10.0 NEUROLOGY

Revised: April 2018 Reviewed: December 2017

10.1 CRANIAL NEURALGIA

Revised: April 2018 Reviewed: December 2017

AEROMEDICAL CONCERNS: The pain of cranial neuralgia can be incapacitating in flight. The symptoms of trigeminal neuralgia may be stimulated by the wearing of an oxygen mask. Glossopharyngeal neuralgia has been associated with syncope and cardiac arrest.

WAIVER: Because of the severity and chronic recurrent behavior of the neuralgias, these are CD, waiver usually not considered.

INFORMATION REQUIRED:

1. Neurology or neurosurgical consultation

TREATMENT: Pharmacological treatments (Tegretol, Triavil, Prolixin, Mexitil), although effective, are not waiverable due to side effect profiles. Surgical "cures" (microvascular decompression) may be achieved, and waivers may then be considered on a case-by-case basis.

DISCUSSION: Although most cranial neuralgias are probably due to microvascular compression at the root entry zone, other etiologies need to be considered, especially in the young adult population in whom demyelinating disease, aneurysms, neoplasms, and infectious etiologies (post-herpetic, Lyme disease, etc) may be more common. The finding of sensory loss in the company of neuralgia should alert the flight surgeon to consider these other causes of cranial neuralgia.

ICD-10 CODES:

G50.0 Trigeminal Neuralgia
B02.22 Post Herpetic Trigeminal Neuralgia
M54.81 Occipital Neuralgia
G52.1 Glossopharyngeal neuralgia

10.2 DECOMPRESSION SICKNESS

Revised: April 2018 Reviewed: December 2017

AEROMEDICAL CONCERNS: Residual neurological/neuropsychological impairment is a safety of flight issue. Most individuals who have suffered DCS make a full recovery and are not at increased risk for recurrent DCS. Decompression sickness with full recovery is not considered disqualifying (NCD) for flying duties. Type I or Type II DCS with residual symptoms after treatment is CD, however waiver may be considered on a case by case basis. Neurology (and possible neuropsychological examination) is required for waiver consideration.

The flight surgeon with a patient with suspected DCS should:

1. Make an aeromedical disposition after consulting with NAMI Neurology.
2. Document a normal evaluation by neurologist, DMO or HMA prior to returning a member to flight status.
3. Members with a history of DCS should be referred for hypoxic training using the Reduced Oxygen Breathing Device (ROBD).
4. Bubble contrast echo is offered to patient only as an option.

Grounding requirements:

1. Type I DCS: at least 3 days with no evidence of residual effects

Type II DCS: at least 14 days with no evidence of residual effects

TREATMENT: Recompression therapy is the standard, however many Type I patients will respond completely to surface oxygen therapy and may not require hyperbaric oxygen.

DISCUSSION: Often we err on the conservative side and treat patients whose findings and symptoms may be equivocal, especially in the training commands where students are instructed to report any and all symptoms that occur following low-pressure chamber flights. A high index of suspicion in this setting coupled with enthusiasm for treatment must be weighed in evaluating the outcome and disposition. Diving-related cases of DCS tend to be more straightforward, as well as more severe. These patients often receive relatively delayed treatment and are more likely to suffer permanent residual effects. Except for older age, no factors are clearly linked to increased risk for recurrent DCS. Individuals who do suffer recurrent DCS are probably at higher risk for reasons that cannot be defined or predicted and should not be considered for waiver without careful evaluation of the risk-benefit factors. The above recommendations adopt the policy used by the Navy diving community and consider DCS as a treatable occupational hazard that should have no adverse impact on a member's future career following full clinical recovery.

ICD-10 CODES:

T70.3 Decompression Sickness: Type I and II
T70.20 Unspecified effects of high altitude
T70.29 Other effects of high altitude
W94 Exposure to high and low air pressure and changes in air pressure
W94.23 Exposure to sudden change in air pressure in aircraft during ascent
W94.29 Exposure to other rapid changes in air pressure during ascent
W94.21 Exposure to reduction in atmospheric pressure while surfacing from deep water

AEROMEDICAL CONCERNS: The aeromedical implication of a seizure in flight is severe.

WAIVER: A single, febrile seizure under age 5 is NCD. Two or more febrile convulsions are CD, waiver considered. A single seizure clearly attributable to a toxic cause may be considered for waiver. All other seizures are CD, no waiver. Myoclonic jerks associated with G-LOC are NCD.

INFORMATION REQUIRED:

1. Neurological consultation
2. EEG
3. MRI scan

TREATMENT: N/A for waiver purposes.

DISCUSSION: The risk of having a first seizure falls from about 0.4% at age 20 to 0.06% at age 50, before rising sharply to 0.8% by age 70. The late rise is because of the increase in precipitating factors such as neuronal degeneration and cerebrovascular disease. After a single, unprovoked seizure in adults, the risk of a second episode while not taking anticonvulsants is 64% over 3 years and 80% at 5 years, with over two thirds of these occurring during the first year. With no risk factors, such as previous neurological insult or a sibling with epilepsy, the risk of a second seizure is 23% at five years. Relapse, even after many years of symptom-free existence without therapy, is possible. These figures apply to individuals living at one atmosphere and one +Gz. The risk for seizure recurrence associated with exposure to the physiological stressors of military aviation is likely to be much higher. Etiologies for seizures in the adult include alcohol (25%), brain tumor (16%), cerebral infarction (14%), trauma (4%), miscellaneous (5%) and unknown (36%). The EEG does not prove or disprove the diagnosis, although an unequivocally abnormal EEG with a good history of seizure does support the diagnosis. EEGs are normal in half of the patients with frank epilepsy. An epileptiform EEG does not, by itself, signify the presence of epilepsy.

