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# Concussion

This article covers the symptoms of concussion and the key roles that GPs play in early management. It discusses factors that affect recovery and the advice GPs should give to patients to help prevent escalation of symptoms and to promote earlier recovery. Finally, it describes the ACC funded Concussion Service, including when and how to refer, and what to expect once a referral is made

Concussion, otherwise known as mild traumatic brain injury (mTBI), occurs when a person sustains a blow to the head, a violent shaking of the head or a sudden marked deceleration of the head. A bump, blow or shake to the head causes the brain to shake inside the skull, which can cause damage such as diffuse axonal injury or micro-bleeds. Concussions can also be caused by sudden blasts to the head, such as with explosions (Figure 1).

Concussion injury results in a rapid onset of short-lived neurological impairment that usually resolves spontaneously. Conventional neuroimaging techniques rarely show any detectable injury suggesting neuronal dysfunction rather than cell death. This neuronal dysfunction is a consequence of a complex biochemical and neurochemical cascade, which is triggered by the traumatic insult.<sup>1</sup>

Concussions can be sustained in a wide variety of contexts, such as sports, motor vehicle accidents, cycle accidents, work accidents, falls onto hard surfaces or from a height (eg, off a roof or a horse), assaults and domestic violence. ACC data identifying the mechanisms for concussions sustained in Aotearoa New Zealand can be seen in Figure 1.

In recent years, there has been a rise in awareness, prevention and intervention regarding concussion in sport. However, although sports such as rugby, soccer, horse riding and cycling are major contributors to concussions in New Zealand, the majority of concussions are not sport related.

Concussion is a common problem that GPs can expect to see relatively regularly. A New Zealand study from 2013 found the incidence of mTBI per 100,000 person-years was

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749 cases, indicating a full-time GP serving 1400 people might have 10 patients sustain a concussion each year (not all will attend the GP following their concussion).<sup>2</sup>

TBIs are sustained by boys and young men almost twice as often as girls and young women, though ACC data reveal that from the age of 40 onwards, the number of TBIs in women slightly outnumbers those sustained by men.

Children (aged 0–14 years) and adolescents and young adults (aged 15–34 years) constitute almost 70 per cent of all TBI cases (mild, moderate and severe TBIs). This is also backed up by the recent ACC data set of all brain injuries sustained over the last 10 years, where 46 per cent of TBIs were sustained by people under the age of 20.

Young children are more likely to experience an mTBI than any other age group.<sup>3</sup> However, because they lack the language to describe how they feel, they rely on an adult to identify and report their symptoms.<sup>4</sup> Adults tend to report what they can see, such as vomiting or loss of consciousness, but this may not reflect the full extent of their child's symptoms. Moreover, young children may show different symptoms to adults, such as grissiness or clinginess.<sup>5</sup> When cognitive or behavioural problems do emerge, they are often misattributed to poor parenting or pre-morbid ability.

A careful approach needs to be taken when evaluating the severity of TBI in young children. Failure to do so may result in misidentification and subsequent lack of management. Further, early assessment and monitoring is essential to ensure that young children are provided appropriate and early input to support them to meet their potential.

## Do you need to read this article?

### Try this quiz

1. All concussions resolve within three months of the injury. **True/False**
2. Females are at greater risk of prolonged recovery from concussion. **True/False**
3. Problems with dizziness after concussion are rare. **True/False**
4. Teenagers with concussion recover quicker than adults. **True/False**
5. GPs can refer to ACC funded Concussion Services up to 12 months following the injury. **True/False**

Answers on page 49



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# GPs' key roles in reducing inequality and in early management of concussion

Compared with people of European origin, Māori people have a greater risk of mTBI (relative risk 1.23). In addition, Māori are at three to four times greater risk than Europeans of sustaining a brain injury due to an assault.<sup>2</sup> Consequently, we would expect to see a higher percentage of claims in the Māori population than the European population. However, recent concussion data provided by ACC showed the percentage of claims made by ethnicity were as follows:

- 16 per cent Māori (Māori make up 17 per cent of the total New Zealand population)
- 6 per cent Pacific (Pacific peoples make up 9 per cent of the total New Zealand population)
- 66 per cent European (New Zealand Europeans make up 70 per cent of the total New Zealand population).

