Appendix 1: Recommendations

Note: This is published as supplied and is unedited by *AJGP*. Colour coding represents the different categories of recommendations, as reflected in Table 1.

RECOGNISE AND ASSESS

Initial diagnosis and assessment

No.	Recommendations	Level of Evidence
1	Suspected mTBI/concussion should be recognised as soon as possible.	EBR[S]
2	Adults and children with suspected mTBI/concussion should be referred to a medical doctor for confirmation of diagnosis.	CBR
3	People with mTBI/concussion should be assessed in a hospital setting if the mechanism of injury was severe or if they develop any of the following signs or symptoms within 72 hours of injury: • seizure or convulsion • loss of consciousness • deteriorating level of consciousness • confusion • not acting normally, including abnormal drowsiness, increasing agitation, restlessness or combativeness • double vision, ataxia, clumsiness or gait abnormality • weakness and tingling in arms or legs • vomiting[2] • presumed skull fracture (palpable fracture, 'raccoon eyes' or Battle's signs, cerebrospinal fluid leak, otorrhea, rhinorrhoea) • severe headache (children 2-18 years) • occipital or parietal or temporal scalp haematoma (in children aged less than 2 years only).	CBR
4	Children with head injuries do not need to attend hospital for assessment and can be safely managed in primary care or at home if all of the following apply: • the injury was sustained from ground-level falls or walking or running into stationary objects • there is no loss of consciousness • GCS score is 15 • there are no signs or symptoms of head trauma other than abrasions.	CBR
5	Special consideration needs to be made for older people (see Glossary) who: • had a fall/head trauma (witnessed or unwitnessed) or explicit significant injury • are on anticoagulation/antiplatelet therapy with the above incidents. • Further assessment and CT of the brain should be considered.	CBR

6	A medical doctor should conduct a review of every person who has sustained mTBI/concussion to confirm diagnosis.	EBR^{S}
7	Initial medical management of a person with mTBI/concussion should be based on a thorough history and physical examination, and concurrent potential contributing factors, such as co-morbid medical conditions and mental health conditions	EBR^{C}
8	Consideration should be given to use of an age-appropriate standardised concussion symptom inventory tool.	EBR^{C}
9	Neuroimaging should not be routinely used for the purpose of diagnosing mTBI/concussion.	EBR^{C}
10	In children with mTBI/concussion who have one or more risk factors for a brain injury, qualified health care professionals should take into account the number, severity and persistence of signs and symptoms (see Figure 1), and family factors (e.g. distance from hospital and social context) when choosing between structured observation and a head CT.	EBR^{C}
11	The need for neuroimaging of adults with mTBI/concussion on acute presentation (within 24-48 hours post-injury) should be determined according to the Canadian CT rule (see Figure 2), noting that people who are anticoagulated or who have bleeding disorders require extra consideration.	EBR^{C}
12	Plain skull x-rays are not recommended for the purpose of diagnosing mTBI/concussion.	CBR
13	Qualified health care professionals should not use single-photon emission CT (SPECT) or quantitative electroencephalogram in the acute evaluation of suspected or diagnosed mTBI/concussion.	CBR
14	If, in an acute care setting, CT head is indicated and no abnormality is identified, neurological deterioration should prompt urgent reappraisal, with consideration of an immediate repeat head CT and consultation with a neurosurgical service.	EBR^{S}
15	People who are being observed after a normal initial head CT who have not achieved a GCS score of 15 after up to 6 hours observation from the time of injury, should have senior clinical review for consideration of a further head CT or MRI and/or consultation with a neurosurgical service. The differential diagnosis of neurological deterioration or lack of improvement should take account of other injuries, drug or alcohol intoxication and non-traumatic aetiologies.	EBR^{S}
16	Consultation with a neurosurgical service should occur in all cases with an intracranial injury shown on a head CT, other than in infants and children with an isolated, non-displaced, linear skull fracture on a head CT without intracranial injury and a GCS score of 15.	CBR