ICD-10 CODES:

G40.3 Generalized idiopathic epilepsy and epileptic syndromes
G40.30 Generalized idiopathic epilepsy and epileptic syndromes, not intractable
G40.31 Generalized idiopathic epilepsy and epileptic syndromes, intractable
G40.4 Other generalized epilepsy and epileptic syndromes
G40.40 Other generalized epilepsy and epileptic syndromes, not intractable
G40.41 Other generalized epilepsy and epileptic syndromes, intractable
G40.5 Epileptic seizures related to external cause
G40.8 Other epilepsy
G40.89 Other seizures, including childhood epilepsy
G40.90 Epilepsy, unspecified, not intractable
G40.91 Epilepsy, unspecified, intractable
R56 Convulsions not elsewhere classified
R56.0 Febrile convulsions
R56.1 Posttraumatic seizures
R56.9 Unspecified convulsions

10.4 GUILLAIN-BARRÉ SYNDROME (ACUTE INFLAMMATORY DEMYELINATING POLYNEUROPATHY – AIDP)

Revised: September 2024 Reviewed: September 2024

AEROMEDICAL CONCERNS: Muscle weakness (including extremities, axial or bulbar groups), sensory changes or ataxia evolving over several hours to days that can affect flying and aircrew abilities, creating safety of flight as well as mission completion concerns. The Miller-Fisher variant is comprised of ataxia, areflexia, and ophthalmoplegia (internal and external). Even subtle ophthalmoplegia may cause double vision and presents a safety of flight concern. Autonomic dysfunction may also be present, posing an additional concern regarding tolerance of gravitational force changes, blood pressure and heart rate variability, and cardiac rhythm disturbances that may be especially life-threatening in the aviation environment. Pain is also a common presenting feature that may be the initial presenting sign and persist beyond the acute course of the disease. Recurrence of symptoms is uncommon, and an alternative diagnosis should be considered.

WAIVER: Guillain-Barré syndrome is disqualifying for all classes. A waiver can be considered after recovery of strength, sensation, and autonomic nervous system function. Tendon-stretch reflexes may never return but would not prohibit waiver recommendation. Persistent pain, autonomic nervous system dysfunction, or neurological deficits affecting functional capacity would be considered disqualifying, and waiver not recommended. Applicants should be at least 6 months after symptom resolution to be considered for a waiver. Designated can be returned to flight 6 months or sooner on a case-by-case basis.

INFORMATION REQUIRED:

1. Neurology consultation that includes quantified strength testing of all motor groups, sensory examination and assessment of autonomic nervous system function (if appropriate, referral for formal autonomic testing – tilt table, QSART, TST, HRDB) with recommendation to return to full physical activity. Reports should include results from laboratory studies, lumbar puncture, electrodiagnostic testing, and pertinent imaging studies.
2. Autonomic dysfunction worksheet, unless assessment of autonomic nervous system completed during neurology consultation.
3. Ophthalmology consultation if ophthalmoplegia among presenting symptoms.
4. Documentation of pain assessment.
5. Functional cockpit and egress testing should be completed after clearance to return to duty from neurologist.

TREATMENT: Typical treatment includes either intravenous immunoglobulin (IVIG) and/or plasma exchange therapy. Therapy is usually recommended to start as soon as possible to potentially curtail the weakness from progressing to the point of impairing walking or respiratory compromise. Steroid therapy is not beneficial and may worsen the outcome.

DISCUSSION: Typical Guillain-Barré syndrome is comprised of rapidly progressive, bilateral, ascending weakness. Other variants might present with cranial nerve involvement causing facial, oculomotor or bulbar weakness. Antecedent illness within four weeks prior to the onset of neurological symptoms occurs in approximately two thirds of cases. Cases also have been reported in proximity to vaccination. This syndrome has a broad spectrum of presentations ranging from minor (e.g. isolated mild sensorimotor deficits) to severe (e.g. complete paralysis of all muscle groups with respiratory and cardiovascular compromise). Recurrence of symptoms

is uncommon and alternative diagnoses such as chronic inflammatory demyelinating polyneuropathy (CIDP) should be considered. Patients with other disorders including infections (EBV, CMV, HIV, West Nile, Lyme, *C. jejuni*), autoimmune (SLE), or neoplastic (lymphoma) may present with AIDP. The presence of pleocytosis in the CSF is incongruous with AIDP and suggests alternative diagnoses (e.g. SLE, lymphoma, infection). Electrodiagnostic studies, ideally at least 2 weeks from symptom onset, can help discriminate between demyelinating and axonal subtypes. Axonal subtype typically has a poorer prognosis concerning recovery of strength given axonal regeneration can be irreversible in some cases. There is generally no contraindication to future vaccination of patients who previously had Guillain-Barre syndrome, however, refer to specialist for vaccine exemption recommendations.

ICD-10 CODE:

G61 Inflammatory polyneuropathy
G61.0 Guillain-Barré Syndrome
G65.0 Sequelae of Guillain-Barré Syndrome

References: Willison HJ, Jacobs BC, van Doorn PA. Guillain–Barre syndrome. Lancet. 2016;388 (10045):717–27.

Name: _____ DODID: _____ Date:_____

Autonomic Dysfunction Worksheet

Review of Systems:

Gen: Exercise Intolerance, Fatigue, Cold or Heat Intolerance, Decreased or Increased Sweating

CV/Pulm: Lightheadedness, Dizziness, Chest Pain, Palpitations, Shortness of Breath

GI/GU: Constipation, Diarrhea, Nausea, Early Satiety, Urinary Urgency or

Incontinence Neuro: Headaches, Neckache (coat-hanger pain)

If POSITIVE for CV/Pulm, please complete orthostatic vital signs as below. Orthostatic Vital Signs Procedure Sheet

Date: _____ Time: _____

1. Recumbent Data: Ideally, patient should lie recumbent for 20 minutes for baseline testing.

Duration recumbent prior to measures (10-20 minutes): _

Blood Pressure: _____ Heart Rate: _____

2. Standing Data: Testing blood pressure and heart rate immediately upon standing and every minute for 10 minutes immediately after standing. Please record any symptoms or clinical signs in comment section.