Thus, the number of claims for concussion is fairly consistent with the percentage of the population for each of the three ethnic groups. This implies that not all Māori and Pacific patients may be presenting to services and registering a claim when they sustain a concussion.

It is widely known and researched that Māori and Pacific peoples, for a variety of reasons, do not access medical services as frequently as New Zealand Europeans. According to WHO, "in both poor and industrialised countries in which they live, the health status of indigenous peoples is invariably lower than that of the overall population".<sup>6</sup>

Barriers to Māori access to healthcare have been described as the cost of health services, lack of transportation, and health service characteristics. Interventions that address financial and logistical barriers have been found to be effective at increasing access to healthcare.<sup>7</sup>

The ACC funded Concussion Service is an interdisciplinary service consisting of triage, assessments and therapy to support ACC clients to recover from mild to moderate TBIs and return to everyday life. It also aims to prevent long-term consequences by identifying clients at risk of persisting symptoms and providing them with effective interventions and education.

GPs can facilitate access to the ACC funded Concussion Service for patients of all ethnicities by having a good knowledge and understanding of the service and how to access it (more detail is provided later in this article). The transport and cost barriers to accessing Concussion Services are issues that can be overcome, with providers able to travel to the person and their whānau and provide the service at no cost to the patient.

Providers of ACC funded Concussion Services have an obligation to ensure their rehabilitation approaches are cognisant of the needs of Māori as clients and whānau. Service providers often have Māori cultural advisors as part of their team.



## Overcoming transport and cost barriers to reduce inequality:

- Concussion Services teams can travel to the patient
- Concussion Services are fully funded by ACC

## Key roles in early management

Most concussions resolve within a number of weeks; however, the first few days and weeks can be unpleasant and distressing for the patient. On average, it takes 18.3 days for a patient to present to the primary healthcare provider after their injury. Therefore, patients whose symptoms resolve in the first week or two of injury may never present to their doctor.

Nonetheless, one New Zealand study showed nearly half of participants who sustained a concussion (47.9 per cent) reported experiencing four or more post-concussion symptoms one year after injury.<sup>8</sup>

GPs can influence the recovery trajectory depending on how they respond in the early stages. For example, a wait-and-see approach to observe how symptoms evolve may be reassuring for some patients, but anxiety provoking and invalidating for others.

GPs provide diagnosis, clarification and education around the concussion. They are also responsible for signing patients off work, school and/or sport for an appropriate period of time. GPs can treat patients in the community, including addressing headache, sleep and mood problems, if they feel the symptoms are resolving in the appropriate time frame (one to two weeks).