17	Consultation with a neurosurgical service should occur in all adults with a base of skull fracture, or skull fracture and confusion, decreased conscious level, or neurological symptoms or signs.	CBR
a	Where structured observation is undertaken, observation period should be 4 hours or greater and should include amnesia and orientation assessment.	PP
b	If the GCS does not return to 15, repeat assessment should be performed.	PP
c	Discharge criteria (see Section 1.1.3) should be met, even if there is a normal head CT.	PP

Complicating factors

d	Consider the possibility of abusive head trauma in all presentations of mTBI/concussion.	PP	1.2.1
e	In people with a ventricular shunt and mTBI/concussion, if there are local signs of shunt disconnection, shunt fracture (e.g. palpable disruption or swelling), or signs of shunt malfunction, consider obtaining a shunt series, and consultation with a neurosurgical service.	PP	1.2.2
18	For people with congenital or acquired bleeding disorders who have experienced mTBI/concussion, consider structured observation over immediate head CT if there are no risk factors for more serious forms of traumatic brain injury (see Figure 1 and Figure 2) and no symptoms consistent with intracranial bleeding. If there is a risk factor for intracranial injury, a head CT should be performed. If there is a deterioration in neurological status, a head CT should be performed urgently.	EBR[C]	1.2.3
f	For people with a coagulation factor deficiency (e.g. haemophilia) who have experienced mTBI/concussion that results in presentation to an acute care setting, neuroimaging should not delay the urgent administration of replacement factor, with guidance from a haematologist sought as required.	PP	1.2.3
g	For children with a bleeding disorder or on anticoagulant or antiplatelet therapy who have experienced mTBI/concussion that results in presentation to an acute care setting, health professionals should urgently seek advice from a haematologist.	PP	1.2.3
h	In adults on anticoagulant or antiplatelet therapy or who have known bleeding disorders, CT should be strongly considered. Qualified health care professionals should follow local protocols and guidelines for management of anticoagulation agents in trauma patients.	PP	1.2.3

19	It is unclear whether people with neurodevelopmental disorders have a different background risk for intracranial injury following mTBI/concussion. Consider performing a period of structured observation or a head CT because these people may be difficult to assess. Shared decision making with caregivers and the clinical team that knows the person is particularly important.	CBR	1.2.4
20	In people who are intoxicated with drugs or alcohol who have experienced mTBI/concussion, treat as if the neurological findings are due to the mTBI/concussion. A low threshold should be used to recommend head CT.	CBR	1.2.5

Initial management

21	Provide patient/parent/support person with clear, age-appropriate verbal and written advice including: • reassurance that most people recover fully • natural history of early symptoms • possibility of persisting symptoms • advice on early symptom management • advice on return to activities/school/work • follow-up with qualified heath care professional if symptoms persist • discharge letter (for people seen in the emergency department).	EBR^{S}	1.3.1
22	All people discharged from medical care after presenting with a mTBI/concussion should be given clear, age appropriate, written and verbal advice on when to return to the emergency department; this includes worsening symptoms (e.g. headache, confusion, irritability, or persistent or prolonged vomiting), a decreased level of consciousness or seizures.	EBR^{S}	1.3.1
23	All people discharged from medical care after presenting with mTBI/concussion, should be given contact information for the emergency department, telephone advice line or other local providers of advice.	EBR^{S}	1.3.1
24	Advise people who have experienced mTBI/concussion to avoid alcohol and other recreational drugs while symptoms persist.	CBR	1.3.1
25	Provide people who have experienced mTBI/concussion with guidance on fatigue management and age-appropriate sleep hygiene methods.	CBR	1.3.1
26	Over-the-counter medications such as paracetamol and ibuprofen may be recommended to treat acute headache in people with mTBI/concussion. Use paracetamol in those who are also taking anticoagulants or antiplatelet medication.	EBR^{C}	1.3.2

