

THE MANAGEMENT OF CONCUSSION / MILD TRAUMATIC BRAIN INJURY ON DEPLOYED OPERATIONS

SUMMARY

1. This policy gives guidance to medical personnel and commanders on the diagnosis and management of UK personnel presenting with concussion/mild Traumatic Brain Injury (mTBI) in the deployed setting.

INTRODUCTION

2. The term Traumatic Brain Injury (TBI) describes the disruption of brain function resulting from either a penetrating or non-penetrating injury and covers a spectrum through mild, moderate and severe. Whilst the moderate and severe cases typically present with obvious clinical injury, the signs and symptoms associated with mTBI can be less distinct.

3. For the purposes of this policy the terms concussion and mTBI are considered to be the same and are therefore interchangeable. However, the use of the term concussion may be preferable when communicating with a patient; it is in common use, implies a transient condition and avoids the use of the term 'brain injury' which may create unnecessary concern. The term 'concussion/mTBI' will therefore continue to be used in this policy except for the Patient's and Commander's Guides where the term 'concussion' is used in preference.

SCOPE

4. This policy gives guidance to medical personnel and commanders on the diagnosis and subsequent management of UK personnel presenting with concussion/mTBI in the deployed setting although it may be applied generically to concussion/mTBI managed in any military situation.

5. This policy does not address moderate or severe TBI which will be managed in accordance with established protocols and procedures¹. Within the constraints of military operations this policy aims to be compliant with national civilian protocols for the management of head injury².

BACKGROUND

6. **Definition.** There is no single universally accepted definition of concussion/mTBI but the UK Defence Medical Services (DMS) policy is based on the World Health Organisation (WHO) guidelines³, and is closely aligned with the US⁴ definition. This allows a common foundation for investigation, diagnosis, treatment, epidemiological surveillance and collaborative research.

7. **Epidemiology.** Concussion/mTBI is not a new condition, with a worldwide incidence reported of between 100-300/100,000 of the civilian population treated in hospital per year. Population-based surveys of self-reported mild head injury yield higher rates of up to 600/100,000⁵. The injury is typically seen during road traffic accidents, falls and contact sports where the head may experience sudden acceleration or deceleration forces. In the military setting, individuals exposed to blasts may experience similar forces and may therefore be at risk of concussion/mTBI.

¹ JDP 4-03.1 Clinical Guidelines for Operations (CGOs) – Section 3, Treatment Guideline 9a, 'Head Injury', dated Feb 11.

² NICE Clinical Guideline 56 – Head Injury dated 28 Nov 1997 (www.nice.org.uk/CG56).

³ Holm et al (2005). Summary of the WHO Collaborating Centre for Neurotrauma Task Force on mTBI *J Rehabil Med*; 37: 137-141.

⁴ American Congress of Rehabilitation Medicine 1993.

⁵ Holm L, Cassidy JD, Carroll LJ, Borg J. Summary of the WHO Collaborating Centre for Neurotrauma TaskForce on Mild Traumatic Brain Injury. *J Rehabil Med* 2005;37:137-141.

8. Recent military data (based on self-reporting following return from operations) indicates a UK concussion/mTBI rate of 4.4 – 9.5%⁶. For comparison, the declared rate of concussion/mTBI in deployed US personnel (based on active case finding) ranges from 5-20%⁷. The MoD continues to develop real time data gathering and analysis of concussion/mTBI via the Defence Analytical Services and Advice (DASA).

9. **Pathophysiology.** The detailed pathophysiology of concussion/mTBI is not fully understood. An active collaborative military research programme continues to investigate concussion/mTBI, including blast related head injury.

10. **Natural History.** Regardless of the underlying process, the majority of cases of concussion/mTBI may be considered as a temporary impairment of brain function presenting with a variety of physical, cognitive, and emotional symptoms following head injury. In the civilian population, most symptoms resolve rapidly (within two to three weeks of injury) and the majority of cases (80%) will be completely symptom free within three months⁸.