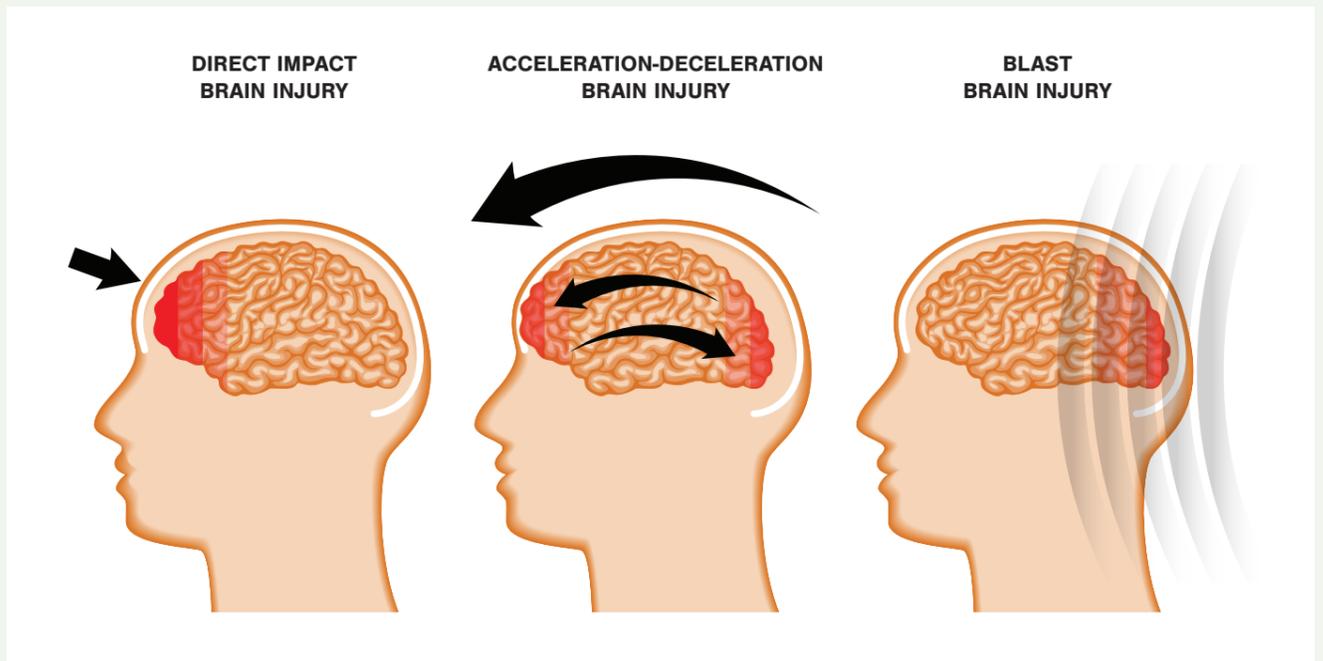


Figure 1. Types of traumatic brain injury



Figure 2. Mechanisms of mTBI in New Zealand

GPs can also refer on to Concussion Services for further investigation of the nature and severity of the injury. Early referral to Concussion Services is generally recommended if symptoms are not resolving in the fortnight following the injury, or if there are indications the injury may have been complicated or more severe (eg, involving a bleed or skull fracture).

A good relationship between the patient and GP, and the GP and treating Concussion Service can assist the process of rehabilitation, allowing it to flow smoothly.

## Common symptoms of concussion

To diagnose concussion, a thorough clinical interview is advised. The Sport Concussion Assessment Tool 5 (SCAT5) is a standardised tool for evaluating concussions designed for use by physicians and licensed healthcare professionals. It also outlines red flags that may indicate a more severe injury. A neurological examination may also assist in this process.

The symptoms of concussion can be subtle and may not appear for a few days following the injury. They may be missed initially but then become more apparent when the person resumes their normal pre-injury activities, such as work, sports or schoolwork. Those affected may act or seem slightly different to people who know them well, and it may be a family member or colleague who comments on changes in function.

The most common sequelae of an mTBI are:

- headaches
- feeling tired and low in energy a lot of the time
- difficulty concentrating, remembering or making decisions
- light-headedness, dizziness or change in balance
- nausea
- blurred vision and other oculomotor dysfunctions, such as deficient accommodation
- mood changes, irritability and restlessness
- changes in hearing, including sensitivity to noise (hyperacusis) and tinnitus
- increased sensitivity to light
- changes in sleep patterns.

The most common symptom following an mTBI is fatigue or an overwhelming sense of mental tiredness. It is important to note that this may be a different sense of fatigue than the one felt after exercising, for example. TBI-related fatigue is a mental tiredness – a drained, slowed sensation.

This is believed to be due to the extra resources required by the recovery process, forcing the brain to "work harder" on everyday tasks that were relatively effortless prior to the injury. This can have carry-over effects that worsen memory, mood, coordination, headaches and concentration.

## Symptoms to watch out for

The presence of any of the following symptoms indicates the need to refer, as specialist intervention is the best way to resolve these:

**Vestibular dysfunction** can result from the trauma to the brain caused by a concussion, meaning the brain can receive abnormal signals regarding the position and movement of the head in space.

When vestibular information is inaccurate, the brain most often relies on visual input to stabilise the head on the body. Relying on vision alone as the primary source of balance often leads to fatigue and difficulty performing routine daily activities. It can also result in eye strain, tension headaches and dizziness.

Dizziness encourages a person to refrain from moving the head and can lead to neck stiffness, headaches and nausea. Presence of a whiplash associated with the concussion can further complicate the diagnosis, and all of these symptoms can limit the ability to participate in life activities.