27	People presenting with acute mTBI/concussion can be safely discharged for home observation in the care of a responsible adult if they meet all of the following clinical criteria: • normal neurological examination and mental status (alertness/behaviour/cognition) • no clinical risk factors indicating the need for head CT (or a normal head CT if performed due to presence of risk factors) • absence of risk factors warranting hospital admission (e.g. other injuries, clinical concerns [e.g. persistent vomiting], drug or alcohol intoxication, social factors, underlying medical conditions such as bleeding disorders or possible abusive head trauma).	EBR[C]	1.3.3

Follow-up

28	All people discharged from hospital after presenting with mTBI/concussion should be advised to follow up with their primary health professional (e.g. general practitioner) within 1 to 2 weeks for assessment of post-concussion symptoms and monitoring of clinical status.	EBR[C]	1.4.1
i	People (or their parents or carers) should be reassured that most post-concussion symptoms are not clinical indicators for imaging.	PP	1.4.2
29	For people at high risk of persisting symptoms (see Box A), qualified health care professionals should consider earlier referral to specialist services for post-concussion symptom management.	EBR[C]	1.4.3

Prognosis

j	For people presenting with mTBI/concussion, qualified health care professionals should consider factors known to be associated with an increased risk of developing post-concussion symptoms (see Box A).	PP	1.5.1
k	Qualified health care professionals should counsel people with mTBI/concussion and their families that, although some factors predict an increased or decreased risk for persisting symptoms, each person's recovery from mTBI/concussion is unique and will follow its own trajectory.	PP	1.5.2

RETURN TO ACTIVITY

General activity

30	Strict rest until the complete resolution of mTBI/concussion-related symptoms is not beneficial and not recommended.	EBR[S]	2.1.1
31	Relative (not strict) rest is recommended for 24-48 hours after mTBI/concussion. Most activities of daily living can resume immediately.	EBR[S]	2.1.1

32	Following mTBI/concussion, physical activity should be started between 24 and 48 hours post injury, gradually increasing from low to moderate physical activity, provided that it is at a level that does not result in significant exacerbation of post-concussion symptoms. A small increase in symptoms (i.e. 20% increase in symptoms) is acceptable. Physical activities that pose no or low risk of sustaining another mTBI/concussion (e.g. walking or stationary cycling) are advisable.	EBR[S]	2.1.1
33	Individuals should be advised to avoid the risk of re-injury (i.e. fall, contact or collision) until a qualified health care professional determines it is safe for higher risk activities.	CBR	2.1.2
34	Explain that transient symptom worsening with increased activity is common.	EBR[C]	2.1.2
l	Where a fall was the cause of mTBI/concussion in an older person, early resumption of daily activities should be encouraged. It is important to provide information on falls prevention strategies.	PP	2.1.2
35	Reduced screen use in the first 48 hours after mTBI/concussion is warranted but may not be effective beyond that time.	EBR[S]	2.1.3
m	Parents and carers should be aware of general recommendations for screen use in children aged over 5 years; that is, promote that children get adequate sleep (8–12 hours, depending on age), recommend that children not sleep with devices in their bedrooms (including televisions, computers and smartphones) and avoid exposure to devices or screens for 1 hour before bedtime.	PP	2.1.3

Return to driving/operating machinery

36	People who have experienced mTBI/concussion should be advised to avoid driving or operating heavy machinery during the first 24 hours.	CBR	2.2
37	People returning to driving should be advised that symptoms such as blurred vision, dizziness, fatigue, impaired cognition, headache and neck pain or stiffness may affect their ability to drive or operate heavy machinery.	CBR	2.2

Return to work

38	Encourage people to return to some form of work, so long as work does not place the person at high risk of reinjury. Facilitate identification of necessary modifications (to decrease the risk of reinjury) and appropriate accommodations by clearly identifying exacerbators of symptoms and functional limitations (physical, cognitive and emotional).	EBR[C]	2.3
39	Students should have returned to school full-time before commencing extra-curricular work (unless part of educational activity).	EBR[C]	2.3

40	When persisting post-concussion symptoms pose a barrier to return to pre-injury employment, introduction of other meaningful activities that facilitate recovery should be considered. Other employment (full-time or part-time), educational activities, community roles, and activities that promote community integration (e.g. volunteer work) may be considered as an alternative focus for meaningful activities.	CBR	2.3

