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

**PART 2:** The management and education of patients with concussion
Overview: Most patients with concussion can be managed in primary care without referral

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

Deliver recovery advice and reassurance

Progressive re-engagement
- Initial stages
  - Low-intensity aerobic activities (e.g., walking, light jogging)
  - Light mental stimulation (e.g., listening to music or reading)
- Increase activity as tolerated
  - 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

Schedule follow-up
- 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.

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.

**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.**

Patient with headache following concussion *(baseline score = 4)*

Selected activity: Walking for 20 min

Patient-reported symptom score after activity:
- ≥ 7
  - Reduce intensity of walk the next day (or if low intensity to start with, reduce duration, e.g. to 15 mins), then increase the intensity and/or duration on subsequent days, as tolerated
- ≤ 6
  - Increase intensity of walk the next day, then continue increasing the intensity of activity on subsequent days, as tolerated
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

- 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-maori-services/

**Advise patients to not drive until cleared by a health 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.

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)

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.

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)
Full recovery may take longer than two weeks

**Kara et al, 2020**

% of patients expected to have recovered

- Concussion event
  - 45%
- 2 weeks
  - 77%
- 4 weeks
  - 94%
- 8 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

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* Strong predictor of prolonged recovery.

HR, heart rate

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

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:

1. Start with low-intensity non-specific aerobic exercises (do not progress to next stage until symptom-free).
2. Progress to basic non-contact sport-specific exercises (do not progress to next stage for at least 24 hours).
3. Progress to more complex non-contact sport-specific exercises that have increased co-ordination and cognitive requirements – resistance training may also be added (do not progress to next stage for at least 24 hours).
5. Return to full contact training (if cleared) to restore confidence and assessment of functional skills by coaching staff (do not progress to next stage for at least 24 hours).
6. Return to sport.

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

- 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.

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

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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.
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

Referral to ACC Concussion Services

- Most patients can be managed 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

Do not use the term “post-concussion syndrome” – it is no longer considered to be a valid diagnosis