**Eye movement dysfunction** is reported to occur in as many as 90 per cent of people with concussion,<sup>9</sup> but it is often not recognised or mentioned by the patient.

**Mood changes**, such as anxiety, depression and increased irritability, are common following concussion. Patients may not link a mental health issue to the physical injury they sustained to the head; probing questions may need to be asked to establish this link.



## Symptoms to look out for:

- Dizziness
- Changes in vision
- Mood changes

# Factors affecting recovery and how to influence them

There are several factors that can affect someone's recovery from concussion.<sup>10</sup> Risk factors for a prolonged recovery from concussion are listed in Panel 1.

Although the most consistent predictor of slower recovery from concussion is the severity of a person's symptoms, a "more severe injury" does not always mean a longer or harder recovery. Pre-existing medical and mood issues can make it more difficult, as can other injuries sustained at the same time as the concussion.<sup>11</sup>

Personal psychological resilience in the face of injury has a big influence, as do the support systems that surround the person.<sup>12</sup> For example, a student living away from home in university halls may have less support than if they are living at home with family, which can affect the trajectory of their recovery.

The lifestyle and type of work the person is returning to are also important. A teenager in year 10 at high school will tend to have more flexibility for time off school and be under less obvious stress than a year 13 student who is about to sit exams. The physical environment and demands of a workplace can delay a return to work (eg, a very noisy workplace or the need to work at heights when still dizzy), and roles that require high cognitive demand can also be difficult.

## What advice to give

While the patient waits to be seen by ACC funded Concussion Services, it is important to advise them to avoid activities that have a high risk of sustaining a further concussion for the next few weeks. If more than one concussion occurs, the symptoms are typically worse and recovery time is increased.

Research on athletes shows that nerve signals in the brain are disrupted for 30 days after a single concussion.<sup>13</sup> During this time, people are more likely to have another injury if engaged in sporting activities because reaction time and brain processing have been disrupted. The patient is less likely to see something, such as a ball, coming towards the head during this vulnerable period.

Current guidelines regarding return to sport following concussion can be found on the ACC SportSmart website ([accsportsmart.co.nz/resources](http://accsportsmart.co.nz/resources)).

Early advice can often prevent escalation of symptoms and leads to earlier recovery. The 2017 consensus statement on concussion in sport states that recovery is faster when you rest immediately following the injury, seek medical advice and go back to normal daily activities gradually.<sup>14</sup>

"After a brief period of rest during the acute phase (24–48 hours) after injury, patients can be encouraged to become gradually and progressively more active while staying below their cognitive and physical symptom-exacerbation thresholds (ie, activity level should not bring on or worsen their symptoms)."<sup>14</sup>

Patients need to know that they should initially base their activities on symptom tolerance. For example, a 10-minute walk may be fine with no aggravation of symptoms, but a 30-minute walk may be too much.

Some patients may cope with some screen time, while others may not. Long periods of screen time are not advised in early stages of recovery. Television, computer work and gaming should be monitored and kept to a minimum. Patients may also want to avoid loud environments and bright fluorescent lighting if they are sensitive to noise or light.

Unless advised by a medical professional, patients are able to drive following a concussion. However, it is best not to do so if they are experiencing any symptoms that may affect their ability to drive safely (eg, visual changes or significant restriction of neck movement that means they cannot scan effectively; or severe fatigue which may lead to poor concentration and slowed reactions).

## Signing patients off from work

Appropriate time off work can also assist recovery. There is no standardised time frame for this as it will depend on symptoms and the type of work the patient does – physical versus cognitive demands, and part-time versus full-time work.

For example, a builder who regularly climbs ladders may need more time off if they are experiencing vestibular symptoms. An office worker who can stagger their screen time may need less time off than a primary school teacher who works in a noisy environment with multiple competing demands and an inability to take breaks when needed.

Too much time off can also lead to problems with recovery after an mTBI. If the patient's days remain too unstructured for too long, this can lead to preventable decreased activity tolerance, lethargy and mood issues. It is important to take all of these things into consideration when signing someone off work, and to review this regularly.