Return to school/learning

41	To minimise academic and social disruptions following mTBI/concussion, qualified health care professionals should not recommend complete rest and isolation, even for the initial 24–48 hours, and instead recommend a period of relative rest.	CBR	2.4.1
42	Complete absence from the school / education environment for more than one week is not generally recommended. Children/adolescents should receive temporary academic accommodations (e.g. modifications to schedule, classroom environment and workload) to support a return to the school environment in some capacity as soon as possible.	CBR	2.4.1
43	A child or adolescent should return to their school environment as soon as they are able to tolerate engaging in cognitive activities without overly exacerbating their symptoms, even if they are still experiencing symptoms. Return-to-school protocols should be customised based on the severity of post-concussion symptoms as determined jointly by health-care and school-based teams and be modified based on ongoing assessment of symptoms.	CBR	2.4.1
44	In consultation with educators, and accounting for social determinants of health, some students may be offered temporary academic supports to promote return to learning including: • environmental adjustments, such as modified school attendance, frequent rest breaks from cognitive/thinking/deskwork tasks throughout the day and/or limited screen time on electronic devices • physical adjustments to avoid any activities at risk of contact, collision or falls, such as contact sports or game play during physical education classes or after-school activities, while allowing for safe non-contact physical activity (e.g. walking) • curriculum adjustments, such as extra time to complete assignments/homework and/or preprinted class notes • testing adjustments, such as delaying tests/quizzes and/or permitting additional time to complete them.	CBR	2.4.2
45	Return-to-school is a priority in children and adolescents, and while full return to learn is recommended before unrestricted return to sport, the two strategies can occur in parallel.	EBR[C]	2.4.3

46	For students who experience prolonged symptoms and academic difficulties despite an active treatment approach, qualified health care professionals should refer the child for a formal evaluation by a specialist in paediatric mTBI/concussion, or a interdisciplinary concussion team where available.	EBR[C]	2.4.4

Return to sport

47	Return to sport strategies should be individualised, follow the recommended guidelines, and be monitored by a qualified health care professional.	CBR	2.5
48	People who experience mTBI/concussion should gradually progress through return-to-learn and the return-to-sport stages (specific steps are outline in Table 2, Table 3 and Figure 3 in Aotearoa New Zealand), ensuring a minimum time away from play of 21 days from injury.	CBR	2.5

ASSESSMENT AND MANAGEMENT OF PERSISTING SYMPTOMS

Assessing persisting symptoms

49	The assessment and management of an individual with persisting mTBI/concussion-related symptoms should be directed towards specific symptoms identified and monitored with a symptom checklist. The person's most prominent symptoms or impairments should be directly assessed, including: • headache (including neck pain), migraine • mood (i.e. depression), anxiety, post-traumatic stress disorder, somatisation and other trauma and stressor-related disorders • sleep • dizziness, balance and visual problems • cognitive symptoms (memory loss, attention) • fatigue • screening for medication/substances that may mask or modify the symptoms.	EBR[C]	3.1
50	Physical examination should be conducted and include: • vital signs (resting heart rate and blood pressure) • complete neurological examination (cranial nerve, motor, sensory, reflex, cerebellar, gait, balance testing) • cervical spine examination (palpation, range of motion, provocative cervical spine tests) • mental state examination including cognitive screening • further examination of the individual should be based on symptoms. Assessments may need to be conducted over a number of appointments.	EBR[C]	3.1
51	The assessment of persisting symptoms should include a review of currently prescribed medications (and adherence), and non-prescribed medications/supplements and substance use, including but not limited to alcohol, cannabis and other drugs.	CBR	3.1