11. **Prognosis.** There is evidence to indicate that early identification, support and appropriate management of concussion/mTBI is important in improving outcome and preventing persistent symptoms⁹. Initial intervention should be focused on reassuring the patient and reinforcing an expectation of rapid recovery.

12. **Differential Diagnosis.** The diagnosis of concussion/mTBI may sometimes be difficult due to symptom overlap or co-existence with other conditions. US¹⁰ and UK¹¹ research indicates that in some cases, concussion/mTBI may be associated with mental health symptoms, notably PTSD, and suggests there may be some common mechanisms involved. These findings highlight the importance of considering the differential diagnosis carefully in concussion/mTBI, particularly in the small number of cases that do not resolve in the expected timeframe.

DIAGNOSIS

13. Patients with concussion/mTBI can present to medical personnel with a variety of symptoms which normally manifest immediately following an event. Whilst most resolve quickly within minutes to hours some may persist longer. To make a diagnosis of concussion/mTBI all three of the following criteria must be met:

- a. A history of related head injury or involvement in a blast.
- b. Glasgow Coma Scale (GCS) no lower than 13 at thirty minutes post-injury. c.

One or more of the following:

- i. **Alteration of consciousness (AOC) / mental state** - this may present as a variety of transient physical, cognitive or emotional symptoms. Commonly this will include confusion, disorientation, feeling or looking dazed and difficulty concentrating.

⁶ Rona, Roberto J.; Jones, Margaret; Fear, Nicola T et al. Mild Traumatic Brain Injury in UK Military Personnel Returning From Afghanistan and Iraq: Cohort and Cross-sectional Analyses. *Journal of Head Trauma Rehabilitation*, 24 March 2011.

⁷ US Army 'Talking Point' brief dated 05 May 2010.

⁸ Carroll et al (2004). Prognosis for mild traumatic brain injury: results of the WHO Collaborating Centre for Neurotrauma Task Force on MTBI *JRehabil Med*; 43:84-105

⁹ Comper P, Bisschop SM, Carnide N & Tricco A. (2005). A systematic review of treatments for mild traumatic brain injury. *Brain Injury*, 19 (11), 863-880.

¹⁰ Hoge CW et al. *N Engl J Med* 2008 Jan 31;358(5):453-63. Mild traumatic brain injury in US soldiers returning from Iraq.

¹¹ Kings' Centre for Military Health Research – a 15 year report. Sep 2010.

- ii. **Loss of consciousness (LOC)** - for no more than 30 minutes duration post-injury.
- iii. **Post-traumatic amnesia (PTA)** - for no more than 24 hours duration post-injury.
- iv. **Transient neurological abnormalities** - such as focal signs or seizures.

14. A comprehensive list of symptoms and signs which may be associated with concussion/mTBI includes:

Physical	Cognitive	Behavioural & Emotional
<ul style="list-style-type: none"> • Feeling / looking dazed • Headaches • Dizziness • Balance disorders • Nausea and/or vomiting • Fatigue • Sleep disturbance • Blurred vision • Sensitivity to light/noise • Hearing difficulties • Numbness and tingling 	<ul style="list-style-type: none"> • Confusion • Disorientation • Problems with memory • Reduced speed of mental processing • Difficulty concentrating • Degraded judgement. 	<ul style="list-style-type: none"> • Problems controlling emotions • Agitation • Irritability • Anxiety • Aggression • Depression • Impulsiveness

For a diagnosis of concussion/mTBI, symptoms must be specifically related to a precipitating event and must not be due to drugs, alcohol, medications or other illness or injury, psychological trauma or language difficulties. Where diagnostic confusion exists appropriate specialist clinical input should be sought.

MANAGEMENT PRINCIPLES

15. **General.** The algorithm at Annex A guides medical staff in the management of concussion/mTBI in the deployed setting both for the Role 1 primary care provider and at Role 2/3. These guidelines are aimed at reducing the impact of concussion/mTBI on the patient by ensuring early education and information through use of a patient information leaflet (Annex B) and timely symptom-based intervention whilst at the same time minimizing the operational impact of unnecessary evacuation. The role of the patient's line manager is considered crucial in the management of concussion/mTBI during the early post-injury phase and advice for commanders is therefore included at Annex C. 'Red Flag' indicators are highlighted to assist medical staff in identifying when early onward referral is appropriate or when further advice should be sought.