Time	Blood Pressure	Heart Rate	Comments/Patient Sx
0 minutes			

1 minutes			
2 minutes			
3 minutes			
4 minutes			
5 minutes			
6 minutes			
7 minutes			
8 minutes			
9 minutes			
10 minutes			

10.5 HEADACHES AND MIGRAINE (INCLUDING HEADACHE ALGORITHM)

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AEROMEDICAL CONCERNS: Severe headaches can be incapacitating in flight, while milder headaches may act as a distraction. Migraine may involve visual and other aura, nausea and vomiting, and transient neurological deficits that may include aphasia, hemisensory and hemimotor impairment, vertigo, syncope, confusion, and disorientation. These are of obvious concern in aviation personnel. Cluster headaches are incapacitating and may be associated with transient neurological symptoms, lacrimation, and a unilateral Horner's syndrome.

WAIVER: The specific nomenclature or diagnostic label of the headaches is not the key factor for determining whether it is disqualifying. Of greater concern is the effect on general performance, special senses, and risk of recurrence. The aeromedical disposition of members with headache will depend on the frequency and severity of the symptoms, the etiology, and the medication required to control the headaches. The accompanying algorithm may be used to help determine whether a history of headache is disqualifying or not. **Migraine headaches with aura and scotoma are CD with no waivers considered for applicants.**

Severity criteria: If *any* of the following criteria are met, the headache is considered disqualifying:

1. Prohibits performance of required social, vocational or academic activities
2. Member sought Emergency Department, hospital or acute care
3. Neurological dysfunction other than nausea/vomiting or photophobia (especially disturbance of special senses, balance, or motor function)
4. Requires other than simple analgesics or non-pharmacologic methods for control.

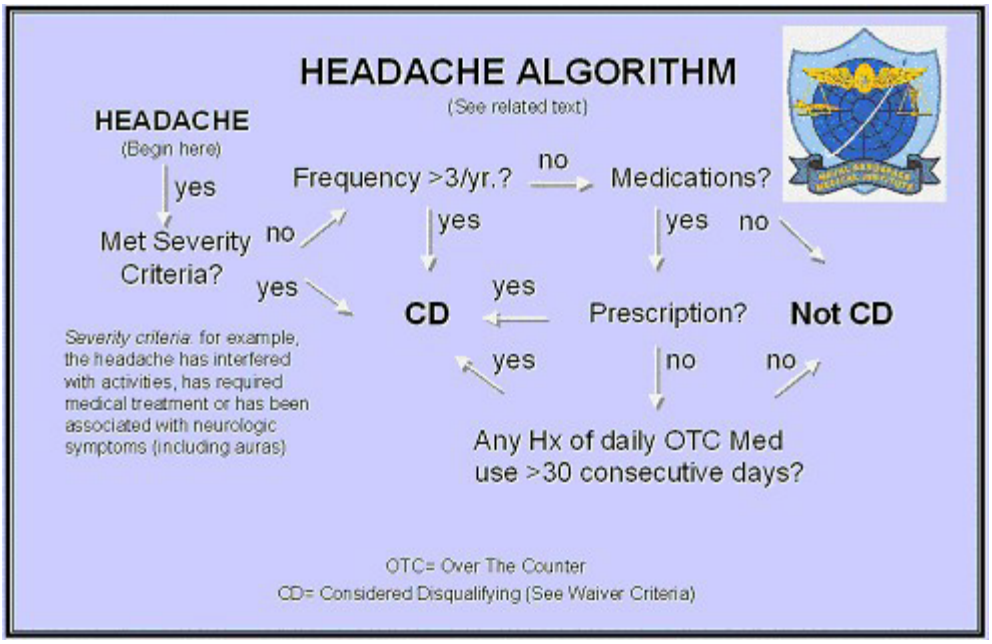
Waiver Consideration Factors: If the headache is determined to be disqualifying, the following factors are considered in the waiver recommendation. Please note these conditions require evaluation by NAMI Neurology and Code 53HN prior to issuance of clearance. A Local Board of Flight Surgeons or Aeromedical Summary should not issue clearance prior to review. The following factors should be considered when submitting for a waiver:

1. Frequency
   a. Severe headache occurred during flight
   b. More than three severe headaches per year
2. Predictability
3. Severity
4. History of any Incapacitation
5. Treatment Required
   a. Non-pharmacologic
   b. PRN abortive therapy
   c. Prophylactic therapy
      (1) Verapamil daily considered for waiver with restrictions if effective and without side effects on a case-by-case basis
      (2) Topamax and inderal are not considered for waiver
6. Type of aircraft
7. Flight hours and experience
8. Specific diagnosis and presentation

9. Status
    a. Applicant or designated
    b. Class I vs. Class II/III

INFORMATION REQUIRED:

1. Neurology consultation



TREATMENT: Simple analgesics are acceptable. The use of NSAID's may be considered for waiver on a case-by-case basis. Life-style changes, biofeedback, and relaxation therapy, if successful, may permit return to flight status for the muscle-contraction or "tension" headache sufferer. Psychiatric/psychological evaluation of these members is strongly recommended. Lithium, methysergide, intranasal lidocaine, adrenocorticosteroids, oxygen inhalation, and sumatriptan may be effective in treating cluster headaches, however neither the cluster headaches nor these treatments generally would be considered for waiver. Although there are many effective pharmacologic treatments for migraine, most are incompatible with waiver.