52	Repeat medical assessment is advisable for people with concerning or worsening post-concussion symptoms at 1-2 weeks following acute injury and then at 4 weeks in people with persisting symptoms.	CBR	3.1
53	When neck pain is present, careful and thorough clinical examination is required. Investigation (i.e. imaging) should only be conducted according to established imaging guidelines (e.g. NEXUS, Canadian Canadian C-spine rule).	EBR^{S}	3.1
n	For people with persisting symptoms following mTBI/concussion, clinical assessment including identification of factors that may suggest an alternative diagnosis is recommended.	PP	3.1
54	Careful and thorough differential diagnoses should be considered as similar symptoms are common in chronic pain, depression, anxiety disorders, sleep disorders and other medical and psychiatric disorders (see Box B).	EBR^{S}	3.1.1

Managing persisting symptoms

55	Individuals with symptoms that persist after 4 weeks should be informed and reassured that a symptom-based approach will facilitate recovery and that symptom resolution is achieved by most people. This information should be provided in written, verbal and/or pictorial formats and should also outline mental health considerations, and non-pharmacological strategies to minimise symptoms including: • activity modifications • limiting triggers • managing fatigue • sleep hygiene • the importance of social interaction • activities of daily living • graduated return to cognitive and physical activity • working with the school team to facilitate school/work success.	EBR^{C}	3.2
56	For people with persisting symptoms, a slower progression in return to normal activity should be implemented if symptom worsening is more than mild or is prolonged.	EBR^{C}	3.2
57	The use of hyperbaric oxygen to treat symptoms post- mTBI/concussion is not recommended.	EBR^{S}	3.2
58	Treatment for specific symptoms or concerns should be initiated while waiting for a referral to an interdisciplinary concussion team or sub-specialist.	CBR	3.2

59	Encourage people with persisting symptoms to engage in cognitive activity and low-risk physical activity while staying below their symptom-exacerbation threshold. Activities that pose no/low risk of sustaining a mTBI/concussion (no risk of contact, collision, or falling) should be resumed even if mild residual symptoms are present or whenever acute symptoms improve sufficiently to permit activity.	CBR	3.2.1
60	Referral to interdisciplinary concussion team or subspecialist (where available) should be considered for people who have persisting symptoms.	CBR	3.2.2

ASSESSMENT AND MANAGEMENT OF SPECIFIC SYMPTOMS

Headache

61	Identification of the headache phenotype can inform management.	EBR[C]	4.1.1
62	A qualified health care professional should take a comprehensive headache history (see Box C) to identify the headache phenotype(s) that most closely resemble(s) the person's symptoms.	EBR[C]	4.1.1
63	Personal, environmental, work-related, school-related, and physical factors such as neck pain should be identified and addressed as potential headache contributors.	EBR[C]	4.1.1
64	Establish the degree of headache-related disability (taking a biopsychosocial approach) to assist in preparing a treatment approach (i.e. non-pharmacological and/or pharmacological).	EBR[C]	4.1.1
65	The qualified health care professionals treating post-traumatic headaches should perform neurological and musculoskeletal examinations, including blood pressure and heart rate monitoring (both lying and standing), cervical spine and vestibulo-ocular system examination.	CBR	4.1.1
66	People older than 5 years with post-traumatic headache should be encouraged to maintain an accurate headache and medication diary (see Box D) and to bring it to every follow-up visit with their treating health care professional.	CBR	4.1.2
67	Although most people with post-traumatic headache do not require imaging, brain or cervical spine imaging (MRI or brain CT) is a consideration when neurologic signs or symptoms are suggestive of possible intracranial pathology or significant cervical spine injury.	CBR	4.1.2
68	Education should be provided to the person with post-traumatic headache on the lifestyle strategies useful for potentially minimising headache occurrence and/or decreasing the impact of headaches when they occur.	CBR	4.1.3
69	Over the counter analgesics (e.g. paracetamol, ibuprofen, aspirin, naproxen) should be used less than 15 days per month.	CBR	4.1.4
70	Combination analgesics (i.e. with caffeine or codeine) should be used less than 10 days per month.	CBR	4.1.4