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## CASE STUDY 1

### Sports injury

#### History and presentation

Philip is a 51-year-old accountant who came off his mountain bike at speed in the Christchurch Adventure Park. He sustained grazes and a broken wrist, but also hit the front of his head in the fall and damaged his helmet on a rock.

When he attempted to go back to work after a week off, he noticed he had problems concentrating and remembering information. He made mistakes with work tasks, got headaches when looking at screens and struggled with bright lights in the office.

He tried to "push on through" these difficulties because he didn't want to get too behind in his work. Nonetheless, he became very fatigued and would occasionally slur his words and have difficulty with word finding. He struggled to complete work tasks, became irritable with his wife and colleagues, and had trouble sleeping. After a few weeks, his employer strongly encouraged him to visit his GP and take time off sick.

#### The road to recovery

Philip's GP signs him off work for three weeks and refers him to the Concussion Service. There, he undergoes initial assessment by a speech-language therapist, followed by a neuropsychological assessment to investigate his ongoing cognitive difficulties. This reveals difficulties with attention and multitasking, and advice is given to both Philip and his employer about how these could be compensated for in the work environment.

He then receives occupational therapy input, focusing on planning work tasks around brain drain and fatigue levels, and education around sleep hygiene. Philip receives clinical psychology input regarding his mood and how to manage his increased irritability, to reduce the impact on him, his wife and his colleagues.

He also participates in a formal Stay at Work programme, which starts towards the end of the Concussion Service input. Philip returns to work in a graduated fashion, moves out of the open-plan office space to reduce distraction, and the demands of his role are changed to reduce the need to multitask.

Six months after his injury, Philip has returned to full-time work and feels he has made a full recovery from his injury.

## CASE STUDY 2

### Domestic violence

#### History and presentation

Kylie is a 29-year-old mother of two who presents to her GP with a history of headaches, dizziness, nausea, tearfulness and irritability over the last three weeks. On further questioning, she notes that her now ex-partner had been "grumpy" with her and "pushed her into a wall" a few weeks ago. Her GP suspects there may have been a history of physical abuse in this relationship.

Once immediate safety concerns are attended to, a further exploration of possible concussion history and symptomatology is conducted. The GP questions Kylie and ascertains that there may be a history of recurrent concussions due to multiple blows to the head over recent years.

#### Onwards and upwards

The GP refers Kylie to the Concussion Service where she is initially assessed by an occupational therapist. Kylie then goes on to receive a detailed medical assessment, including MRI scanning,

a vestibular assessment from a physiotherapist, and rehabilitation input from the occupational therapist and a clinical psychologist. The MRI scan reveals indicators of a diffuse axonal injury.

Kylie is prescribed medication to help with the headaches, undergoes an Epley manoeuvre to treat her dizziness and nausea resulting from benign paroxysmal positional vertigo, and takes part in brief psychological therapy to address her mood disturbance.

Occupational therapy focuses on activity scheduling and pacing to help her to cope with her fatigue alongside the demands of being a mother and part-time worker in a clothing store.

Four months after the referral to the Concussion Service, Kylie is back to working her usual hours and managing the demands of her everyday family life, although she reports that she continues to take regular brain breaks to allow her to function adequately without getting unduly fatigued or irritable.

She is discharged back to the care of her GP with a recommendation for referral to domestic violence counselling services. This will allow Kylie the opportunity to continue to explore the impact the violent relationship has had on her mental and physical wellbeing.

# Concussion Services: When and how to refer, and what to expect

Timing of referral to Concussion Services can vary depending on how your patient is presenting. The Concussion Service contract allows referral up to 12 months after injury. If your patient is experiencing persistent symptoms, it is best to refer earlier rather than later. The service is designed to get on top of symptoms early with education and specialist assessment/rehabilitation.

After one year, ACC would need to look at evidence that the injury is the cause of the patient's current problems. They would assess that evidence and then refer for rehabilitation under other contracts, such as Training for Independence, if appropriate.

Internationally, delays in referral to concussion services have been recognised as an issue and can be due to many reasons, including:

- the mTBI not being diagnosed or recognised at the time of injury
- the GP being unfamiliar with the concussion service or choosing to manage the patient themselves until they have exhausted their own resources and knowledge
- patients not seeking assistance until the symptoms significantly affect functioning at home or at work.