DISCUSSION: Historically, migraine patients who have returned to flying duties claimed to have had no symptoms for periods ranging from 6 months to several years. This suggests that the original diagnosis was incorrect, that our understanding of the natural history of migraine is at fault, or that symptoms are being deliberately suppressed in order to return to flying. Migraines often begin in adolescence then may remit for several years, usually returning by mid-life. At least 70% of migraineurs have a family history for the same. Less than one third of patients have "classic" migraine with visual aura, but nearly one half will have paresthesias (usually lingual and perioral) with their attacks. Vertigo occurs in about 10% of the cases. Auras typically last 15 - 20 minutes and are followed by unilateral, throbbing headaches associated with photo- and phonophobia, nausea, anorexia, and lethargy. Most patients prefer to lie in a dark quiet room for relief. Precipitants for migraine may include dairy products, chocolate, MSG, nitrates (preserved meats), tyramine (aged cheese, pickled herring, yogurt, fava beans), sleep deprivation, food deprivation, barometric pressure changes, ice cream, and alcoholic beverages. Digital pressure applied to the temples, cold packs, and caffeine are usually beneficial in providing relief. Many patients have a history of carsickness in childhood.

Cluster headaches occur almost exclusively in men, begin in the third or fourth decade, are unilateral, and never change sides. Clusters consist of recurrent severe headaches lasting about 45 minutes, several times daily for a few weeks to months at a time, with a tendency to recur annually, often around the summer or winter solstice.

Recurrent muscle-contraction or tension headaches are associated with depression in the majority of cases, however, underlying cervical spondylosis and DJD may be a contributing factor and will respond to NSAID's and physical therapy. Exertional headaches, cough headaches, and immersion headaches may be associated with posterior fossa pathology (especially Arnold-Chiari Malformation), thus warranting a MRI scan. Coital headaches are almost always benign. Incorrect prescription for astigmatism may also be a cause for headaches; however eye and ENT pathologic explanations are unlikely unless the patient has obvious gross clinical findings of disease in these areas.

ICD-10 CODES:

G40.00 Cluster headache
G43.0 Migraine without aura
G43.1 Migraine with aura
G43.8 Other migraines
G43.B Ophthalmoplegic migraine
G43.C Periodic headache syndromes in child or adult
G44.2 Tension headache

AEROMEDICAL CONCERNS: MS typically presents with visual disturbance, vertigo, lower body weakness, or sensory changes. The symptoms can present over a period of time as short as a few hours. Mild dementia may occur in 20% or more of patients. In some cases, paroxysmal events lasting less than 5 minutes (trigeminal neuralgia, abdominal "crises", myoclonus) can be the presenting feature.

WAIVER: A diagnosis of definite MS is permanently disqualifying without waiver. Waivers may be considered for uncertain diagnoses that may be classified as monosymptomatic demyelinating disease, possible MS, etc. Usually a period of grounding for observation of 6 to 12 months after full recovery from the "attack" of monosymptomatic disease is required. Laboratory findings are critical in predicting the likelihood of progression to MS.

INFORMATION REQUIRED:

1. Neurology consultation
2. Multimodality evoked potentials
3. MRI scans (brain and spinal cord)
4. CSF (cells, protein electrophoresis, IgG, oligoclonal bands, myelin basic protein)
5. Monocular color vision testing
6. Visual fields
7. Retinal photographs (if indicated)
8. Neuropsychological testing (if indicated)

TREATMENT: High dose intravenous methylprednisolone (250 mg qid x 3 days) followed by eleven days of tapering prednisone (1 mg/kg) given ASAP for the first "attack" of MS may reduce or delay the subsequent progression to relapsing-remitting or chronic progressive MS. Beta Interferon may also have a prophylactic or delaying effect on the development of MS.

DISCUSSION: The average age of onset is 33 years, with a male:female ratio of 2:3. The onset is of a single CNS white matter lesion in 55% of cases, with optic neuritis (ON) occurring in 16-30% of initial presentations. ON will occur at some time during the disease in 30-70% of cases, and 25% of these will have a recurrence of ON. In 90% of persons with ON, recovery is complete. Up to 20% of cases follow a benign course with no permanent disability, 20-30% follow an exacerbating/remitting course, 40% follow a remitting/progressive course, and 10-20% show steady progression. In the early stage the attack rate is 0.5/year falling to 0.25/year in intermediate years. In 5% of cases, there is a latent period of several years between first and second attacks, while in a few cases the disease becomes totally quiescent. The features suggesting favorable prognosis are onset before 35 years, acute onset with only 1 symptom, and predominantly sensory symptoms. Poor prognosis is associated with onset at age greater than 35 years, more than 1 symptom with each attack, early onset of motor signs within 5 years, and male gender.

ICD-10 CODES:

G35 Multiple Sclerosis
G36 Other acute disseminated demyelination
G36.0 Neuromyleitis optica
G37 Other demyelinating dieases of central nervous
H46 Optic neuritis

AEROMEDICAL CONCERNS: Depending upon the nerve or nerves involved, peripheral nerve dysfunction may represent a trivial nuisance (e.g. meralgia paresthetica) or a grounding impairment (e.g. radial nerve palsy). Full recovery of neurological function, elucidation of the underlying etiology, and certainty regarding the prognosis are issues to be considered in the individual with peripheral nerve abnormalities.

WAIVER: Most conditions require grounding pending full recovery (if it occurs) and establishment of a firm diagnostic understanding of the cause of the patient's neuropathy.

INFORMATION REQUIRED:

1. Neurology consultation
2. Supporting laboratory findings (where appropriate), such as EMG, NCV, evoked potentials, thyroid functions, Lyme serology, VDRL, HIV, B12, folic acid, ESR, protein electrophoresis, heavy metals, etc.

TREATMENT: Depends on the underlying cause, if known and if treatment exists.

DISCUSSION:

Bell's Palsy: During the acute phase of the paralysis, grounding is required both as a result of the disabling nature of acute facial nerve weakness (difficulty speaking clearly, inability to blink and close the eye in response to visual threats) and because of the fact that not all Bell's palsies are mononeuropathies (i.e. may evolve into acute inflammatory demyelinating polyneuropathy a.k.a. Guillain-Barre, or may be associated with other systemic conditions such as Lyme disease or sarcoid). Once full function has returned, member is PQ. In the event of incomplete recovery or recurrence of facial palsy, waivers are considered on a case-by-case basis.