16. **Role 1.** Annex A outlines the management algorithm for suspected concussion/mTBI in the deployed Role 1 setting. The policy permits stable patients (without 'red flags') to be held at Role 1 for a maximum of 14 days, after which referral/ advice must be sought from Role 2/3. The policy does not differentiate between those Role 1 locations with a Medical Officer (MO)/Nursing Officer (NO) and those remote locations where other Role 1 medical personnel¹² may be operating without immediate supervision. These guidelines are deliberately generic and detailed Standing Operating Instructions (SOIs) may need to be developed for specific operating environments taking into account the experience and qualifications of medical staff at Role 1 locations. In such cases it may

¹² RN Medical Assistants (MA), Combat Medical Technicians (CMT and RCMT) and RAF Medics.

be appropriate for local SOIs to reduce the period for which concussion/mTBI patients may be held under review before referral to a MO/NO.

17. **Role 2/3.** Suspected concussion/mTBI cases referred to Role 2/3 will undergo more detailed neurological and cognitive examination which may include neuro-imaging and specialist advice in accordance with national best practice in secondary care¹³¹⁴. Where the diagnosis remains unchanged, subsequent management will be determined by the local situation and any theatre medical holding policy in force. It may be appropriate to return the patient to their forward location to continue under Role 1 management or to retain the patient in a rear echelon area. Where evacuation from theatre is recommended for a primary diagnosis of concussion/mTBI the referring clinician is to ensure that appropriate arrangements are made for review of the patient in the Defence Medical Rehabilitation Centre (DMRC) Headley Court and that any aeromedical evacuation signals are addressed accordingly¹⁵¹⁵.

18. **Role 4.** Provision of concussion/mTBI care in the UK Home Base is focused on DMRC Headley Court where a multidisciplinary team delivers the 'Concussion/mTBI Programme'. The detailed management of each patient referred to DMRC is tailored to the individual case but in summary, Role 4 management is based on a three-tier approach:

- a. Tier 1 – Assessment by interview followed by specific therapeutic goal-driven phone and web based therapy for those who have persistent symptoms.
- b. Tier 2 – Enrolment in a two week intensive inpatient treatment group.
- c. Tier 3 – Tailored follow up programme to ensure symptoms remain managed following return to full time work.

19. In addition to referrals from operational theatres, DMRC assesses all inpatients and outpatients who may be at risk of concussion/mTBI. Similar routine assessment also takes place on all casualties evacuated to RCDM Birmingham from any operational theatre. Recognising that in some cases patients may not report their mTBI/concussion symptoms until after leaving an operational theatre, the mTBI team at DMRC will also accept medical referrals from elsewhere within the DMS in the normal manner.

TREATMENT

20. The principle of treatment is to foster natural recovery by reassurance, education and monitoring. Periodic medical review will be required, tailored to each individual until symptom free and returned to duty.

21. The majority of patients will present to Role 1 medical staff soon after a head injury / blast incident. Assuming no other injuries take precedence, medical staff should take a careful history to determine the details of the suspected concussion/mTBI event. Any physical, cognitive and emotional symptoms should be determined and a basic neurological examination¹⁶¹⁶ conducted to exclude any 'red flags' which may require evacuation or referral. It should be noted that 'red flags' do not necessarily preclude a diagnosis of concussion/mTBI but merely provide an indicator to seek further medical opinion. The UK's current symptom-based approach does not require mandatory medical assessment (screening) following exposure to head injury / blast incident. However, medical

¹³ JDP 4-03.1 Clinical Guidelines for Operations (CGOs) – Section 3, Treatment Guideline 9a, 'Head Injury'.

¹⁴ NICE Clinical Guideline 56 – Head Injury dated 28 Nov 1997 (www.nice.org.uk/CG56).

¹⁵ AP 3394 - 4th Edition.