A recent New Zealand study found that more days between injury and initial assessment by a Concussion Service was associated with more psychological post-concussion symptoms being reported, which, in turn, was associated with slower recovery and more time spent in the Concussion Service.<sup>15</sup>

This underlines the importance of early referral. In general, once referred to a Concussion Service by ACC, patients will be assessed within one to two weeks. Thus, there is adequate availability of services once referral has occurred.

## How to refer for Concussion Services

If you suspect a concussion, you must lodge an ACC claim with concussion as the diagnosis. Complete form ACC883 for an adult (<https://tinyurl.com/ACC883>) or ACC7412 for a child (<https://tinyurl.com/ACC7412>).

If you are unsure on initial presentation, but then it becomes clear the injury was concussion, confirm or update the diagnosis using an ACC18. This creates a clear pathway for management of the injury.

All Electronic Request Management System (ERMS)/direct referrals must be approved by ACC before any assessment or treatment being offered by a Concussion Service provider, and having a clear diagnosis will expedite this process. If the diagnosis needs to be confirmed, this can be done by the Concussion Service provider, but it may delay input for your patient. Note that ACC is currently looking at ways to improve the primary care pathway for concussion; therefore, referral processes may change in the next 12 to 24 months.

In May, ACC started a 12-month pilot with the PHOs Pegasus and ProCare to trial a new standardised concussion treatment pathway. This pathway aims to reduce delays by supporting GPs to manage appropriate patients in primary care and to quickly identify and refer those who require specialist Concussion Services.

## What to expect

Concussion Service providers are experts in knowing what to assess and then how to address the needs identified. This can often prevent ongoing issues. There are also specialist providers for children. Panel 2 outlines what you can expect from a Concussion Service.

Concussion Services in Aotearoa New Zealand, funded under the ACC contract, provide an assessment/triage stage where appropriate assessments are used to identify and prioritise needs. The initial assessment may identify that a specialised allied health assessment, such as vestibular assessment by a physiotherapist, is required. Further assessments may be carried out by a neuropsychologist, medical specialist or optometrist.

Sometimes, all the patient may need is education about their injury, reassurance that it will get better and some simple strategies to manage their symptoms as they return to their usual activities.

Others need to continue with a full suite of interdisciplinary input from occupational therapy, speech-language therapy, physiotherapy, neuropsychology and clinical psychology, with support from the medical specialist and/or optometrist:

- Occupational therapy or speech-language therapy will tend to focus on cognitive-communication skills, fatigue management and return to usual activity.
- Physiotherapy will focus on vestibular rehabilitation, oculomotor rehabilitation, cervical spine treatment and gradual return to physical function.
- Neuropsychology will assess cognitive function and make recommendations for coping with any cognitive impairments present.
- Clinical psychology can provide input for changes in mood and the impact of the accident on family/whānau relationships, work or study.

The team will work with families, GPs, schools and employers to ensure the patient is fully supported through their recovery. Input under ACC vocational contracts may be necessary to ensure the patient achieves a full and sustainable return to employment.

The GP is an important part of this process when approving return to work plans and updating medical certificates. Clear and regular communication between the GP and the Concussion Service ensures consistency of input and advice, facilitates the best possible outcome for the patient, and helps to return them to their normal everyday activities as quickly as possible. ■

“More days between injury and initial assessment by a Concussion Service was associated with more psychological post-concussion symptoms”

**D** The references for this article are available with the online version on [nzdoctor.co.nz](http://nzdoctor.co.nz)

## The importance of rest

Hemi is referred to the Concussion Service by his GP. There, a vestibular assessment, Buffalo Concussion Treadmill Test and neuropsychological screen are completed, and he is given education and advice about managing his symptoms.

Physiotherapy assessment indicates Hemi has normal oculomotor function apart from a mild convergence insufficiency, high-level balance issues and mild motion sensitivity. The neuropsychological screen finds his cognitive performance is variable. Attention, cognitive proficiency and inhibitory control are all unimpaired; however, Hemi's processing speed and memory are lower than expected given his pre-injury functioning.