Carpal Tunnel Syndrome: Safety of flight concerns due to impaired fine motor coordination, strength, sensation, and abnormal sensations in the fingers and hands require grounding until adequate resolution of the neuropathy has been achieved. Waiver requests should include results of electrophysiological studies and functional demonstration of satisfactory recovery (e.g. performance in simulator, cockpit egress testing, operation of safety harness and parachute fittings, etc).

Ulnar/Radial Neuropathy: Same as for Carpal Tunnel Syndrome.

Peroneal Neuropathy: Must demonstrate sufficient return of strength to control rudder and brake pedals and safely egress from aircraft (documented by actual testing) to be considered for waiver. Please also submit electrophysiological test results.

Sciatica: Return of strength (as for peroneal neuropathy) in addition to disappearance of pain (off medication) is required for waiver consideration.

Meralgia Paresthetica: As this is only a sensory neuropathy, waiver can be recommended as long as the member is not disabled or impaired by discomfort and can tolerate the symptoms without need of medication.

ICD-10 CODES:

G51.0 Bell's Palsy
G57.1 Meralgia Paresthetica
M54.3 Sciatica
G56.0 Carpal Tunnel Syndrome
G58 Other mononeuropathies
G58.8 Other specified mononeuropathies (includes peroneal neuropathy)

AEROMEDICAL CONCERNS: The major risk is rebleeding, but there is also a risk of developing hydrocephalus. Bleeding usually follows sudden increases in blood pressure, and it is likely that the anti-G straining maneuver could be just as effective in this as exercise, lifting, or defecation.

WAIVER: Waivers are not considered for patients who have undergone surgical repair of leaking intracerebral aneurysms or removal of AVM's. Patients who have recovered fully from idiopathic SAH with conservative measures may be considered for waiver after 2 years. **No waivers are considered for Applicants.**

INFORMATION REQUIRED:

1. Neurosurgical opinion and confirmation of successful obliteration of the vascular anomaly
2. Neurological evaluation
3. Neuropsychological evaluation
4. MRI or CT scan to confirm absence of hydrocephalus or superficial siderosis

TREATMENT: Intracranial surgery is disqualifying for flying duties.

DISCUSSION: Most patients with this condition have ruptured a Berry aneurysm. Approximately 5% have bled from an AVM and 15% have no identifiable cause. About 25% of patients treated conservatively die within 24 hours of rupture of intracranial aneurysm and up to 25% die in the following 6 months from recurrent hemorrhage, cerebral infarction, or following vasospasm. In the survivors, the risk of rebleeding is just over 2% for the first year declining to almost 1%/year after that. Only 32% of such cases are reported to lead a normal life after the bleed. Those patients in whom no cause is found tend to have a better prognosis. Aneurysms are multiple in 10-20% of cases, and the rate of rebleeding for these is 3% a year. In those patients treated surgically, the risk of rebleeding is negligible if the aneurysm is solitary and has been successfully isolated from the cerebral circulation, but up to 20% of such patients exhibit cognitive or psychosocial decrements at one year. AVMs cause less early death (about 10%); the risk of rebleeding is 7% in the first year and 3% a year thereafter. In patients with AVMs who did not undergo operative repair and were followed for 20 years, there was a 42% incidence of hemorrhage, 29% incidence of death, 18% risk of epilepsy, and a 27% chance of having neurological impairment.

ICD-10 CODE:

I60 Nontraumatic subarachnoid hemorrhage (SAH)
S06.6 Traumatic subarachnoid hemorrhage (SAH)

10.9 SYNCOPE

Revised: April 2018 Reviewed: December 2017

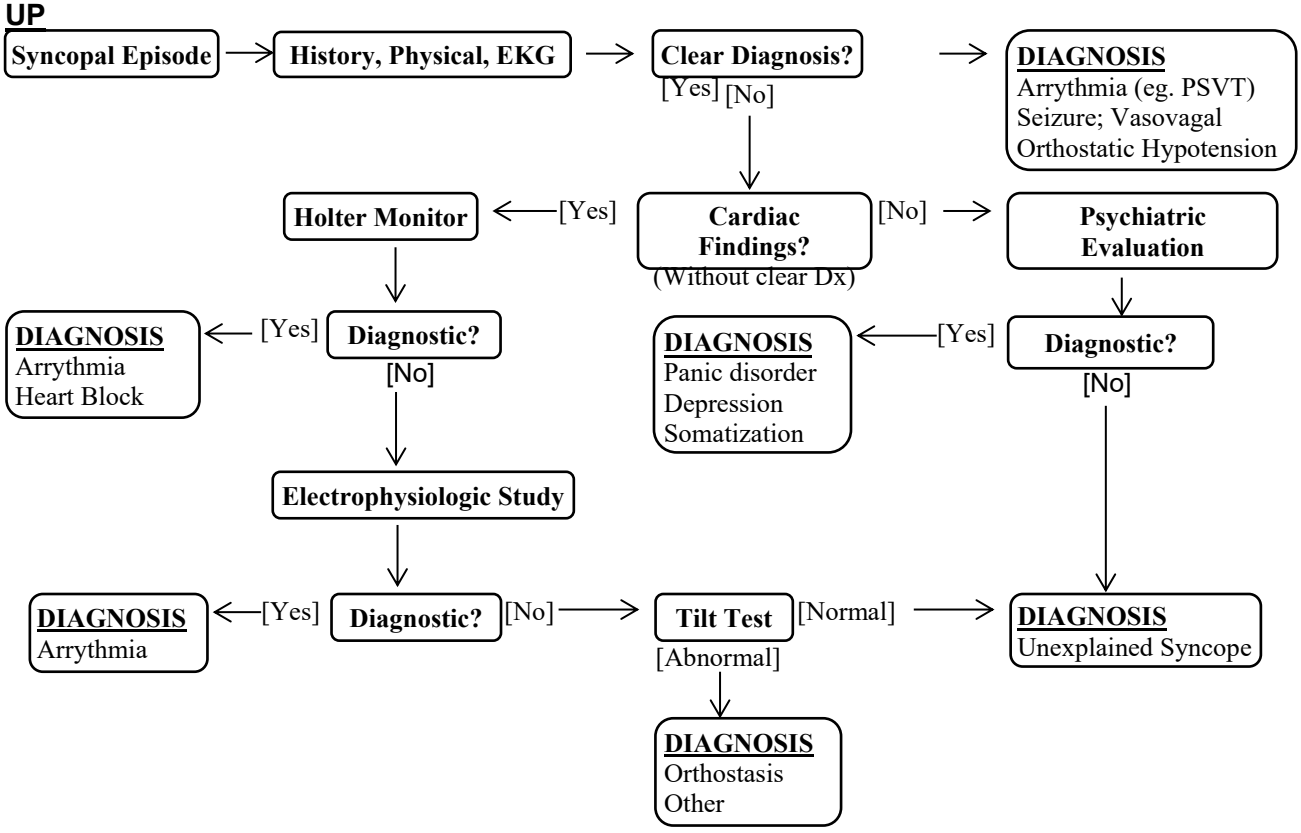
AEROMEDICAL CONCERNS: Loss of consciousness in flight.