¹⁶ As a minimum this should include standard head injury observations as per F Med 290 ' Head Injury Observation Chart' i.e. GCS score, pupil reaction and symmetry, limb power, pulse and blood pressure

staff should adopt a proactive approach following any high risk incident and be alert to the possibility of concussion/mTBI in those involved. Where a diagnosis of concussion/mTBI is made, the following action is to be taken:

- a. Reassure & advise patient. Issue 'Patient's Guide to Concussion' (Annex B).
- b. Issue 'Commander's Guide to Concussion' (Annex C) for patient's military line manager with appropriate verbal consent recorded in the medical record. Where consent to release information is not given this must also be recorded.
- c. Stand down patient for 24 hours and consider subsequent employment restrictions (see below).
- d. Review patient at 24 hours; as required thereafter; and prior to return to duty.

22. Annex D should be used by medical staff to chart progress of concussion/mTBI symptoms. The ability to demonstrate an improving trend in symptoms will be reassuring to the patient and may assist the recovery process. Conversely, a deteriorating trend in symptoms may highlight to medical staff the need for onward referral. Once completed Annex D will become part of the patient's medical record and should be managed accordingly.

23. There is no specific drug treatment for the management of concussion/mTBI but simple analgesics (eg paracetamol) may be used for headache symptoms.

EMPLOYMENT RESTRICTIONS

24. All patients diagnosed with concussion/mTBI are to be given a minimum 24 hour rest period whenever the operational situation allows. Assuming the individual can be adequately rested and attend for any necessary medical reviews, this stand down should take place in the individual's normal place of duty.

25. Following this period of stand down, appropriate employment restrictions should be tailored to individual circumstances and managed in collaboration with the patient's local chain of command. This will be important in protecting the patient from stressors which may delay recovery, and should include steps to minimize the risk of exposure to any further concussion/mTBI event before full recovery has taken place.

26. If all symptoms resolve within 24 hours of the injury, the individual may return to full duties following local medical review but should be advised to seek further medical assistance if symptoms return. Those individuals not fully recovered after this period should be reviewed and considered for further stand down or a limited return to work. This graduated return to full duties must be tailored to their rate of recovery as measured by the presence or absence of concussion/mTBI symptoms, and based on a local risk assessment. Examples of common restrictions that should be considered after a concussion/mTBI event are below:

- a. Unfit weapon handling and/or guard duties.
- b. Unfit to operate unguarded machinery.
- c. Unfit to operate vehicles (e.g. MT, aircraft, marine craft as required).
- d. Unfit extended working hours / shift work; or fit limited working hours only.
- e. Unfit strenuous physical exertion including physical training.

27. Individuals who have not recovered adequately by 14 days post-incident are to be

referred to Role2/3 for further assessment.

28. Particular care should be taken where there is a history of previously diagnosed concussion/mTBI incidents. Any stand-down period may need to be extended and medical staff should seek advice and/or consider early referral to a higher level of care where there is a history of multiple concussion/mTBI incidents.

RECORD KEEPING

29. In order to monitor the incidence of concussion/mTBI it is important that data is recorded in a consistent manner. Where the DMICP electronic patient healthcare record is in use, concussion/mTBI should be coded using the customised DMS code 'DMSRC133 Mild Traumatic Brain Injury'. In the secondary care setting where ICD 10 is in use 'S0600 Concussion – Closed Intracranial Injury' is to be used. An electronic template for concussion/mTBI is under development for use in the primary care environment.

TRAINING & EDUCATION

30. **Medical Personnel.** Head injury is a commonly occurring condition in the peacetime setting and it is expected that all military medical staff should already be aware of the basic principles involved in the management of concussion/mTBI. Single Service Medical Directors are to ensure that appropriate through-life training on the management of concussion/mTBI is in place for their medical personnel. All medical staff will require refresher training on concussion/mTBI prior to deploying on operations in order to ensure compliance with this policy.