71	Migraine-specific acute therapies should be trialled when non-specific acute therapies are incompletely effective. Triptans can be used for migrainous-type headaches less than 10 days per month.	CBR	4.1.4
72	When headaches are too frequent (e.g. more than 10 days per month) or disabling, prophylactic therapy should be considered	CBR	4.1.4
o	Prophylactic therapy should be guided by headache phenotype.	PP	4.1.4
73	Post-traumatic headaches may be unresponsive to conventional treatments. If headaches remain inadequately controlled, referral to a neurologist, headache specialist, paediatrician, or interdisciplinary concussion team is recommended.	CBR	4.1.5

Sleep disturbances

74	A repeat medical assessment should be performed for all people presenting with sleep disturbances 1-2 weeks following acute mTBI/concussion .	CBR	4.2.1
75	People with post-concussion symptoms should be routinely screened for sleep-related problems (i.e. sleep disturbances). For those screening positive, sleep should be evaluated using a validated assessment tool, particularly for insomnia	CBR	4.2.1
76	When criteria are met for chronic insomnia, sleep should be monitored for improvement over time using validated person-reported outcome measures or sleep monitoring devices.	CBR	4.2.2
77	Other pre-existing sleep-wake disturbances and medical conditions that influence sleep should be screened for and treated. Medications that influence sleep (including supplements, herbal medicines or steroid medications) should be noted and their use monitored.	CBR	4.2.2
78	Education and treatment of sleep disturbances (including sleep apnoea) should be prioritised (along with headache and mood), given their significant impact and interaction with other functionally limiting symptoms.	EBR^{C}	4.2.3
79	Education on sleep disturbances should be provided in written, verbal and/or pictorial formats.	CBR	4.2.3
80	People with insomnia should be given advice on sleep hygiene (see Box E) and self-management strategies or programs.	CBR	4.2.4
81	Advise people with post-concussion insomnia to use melatonin (2-5 mg two hours before bedtime).	EBR^{S}	4.2.4
82	Advise on reduced evening light exposure and consider bright light exposure or blue light therapy in the morning.	EBR^{C}	4.2.4
83	Refer people with prolonged post-concussion insomnia for cognitive behavioural therapy (CBT) specifically for sleep or to a sleep physician (where accessible).	EBR^{C}	4.2.4

p	Maintain a high index of suspicion for sleep problems.	PP	4.2.4
q	Screen for obstructive sleep apnoea and depression as causes of poor sleep	PP	4.2.4
r	Assess sleep using a sleep diary over 2–3 weeks.	PP	4.2.4
s	Encourage physical activity.	PP	4.2.4
t	Avoid using benzodiazepines.	PP	4.2.4
84	If non-pharmacological treatment options have not been effective in treating sleep disturbances that persist beyond 4 weeks, medications could be considered to facilitate sleep. The following principles must be considered: • avoid medications that may lead to dependency or sleep disturbances • avoid benzodiazepines • aim for a short duration of use • recognise potential adverse effects/interactions of medications • avoid polypharmacy where possible • prescribe medications that may manage multiple co-occurring symptoms e.g. Amitriptyline for headache and sleep disturbances • start at a low dose and gradually increase as tolerated	CBR	4.2.5
85	If sleep problems emerge or continue despite appropriate sleep hygiene measures, qualified health care professionals may consider referral of people with mTBI/concussion to a sleep disorder specialist or an interdisciplinary concussion team.	EBR^{C}	4.2.6

Fatigue

86	Characterise the dimensions of fatigue (e.g. physical, mental, impact on motivation) and consider alternative or contributing causes that may not be directly related to the injury (see Table 4 for useful assessment tools).	EBR^{C}	4.3.1
87	People with significant symptoms of fatigue should be given information about management of contributing factors (see Table 4).	EBR^{S}	4.3.2
88	Advise people with fatigue resulting from disturbed sleep to use melatonin (2-5 mg two hours before bedtime).	EBR^{C}	4.3.3
89	Cognitive behavioural therapy and mindfulness-based stress reduction should be considered when managing fatigue.	EBR^{C}	4.3.3
90	Blue light therapy may be considered to reduce symptoms of fatigue and excessive daytime sleepiness.	CBR	4.3.3
91	Referral to interdisciplinary concussion team or a qualified health care professional should be considered if fatigue causing functional impairment persisting for more than 4 weeks .	EBR^{C}	4.3.4

