soccer/Football – https://fit4football.co.nz/wp-content/uploads/2021/04/NZF-Concussion-Policy-Updated.pdf

Mountain Biking/Cycling NZ – https://cyclingnewzealand.cb.baa.nz/assets/Website-Files/Homepage/Mountain-Bike/About-MTB/1715-MTBNZ-Concussion-Awareness-Policy.pdf

1. Accident Compensation Coporation (ACC). ACC SportSmart. Sport concussion in New Zealand national guidelines. 2016. Available from: https://www.accsportsmart.co.nz/assets/assets-final/resources-final/3152df545a/acc7555-accsportsmart-concussion-national-guidelines.pdf (Accessed Feb, 2022);
2. The Australian Institute of Sport, Australian Medical Association, Australasian College of Sport and Exercise Physicians and Sports Medicine Australia. Concussion in Sport Australia. Position Statement. 2019. Available from: https://www.concussioninsport.gov.au/__data/assets/pdf_file/0005/683501/February_2019_-_Concussion_Position_Statement_AC.pdf (Accessed Feb, 2022).

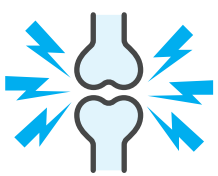
The risks of not following concussion recovery advice

Short-mid-term

Another concussion or more severe TBI

Prolonged recovery

Second impact syndrome
Brain swells rapidly shortly after a person suffers a second concussion; rare, but often fatal if it occurs



Subsequent injuries elsewhere on the body

Long-term

Cognitive or neuropsychological deficits that persist in later life

There is currently insufficient evidence to define a causal relationship between multiple concussions and CTE

- **CTE involves a specific pattern of neurodegenerative changes** that has been noted in the brains of some people with a history of repeated head trauma; **it can only be definitively diagnosed with a brain autopsy** (i.e. there is no clinical criteria for confirming its presence in a living patient)
- CTE is predicted to be **extremely rare in clinical practice**
- **Investigation into CTE and its causes is ongoing**; if there is a causative association with repeat concussions, researchers still need to quantify its relative contribution in the context of other potential modifiable risk factors, e.g. alcohol intake

TBI, traumatic brain injury; CTE, Chronic traumatic encephalopathy.

1. Ontario Neurotrauma Foundation. Guideline for concussion/mild traumatic brain injury & prolonged symptoms. 3rd edition, for adults over 18 years of age. 2018. Available from: https://braininjuryguidelines.org/concussion/ (Accessed Feb, 2022);
2. The TBI/CTE group, McKee AC, Cairns NJ, et al. Acta Neuropathol 2016;131:75–86.

Follow-up and persistent concussion symptoms

A **follow-up appointment** should be scheduled **7 – 14 days after the initial consultation**

This provides an opportunity to:

- **Repeat symptom scoring** and consider further assessments
- Check for any emerging **red flags**
- Reinforce appropriate **recovery advice**
- **Schedule additional follow-up** appointments as needed
- Consider need for **referral** to ACC Concussion Services

Persistent concussion symptoms

(lasting > 3 months) occur in a small proportion of patients

- **Discuss social support and potential stressors**
- Reconsider **differential diagnoses**
- Assess **current medicine use, alcohol** or **recreational drug** use

Do not use the term "post-concussion syndrome" – it is not longer considered to be a valid diagnosis

Referral to ACC Concussion Services

- **Most patients can be manged in primary care**, however, some patients may benefit from tailored interdisciplinary management
- Assuming the patient presents early in primary care, referral is generally not recommended at the first assessment as **symptoms often take more than 7 – 14 days to resolve**
- **Consider referral if:**
  - Symptoms have not improved at follow-up appointments and are impacting on the person's ability to do everyday activities e.g. impacting return to school or work
  - More than 14 days has passed since the injury when the patient first presents to primary care and symptoms have not improved

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