WAIVER: A waiver is not required for simple episodes of vasovagal syncope, with known precipitating causes such as pain or the sight of blood. Normal physiological syncope in response to a training event (i.e. hypoxia demonstrated in a hypobaric chamber or G-induced loss of consciousness (G-LOC) in a centrifuge) does not require a waiver. A waiver is necessary for unexplained syncope, recurrent syncope, syncope associated with pathology (e.g. cardiac conduction or valvular defect), syncope with LOC > 1 minute, delay in recovery of normal function > 5 minutes, or G-LOC > 18 seconds, or syncope associated with convulsions lasting over 6 seconds. Non-waiverable situational syncope includes cough-, postural-, Valsalva-, and exertion-induced syncope. Other types of syncope with be considered for waiver on a case-by-case basis.

INFORMATION REQUIRED:

1. Detailed history of the event(s)
2. Physical exam
3. EKG
4. Additional cardiovascular studies as indicated (see Syncope algorithm)
5. Psychiatric evaluation (as indicated)

SYNCOPE WORK-UP



TREATMENT: Avoidance of known stressors (if possible).

DISCUSSION: In 12% of patients with syncope, some type of convulsive movement may occur. Careful history taking, the presence of facial pallor, and the rapid recovery without amnesia help to distinguish syncope from epilepsy. Head injury sustained during the fall may confuse the issue. Presence or absence of incontinence does not help in distinguishing between syncope and seizure. Tongue-biting is strong evidence supporting a seizure event and is unlikely in syncope events. Recurrent unexplained syncope often can be attributed to psychiatric causes, especially panic disorder, depression, and somatization. Brain scans, EEGs, carotid ultrasound, and lab tests are not usually helpful in arriving at a cause for syncope. If the history, PE, and EKG don't provide the diagnosis, it is unlikely that further studies will help. In cases of cough-, Valsalva- and exertion-induced syncope, remember to consider posterior fossa pathology, especially Arnold-Chiari malformation.

ICD-9 CODE:

R55 Syncope and collapse

AEROMEDICAL CONCERNS: Disorders of sleep architecture and timing are common in the general population. These disorders frequently result in complaints of excessive daytime somnolence or insomnia with demonstrable deficits in cognitive and psychomotor performance. Aviation personnel perform a variety of complex tasks requiring a high degree of mental and physical well-being. Fatigue, sleepiness, and circadian rhythm disturbances can have a critical effect on aviation safety.
WAIVER: Because of the persistent nature and impact on psychomotor and cognitive performance, a history of sleep disorders is generally considered permanently disqualifying without waiver. Waivers may be considered in cases when successfully treated.

INFORMATION REQUIRED:

1. Neurology/sleep specialist consultation with polysomnography (PSG). Naval Aviation personnel who require aeromedical certification shall undergo PSG for evaluation of suspected sleep disorder. Referral to a quality sleep medicine center required. (MTF or civilian academic center preference should be consistent with TriCare access standards).
2. Psychiatric evaluation (as indicated)

TREATMENT: Treatment options for the sleep disorders vary based upon diagnosis.

DISCUSSION: Diagnosis of a potential sleep disorder requires a detailed history around the individuals sleep complaint. This should include severity, duration, details of sleep schedule, collateral history from a spouse or partner regarding snoring or apneas, significant environmental stressors, and any evidence of underling psychopathology. Prior to referral to a specialist, every attempt should be made to distinguish a pathologic sleep disorder from poor sleep hygiene. In these cases, simple behavioral modifications may be all that is needed to return the individual to normal function.

Further discussion on the following are discussed below: somnambulism, obstructive sleep apnea, insomnia, idiopathic hypersomnia, narcolepsy, periodic limb movement disorder, restless legs syndrome, and circadian rhythm disorders.

Somnambulism: Due to undesirable or fatal activities that can occur while sleepwalking, a history after age 12 is disqualifying for naval duty, but waivers have been granted for general duty. Sleepwalking episodes typically occur in children before puberty. It is unusual after age 12, with most outgrowing these episodes by age 15. The prevalence in adults has been reported to be approximately 1%, with most persisting from puberty. Recurrent sleepwalking rarely may be associated with a seizure disorder. Other disorders can result in nocturnal wandering (i.e. REM sleep behavior disorder, dissociative disorders, and sleep apnea). These disorders need to be investigated before a primary diagnosis of somnambulism is given. Due to the variable and unpredictable risk to the individual onboard ship, this condition is generally not waived for aviation duty.