31. **General.** All personnel deployed on operations are to be made aware of the risk of concussion/mTBI particularly in relation to blast injury and should be encouraged to report to medical staff if symptomatic after a head injury or exposure to blast. Education should be targeted during the pre-deployment training phase and on arrival in Theatre as part of any RSOI¹⁷ medical package. Military commanders and line managers will be made aware of their important role in the management of personnel diagnosed with concussion/mTBI through the issue of Annex C.

SUMMARY

32. Early identification, support and treatment of concussion/mTBI is important. Current evidence points to success from early educational intervention which should be focused on an expectation of rapid recovery. This will reduce the likelihood of persistent symptom developing in the majority of cases and allow management to take place predominantly in the Role 1 / primary care setting.

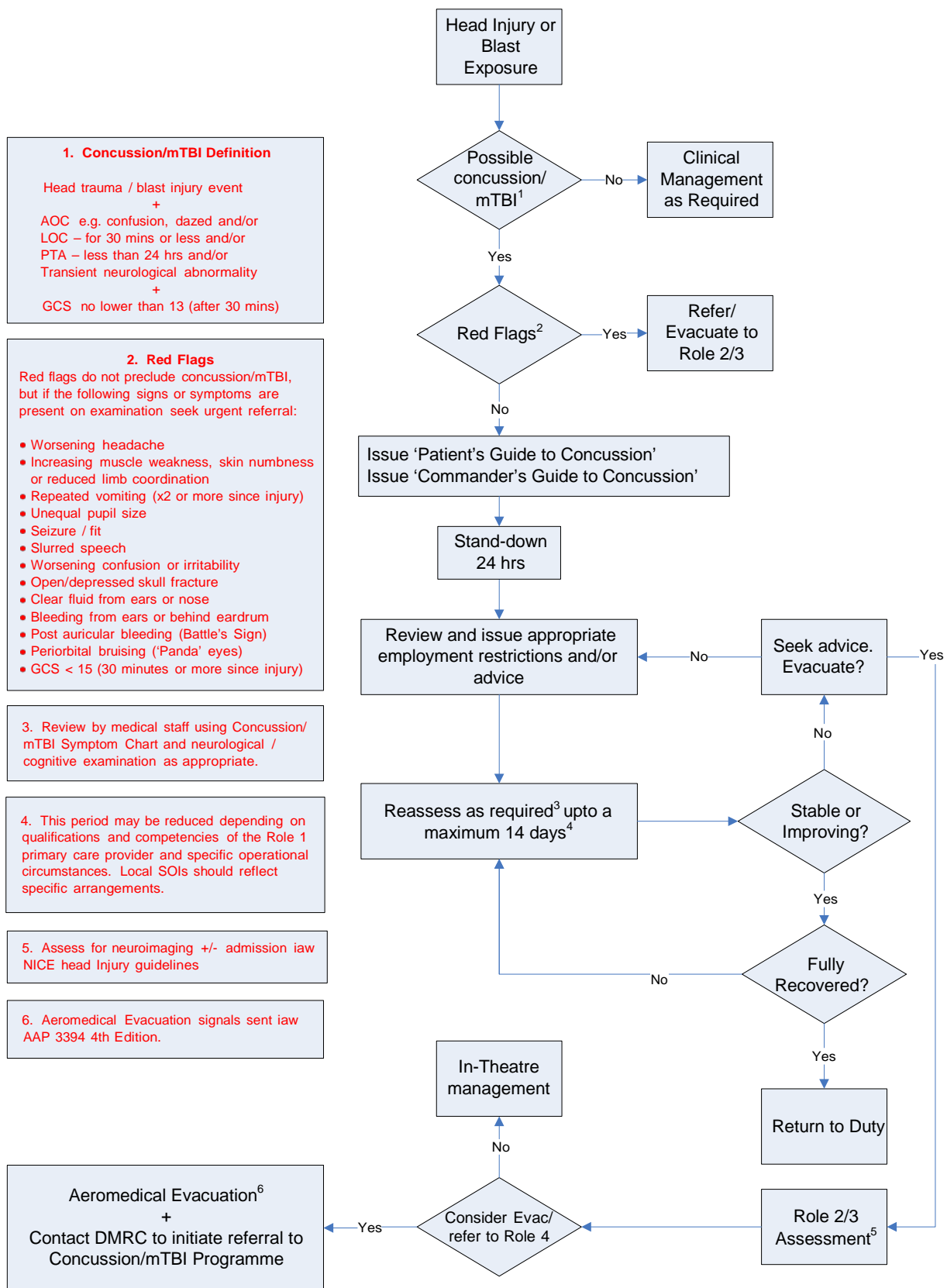
33. Persisting symptoms may or may not be associated with a reported concussion/mTBI, but where it becomes apparent that the condition is not resolving in the expected timeframe early onward referral should take place. DMRC Headley Court is the DMS centre of expertise on the treatment of symptoms associated with concussion/mTBI. Where diagnostic confusion exists advice may also be sought from the DCMH teams (for mental health symptoms) or from a military neurologist.