Mental health disorders, mood and behaviour symptoms

92	Qualified health care professionals should routinely monitor for and manage depression and anxiety in people with a recent mTBI/concussion.	EBR[C]	4.4.1
93	In assessing mental health symptoms following mTBI/concussion, use a structured clinical interview, self-report questionnaires, and behavioural observation to determine whether the symptoms meet criteria for a mental health disorder (see Box F).	EBR[S]	4.4.2
94	If a mental health disorder is identified, existing practice guidelines for the treatment of the diagnosed condition should be followed.	EBR[S]	4.4.3
95	Cognitive behavioural therapy (CBT) and other psychotherapeutic modalities delivered by an qualified health care professional should be recommended for people with mental health conditions following mTBI/concussion.	EBR[C]	4.4.3
96	Mindfulness-based stress reduction may be recommended to help manage chronic symptoms following mTBI/concussion.	EBR[C]	4.4.3
u	If pharmacological treatment of mental health disorders, mood and behaviour symptoms in people following mTBI/concussion is considered, a qualified health care professional with experience in managing mental health should be involved.	PP	4.4.3
97	Treat mental health conditions or consider referral to a mental health specialist, especially where there is a lack of response to treatment.	CBR	4.4.4

Cognitive difficulties

98	Qualified health care professionals should attempt to determine the aetiology of cognitive dysfunction within the context of other mTBI symptoms.	CBR	4.5.1
v	Cognitive change in an older person could be a symptom of dementia. An early assessment to exclude intracranial pathology is recommended in older people with mTBI/concussion. After exclusion of other organic pathology, consider referral of older people with cognitive difficulties for further assessment (e.g. to a geriatrician, neurologist).	PP	4.5.1
99	People with pre-existing conditions and comorbid symptoms (e.g. anxiety, mood disorders, posttraumatic stress disorder, attention-deficit/hyperactivity disorder, sleep disturbances, fatigue, pain) should be provided with education highlighting that these pre-existing conditions may contribute to having an increased risk of more severe and prolonged cognitive symptoms.	EBR[C]	4.5.2
100	Manage cognitive symptoms that interfere with daily functioning which may include self-directed compensatory strategies (i.e. internal, external, environmental). If cognitive difficulties persist for more than 4 weeks, consider specialist assessment, preferably by a neuropsychologist or interdisciplinary concussion team.	EBR[C]	4.5.3

101	Referral for specialised cognitive assessment (e.g. neuropsychological assessment) may be considered in the following circumstances: • there is functionally limiting cognitive impairment • comorbidities potentially impacting cognition have been optimally managed • there is no ongoing cognitive symptom improvement • cognitive symptoms are prolonged (i.e. beyond 1 month)	CBR	4.5.4
102	Older people with cognitive symptoms should be referred to a geriatrician, neurologist, memory clinic or cognitive medical specialist for evaluation.	CBR	4.5.4
103	If cognitive symptoms are persisting beyond 3 months, then review, modify, and extend work/school accommodations as appropriate. These accommodations must be assessed and reviewed by the medical team and adjusted to individual needs as required.	CBR	4.5.4

Sensory sensitivity

104	For people with noise, light and other sensory sensitivities, a graduated exposure program is recommended. People should receive education about sensory tolerance levels and be encouraged to gradually increase exposure to these stimuli. Specifically, they should recognise the point at which mild symptoms have onset and push to the point that does not result in a significant or prolonged exacerbation of symptoms to promote desensitisation.	CBR	4.6