Obstructive Sleep Apnea (OSA): see separate section which follows.

Insomnia: The term insomnia is a symptom rather than a specific diagnosis. Insomnia refers to difficulty initiating or maintaining sleep. Among individuals complaining of sleep problems, insomnia is the most common complaint. Insomnia can result from a multitude of diagnoses, including sleep apnea and periodic leg movement disorder. Insomnia is commonly associated with psychiatric disorders including anxiety, depression, personality disorders, or maladaptive traits. Transitional situational insomnia can also result from changes in sleeping environment or in proximity to a significant life event. The psychology of insomnia can occur as a result of a preoccupation with a perceived inability to sleep, or when poor sleep habits persist following resolution of a life stressor. Drug or alcohol related insomnia is another common cause of this complaint. This can result from a variety of agents, including caffeine, which may disrupt sleep architecture as long as 14 hours after ingestion. Most insomnia complaints are transient, resolve in less than 3-4 weeks, and do not require a waiver. Persistent insomnia requires work-up to define an underlying cause. In those cases where an underlying cause is not found, the term Primary Insomnia has been used. Treatment of the underlying diagnosis and a normal sleep study are required before waiver submission.

Idiopathic Hypersomnia: This is a diagnosis of exclusion. It is characterized by complaints of excessive daytime somnolence, generally develops in adolescence or early adulthood, and is persistent. It is important to differentiate this from Upper Airway Resistance Syndrome, a variant of OSA. Stimulant medications are frequently used in treatment and are not compatible with aviation duty. Despite adequate treatment, it is difficult for patients to maintain adequate task performance. Waiver will not be considered for this diagnosis.

Narcolepsy: Narcolepsy affects 50-70 persons per 100,000. Peak onset occurs in the teens and the 25-30 year age group. The classical tetrad of symptoms includes excessive daytime sleepiness, cataplexy, hypnogogic hallucinations, and sleep paralysis, but not all of these are present in every individual. There is a 40-fold increased risk if there is an immediate family member with the disorder. EDS and sleep attacks are generally the first symptoms observed. Diagnosis is confirmed by sleep studies including a polysomnogram and a Multiple Sleep Latency Test (MSLT). The disorder is characterized by short sleep latencies and rapid-onset REM. Treatment consists of stimulants, which are not compatible with aviation duties. Waivers will not be considered for this diagnosis.

Periodic Limb Movement Disorder (PLM): This disorder is manifested by rhythmic nocturnal myoclonus of the arms and legs and may last minutes to hours. It occurs in the first half of the sleep period and may result in frequent arousals and sleep fragmentation. PLM is present in 17% of those having a polysomnogram for insomnia and can coexist with other sleep disorders including narcolepsy and sleep apnea. 11% of individuals with PLM complain of excessive daytime sleepiness. Treatment consists of benzodiazepines (e.g. clonazepam), which are not consistent with aviation duty. Waivers will not be considered for this diagnosis.

Restless Legs Syndrome (RLS): This disorder is manifested by uncomfortable leg sensations that occur at rest. Unlike PLM, night time awakenings in RLS are associated with conscious awareness of the limb movements. RLS affects up to 10% of the U.S. population and over 90% of patients with RLS report sleep disturbance. Despite this, RLS is typically under diagnosed. Only 30% of PLM patients have RLS, but 85% of cases with RLS will also have PLM. Waivers are not considered in patients with PLM. Primary idiopathic RLS manifests an early age and is associated with a better prognosis than secondary RLS. Secondary RLS may occur as a result of pregnancy, end stage renal disease, arthritis and iron deficiency. The severity of RLS symptoms correlates inversely with serum ferritin levels in iron deficient individuals. Iron and magnesium supplementation may resolve RLS, but iron supplementation is not therapeutic in those individuals with ferritin levels above 50ng/mL. Beneficial lifestyle modifications include alterations in timing, duration and intensity of physical exercise, elimination of alcohol, caffeine and tobacco products as well as optimization of personal sleep hygiene. Stretching, hot baths, alternation of warm and cold soaks to the legs, engaging in mentally engrossing activity and cooling of the feet have also been reported to alleviate symptoms.

Waivers are not considered for applicants. For designated aviators, vigilance testing and polysomnogram are required for waiver consideration. Underlying medical conditions in secondary RLS must be addressed.
Medications such as opiates, tramadol, clonazepam, and dopaminergic agents such as levodopa, ropinirole and pramipexole, are not approved for waivers due to common side effects.

VIGILANCE TESTING: The defacto standard for measuring sustained alertness where public safety is concerned is the Maintenance of Wakefulness Test (MWT). Although a Mean Sleep Latency (MSL) of 30.4 +/- 11.2 minutes is considered normal for the general population, treated aircrew members have historically demonstrated the ability to stay awake for all 40 minutes of each of the 4 trials of the MWT. Research has shown significantly more lapses in attention in drivers whose MSL was less than 33 minutes. Accordingly, the minimum MSL standard for aeromedical waiver eligibility is ≥ 35 minutes.

If a MWT cannot be obtained, vigilance may be assessed with a Neuropsychological evaluation that includes a test of sustained attention, such as the Connor's Continuous Performance Test (CPT-II). The report should address how vigilance was assessed, as well as how the patient performed on measures of executive function.