Based on this, the occupational therapist suggests Hemi reduces the time he spends at school and the intensity of his exercise regimen for a short time. They schedule times for rest during the school day, and they arrange with the teacher a signal that Hemi can use to indicate when he needs a break.

With the increase in rest, Hemi finds he has fewer headaches, and, when he does have one, it tends to be less intense. He also finds it fatiguing when concentrating in the noisy class environment, but noise-cancelling earplugs help a lot. He receives physiotherapy input for his balance and motion sensitivity issues.

Over three months, Hemi is able to gradually increase his activity tolerance and has now returned to his usual activities.

## Panel 1.

### Risk factors for persistent symptoms and prolonged concussion recovery

- ◆ More severe, and greater number of, symptoms on initial presentation.
- ◆ The presence of:
  - cognitive problems
  - fatigue
  - prolonged headache
  - migraine or migraine-like symptoms
  - loss of consciousness at time of injury
  - a period of post-traumatic amnesia
  - unaddressed vestibular and oculomotor dysfunction.
- ◆ History of prior concussion.
- ◆ Pre-injury history of mental health problems.
- ◆ Age – some research suggests the teenage years might be the most vulnerable time for having persistent symptoms, with greater risk for girls than boys.
- ◆ Sex – women show more symptoms and cognitive function deficits than men after concussion.

## Panel 2.

### In a nutshell: What to expect from a Concussion Service

- ◆ Quick response time.
- ◆ Full interdisciplinary team (neuropsychologist, clinical psychologist, physiotherapist with vestibular experience, occupational therapist, speech-language therapist, medical specialist).
- ◆ Services provided at home, work, school, university/college or in a clinic setting.
- ◆ Wide geographical areas covered – remote and rural included.
- ◆ Good communication and reports provided for your information.
- ◆ Further services and/or referrals if required.
- ◆ No cost to the patient.

## Useful websites

- ◆ ACC SportSmart. [accsportsmart.co.nz/concussion](http://accsportsmart.co.nz/concussion)
- ◆ ACC. Referring a patient for rehabilitation. [tinyurl.com/ACC-TBIreferral](http://tinyurl.com/ACC-TBIreferral)
- ◆ Brain Injury New Zealand. [brain-injury.nz](http://brain-injury.nz)
- ◆ BrainLine. [brainline.org](http://brainline.org)
- ◆ Centre for Neuro Skills. [neuroskills.com](http://neuroskills.com)
- ◆ Headway: Brain Injury Auckland. [headway.org.nz](http://headway.org.nz)
- ◆ BMJ Concussion Recognition Tool. [bjsm.bmj.com/content/51/11/872](http://bjsm.bmj.com/content/51/11/872)
- ◆ Goodfellow Unit. Concussion/Mild Traumatic Brain Injury (mTBI). [tinyurl.com/Goodfellow-mTBI](http://tinyurl.com/Goodfellow-mTBI)
- ◆ BPACnz. An overview of concussion/mild traumatic brain injury management for primary healthcare professionals. [bpac.org.nz/2022/concussion.aspx](http://bpac.org.nz/2022/concussion.aspx)

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## CASE STUDY 3

### Head knocks in a child

#### History and presentation

Eleven-year-old Hemi sustained two hard head knocks within a few days of each other. The first was during a rugby tackle, where he fell awkwardly and hit his head on the ground with some force. He was able to continue the game, but felt unwell, had blurred vision and dizziness, and found it difficult to stand.

The second knock was during judo training – Hemi was thrown and landed on his back, hitting his head hard. Over the next two days, he experienced confusion, memory difficulties, a sore head, dizziness, impaired balance, headaches, fatigue and low mood.

He is reviewed by his GP, who recommends rest and avoidance of high-risk activities. Hemi spends the school holidays resting and stops exercise for a few weeks in order to focus on managing his symptoms. Over this time, he experiences noise sensitivity, reduced concentration (which affects his ability to read for pleasure), difficulty keeping track of conversations, reduced appetite and feelings of frustration, anger and sadness.

Once the holidays end, Hemi attempts to return to school but is extremely fatigued and unable to cope with full days.

Case studies do not represent identifiable people

## Quiz answers

1. False 2. True 3. False 4. False 5. True