Balance, dizziness and visual dysfunction

105	If vestibular, vision, balance and coordination symptoms are endorsed, they should be screened for and monitored at follow-up appointments. A validated screening tool can be useful.	EBR[C]	4.7
106	If changes in vision are reported, a detailed history, including visual history, should be taken and assessments performed of visual acuity, pupillary function, visual fields, fundoscopy, binocular vergence, and extra-ocular movements.	EBR[C]	4.7.1
w	An eye examination should be undertaken to rule out ocular injuries and/or pre-existing disease that may impact vision.	PP	4.7.1
107	Perform oculomotor and vestibulo-ocular examinations including: • assessment of convergence, accommodation, saccades and smooth pursuits • assessment of the vestibulo-ocular reflex such as the head thrust test and/or dynamic visual acuity (may require involvement of a vestibular rehabilitation physiotherapist) • age-appropriate assessment of postural stability and balance (e.g. standing balance test or Balance Error Scoring System).	EBR[C]	4.7.2

108	Screen for benign paroxysmal positional vertigo (BPPV) if the person reports vertigo or dizziness that occurs for seconds following position changes and consider targeted particle re-positioning manoeuvres.	CBR	4.7.3
x	After completing a neurological screen and clearing the cervical spine to move into the test position, perform the Dix-Hallpike Test. If positive for BPPV (i.e. reproduction of vertigo, typically for seconds, in addition to a characteristic pattern of nystagmus for the canal that is being assessed), a Particle Repositioning Manoeuvre may be appropriate (e.g. the Epley manoeuvre).	PP	4.7.3
109	If the Dix-Hallpike manoeuvre reproduces vertigo, and there is no evidence of nystagmus, a Roll test should be performed, and other differential diagnoses or referral should be considered. The Epley manoeuvre should still be considered for treatment.	CBR	4.7.3
110	Screen for and consider underlying psychosocial factors that may exacerbate symptoms of vestibular, vision, and oculomotor dysfunction.	CBR	4.7.4
111	Provide general post-concussion education that outlines symptoms of mTBI/concussion, and provide suggestions regarding accommodations to manage visual, vestibular and oculomotor symptoms.	CBR	4.7.5
112	When the Dix-Hallpike manoeuvre is positive, the Epley/canalith repositioning manoeuvre should be used to treat benign paroxysmal positional vertigo.	EBR^{C}	4.7.6
113	If BPPV does not resolve within 1-3 treatments, consider referral to an otolaryngologist or qualified health care professional certified in vestibular rehabilitation.	CBR	4.7.6
114	Consider referral to an interdisciplinary concussion team or physiotherapist with competency-based training.	EBR^{C}	4.7.6
115	Vestibular rehabilitation therapy is recommended for people experiencing functionally limiting dizziness.	EBR^{S}	4.7.7
116	When a person with mTBI/concussion identifies a problem with hearing (i.e. intolerance to everyday sounds, hearing loss, tinnitus), a detailed history (including auditory history) should be taken, otologic examination (including otoscopy) performed, and referral for audiological assessment and/or ENT opinion if no apparent cause is found.	EBR^{C}	4.7.8
117	Consider referral to an ENT specialist for people with either unilateral tinnitus or persistent tinnitus that has not responded to self-management strategies.	CBR	4.7.9
118	If vestibular, vision, balance and coordination symptoms remain functionally limiting, further assessment to identify potential causes of symptoms to direct treatment is required. Referral to a qualified health care professional with specialised training in the vision or vestibular system is recommended, where available.	CBR	4.7.10

Autonomic nervous system

y	Autonomic dysfunction can occur following mTBI/concussion and may contribute to persisting symptoms.	PP	4.8

REPEAT CONCUSSION AND LONG-TERM EFFECTS

Repeat concussion

119	People diagnosed with a repeat concussion soon after the index injury (within 3 months) or after multiple repeat episodes are at increased risk of persisting post-concussion symptoms.	CBR	5.1.1
z	When returning to sport, people with repeat mTBI/concussions within the season are likely to require a more conservative approach and may require input from an interdisciplinary concussion team.	PP	5.1.1
aa	People who are concerned about possible long-term effects of repetitive head injuries should be encouraged to seek medical assessment and advice. Symptoms that cause concern are more likely to be due to other medical conditions that can be managed effectively.	PP	5.1.1

Access the ANZ Concussion Guidelines via the website (www.anzconcussionguidelines.com).