Annexes:

- A. Concussion/mTBI – Clinical Management Algorithm
- B. Patient's Guide to Concussion
- C. Commander's Guide to Concussion.
- D. Concussion/mTBI - Symptom Chart for Use by Medical Staff

¹⁷ RSOI – Reception, Staging and Onward Integration

CONCUSSION / MTBI CLINICAL MANAGEMENT ALGORITHM



PATIENT'S GUIDE TO CONCUSSION

What happened to me? Your assessment indicates that you have had a concussion. This is also sometimes referred to as a “mild traumatic brain injury” (mTBI).

What is a concussion? A concussion is a head injury from a hit, blow, or jolt to the head (either from a direct blow or from being close to a blast) that briefly knocks you out (loss of consciousness), or makes you feel confused or “see stars” (alteration or change in consciousness).

What are the symptoms? Immediately or soon after the concussion, you may feel disorientated and may experience headaches, dizziness, balance difficulties, ringing in the ears, blurred vision, nausea, vomiting, irritability, temporary gaps in your memory, sleep problems, or attention and concentration problems.

How long does it last? Most people recover completely from concussion. Symptoms usually begin to improve within hours and typically resolve completely within days to weeks.

Recovery. Recovery is different for each person and depends on the nature of the injury. The most important thing you can do is to allow time for your brain to recover and this is best done by a combination of rest and a graduated return to full duties.

Why does a concussion affect return to duty? Concussion can reduce your effectiveness which could impair your performance and endanger you or your colleagues. If you get another concussion before healing from the first one, you are at greater risk of a more serious injury.

What happens now that I have been diagnosed with a concussion?

- You may have been given a period of stand down or light duties. You will be advised when you need any medical review. Be honest about your symptoms when you see your medical provider - they are protecting you and your unit.
- Your military line manager will be informed of any work restrictions. With your consent they will receive a separate leaflet providing guidance on concussion and advice on how to promote your quick recovery.
- Rest - Avoid exerting yourself physically (heavy lifting, exercising, etc). Avoid mental exertion (e.g. writing reports and activities requiring you to concentrate hard).
- Return to Duty - Expect to recover fully and RTD. Your medical provider will continue to evaluate you and will determine (in conjunction with you and your military Line Manager) when it's safe for you to RTD.

Do's & Don'ts

Things That Speed Recovery	Things That Slow Recovery
<ul style="list-style-type: none"> • Maximise downtime/rest during the day • Get plenty of sleep • Protect yourself from another concussion: avoid contact sports • Let others know that you've had a concussion so they can watch out for you • Return immediately to your medical staff if you're feeling worse or experience any warning signs* 	<ul style="list-style-type: none"> • Another concussion before healing of the first one • Alcohol • Inadequate sleep (made worse by caffeine or 'energy-enhancing' products) • Aspirin, ibuprofen, and other over-the-counter pain medications unless instructed by your doctor • Sleeping aids and sedatives unless instructed by your doctor

Coping measures. The following table lists some practical coping measures that you are advised to use:

Symptom	Action
Slower Thinking, Confusion and Difficulty Concentrating	<ul style="list-style-type: none"> • Establish a daily routine and structure your time. • Ask others to slow down and to repeat things if needed. • Allow extra time to complete tasks. • Break activities down into smaller periods and take more rests. • Do only one thing at a time. • Avoid distractions e.g. turn off the TV/radio when working. • Consult with friends/colleagues when making important decisions.
Memory problems	<ul style="list-style-type: none"> • Put important items in the same place all the time. • Use a pen and notebook to keep track of things that need to be done or are hard to remember. Keep to hand at all times. • Ask friends and colleagues to remind you.
Irritability	<ul style="list-style-type: none"> • Walk away from situations if they cause annoyance. • Actively use relaxation techniques. • Working out in the gym can help if it does not over-tire. • More rest can reduce irritability.
Fatigue	Rest whenever possible.
Anxiety, sleep problems, and low mood	These tend to be reactions to the other problems and tend to improve as other symptoms reduce. If you are worried about them see your medical staff.

* **Warning Signs.** If you begin to experience any of the following, seek immediate medical attention:

<ul style="list-style-type: none"> • Worsening headache • Worsening balance • Double or disturbed vision 	<ul style="list-style-type: none"> • Decreasing level of alertness • Increased disorientation • Repeated vomiting 	<ul style="list-style-type: none"> • Seizures or fits • Unusual behaviour • Amnesia/memory problems
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COMMANDER'S GUIDE TO CONCUSSION

Why have I received this? Medical staff have determined that one of your personnel has sustained a concussion - sometimes also referred to as a "mild traumatic brain injury" (mTBI). The patient has consented to sharing this information with you. As the patient's military line manager you have an important role in promoting their recovery.

What is a concussion? A concussion is a head injury from a hit, blow, or jolt to the head (either from a direct blow or from being close to a blast) that briefly knocks the person out (loss of consciousness), or makes them feel confused or "see stars" (alteration or change in consciousness).

What are the symptoms? Immediately or soon after the concussion, the affected individual may feel disorientated and may experience headaches, dizziness, balance difficulties, ringing in the ears, blurred vision, nausea, vomiting, irritability, temporary gaps in memory, sleep problems, or attention and concentration problems.

How long does it last? Most people recover completely from a concussion. Individuals should be reassured that symptoms usually begin to improve within hours and typically resolve completely within days to weeks.

Recovery. Recovery is different for each person and depends on the nature of the injury. The most important thing is to allow time for the brain to recover and this is best done by a combination of rest and a graduated return to full duties.

Why does a concussion affect return to duty? Concussion can reduce effectiveness which could impair an individual's performance. In the operational environment this may endanger them or their colleagues. If the individual sustains another concussion before healing from the first one, they are at greater risk of a more serious injury.

How can I help? Medical staff will already have reassured the patient and encouraged them to expect a full recovery - you should reinforce this message. Evidence shows that you can assist the speed of recovery by reducing the demands placed upon the individual to a level that does not worsen their symptoms. Medical staff will advise on any 'stand down' or period of light duties/restricted activity but you are better placed to tailor this to the individual's role. Match duties to the individual's ability and level of symptoms. Encourage them to talk regularly with you about this. If symptoms get worse this may indicate they are pushing themselves too hard. Routine and familiar tasks will be easier than new and unfamiliar ones. Encourage personnel to take extra breaks if needed. Once symptoms have stabilised increase the amount of work gradually.

Do's & Don'ts. Patients are advised to do the following:

Things That Aid Recovery	Things That Impair Recovery
<ul style="list-style-type: none"> • Maximise downtime/rest during the day • Get plenty of sleep • Protect from further concussion; no contact sports • Let colleagues know that they've had a concussion so they can look out for them – use 'buddy' system • Return immediately to medical staff if they are feeling worse or experience any warning signs* 	<ul style="list-style-type: none"> • A further concussion before healing of the first one • Alcohol • Inadequate sleep (made worse by caffeine or 'energy-enhancing' products) • Aspirin, ibuprofen, and other over-the-counter pain medications unless instructed by medical staff • Sleeping medication unless instructed by MO

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