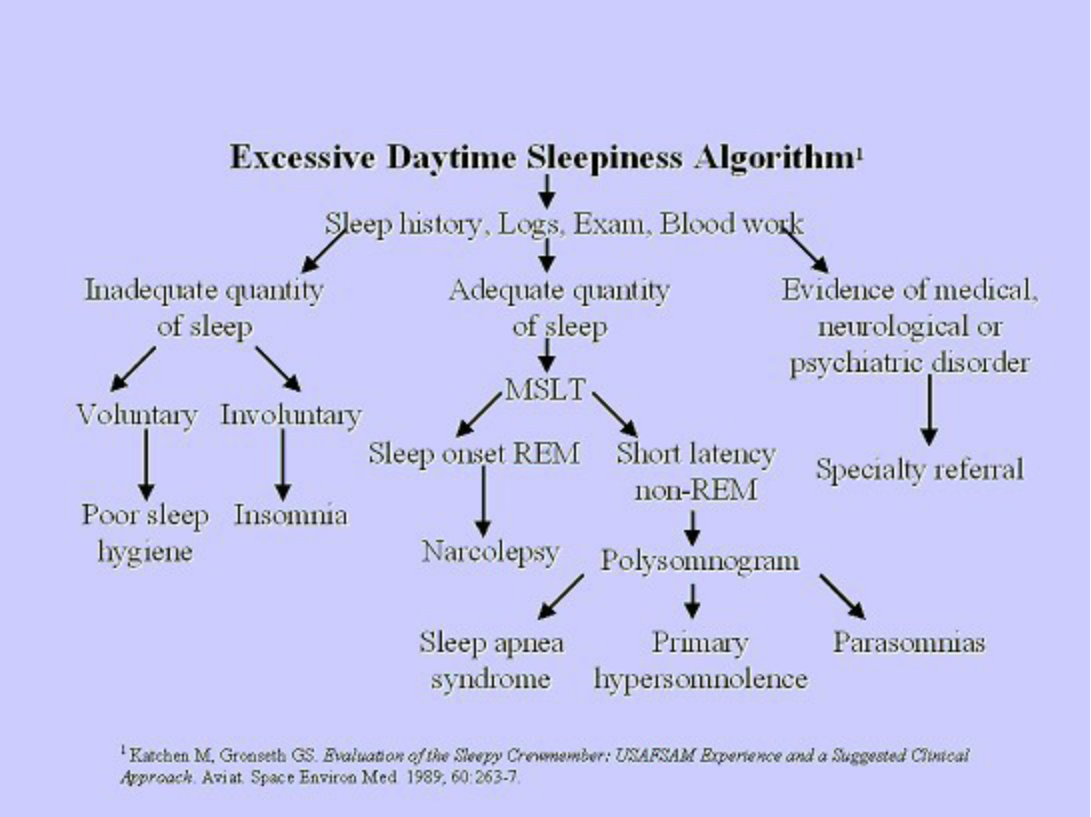
The Multiple Sleep Latency Test (MSLT) is not a test of sustained vigilance and will not support an aeromedical waiver.

An aviator's self-report is not sufficient evidence of adequate alertness for initial aeromedical waiver.

Circadian Rhythm Disorders: This refers to a series of disorders in which there is a disorganization of the regular daily alteration between sleep and wakefulness and its synchrony with the day-night cycle. These disorders can be classified as either persistent or transient.

The persistent disorders include Delayed Sleep Phase Syndrome (DSPS), Advanced Sleep Phase Syndrome (ASPS), Non-24 hour Sleep Syndrome, and Irregular Sleep-Wake Syndrome. In DSPS, the circadian system is shifted markedly later than normal (e.g., unable to fall asleep before 3 am and cannot wake up before noon without extraordinary effort). This syndrome occurs in young to middle aged adults. DSPS has been estimated to occur in over 7% of adolescents. It should be noted that the remaining diagnoses are rare. ASPS occurs in the aged and is the exact opposite circadian shift seen in DSPS. In Non- 24 hour Sleep-Wake Syndrome, environmental cues fail to synchronize the internal sleep-wake rhythm with the day-night cycle. This results in the circadian rhythm being shifted 1-2 hours later each day, resulting in cyclical insomnia. Irregular Sleep-wake Syndrome represents a failure of the internal clock. It is manifested by random, scattered sleep-wake periods throughout the 24-hour period. This is usually associated with a tumor or other destructive neurological lesion. Transient conditions include Time-zone Change Syndrome or "Jet-Lag" and Shift-work Syndrome. Jet-Lag is a self-limiting and is NCD, but may necessitate grounding until re-synchrony occurs. The transient sleep disruptions and performance decrements seen in jet-lag may become chronic in the shift worker. Individuals affected severely enough to seek medical attention may best be treated by removal from the shift-work environment. In almost all cases this condition is not compatible with aviation duty and is CD, waiver not recommended. All persistent disorders are CD, but waiver may be considered in successfully treated cases. One should recognize that treatment of these disorders involves sleep schedule manipulations and successful treatment only occurs in a small percentage of individuals.

Medical Conditions that may disrupt normal sleep include depression (20%), post-viral fatigue syndrome, head injury, anemia, hypoglycemia, thyroid disease, drugs/alcohol, pain, GERD, and pulmonary disease, among others. Treatment of the medical condition generally resolves the sleep complaint.



*None of these conditions, by themselves, are an indication for Sleep Medicine referral without additional symptoms or other evidence suggestive of a sleep disorder.

ICD-10 CODES:

G25.81 Restless leg syndrome
G47 Sleep Disorders
G47.0 Insomnia
G47.01 Insomnia due to medical condition
G47.1 Hypersomnia
G47.14 Hypersomnia due to medical condition
G47.2 Circadian rhythm sleep disorder
G47.21 Circadian rhythm sleep disorder, delayed sleep phase
G47.3 Sleep apnea
G47.31 Primary central sleep apnea
G47.4 Narcolepsy and cataplexy
G47.41 Narcolepsy
G47.411 Narcolepsy with cataplexy
G47.419 Narcolepsy without cataplexy
G47.61 Periodic limb movement disorder
G47.69 Other sleep related movement disorders
F51.4 Sleep terrors (night terrors), somnabulism
G47.8 Other Sleep Disturbance

10.11 OBSTRUCTIVE SLEEP APNEA

Revised: Dec 2024 Reviewed: June 2024

AEROMEDICAL CONCERNS: The primary aeromedical concern is cognitive impairment due to Excessive Daytime Sleepiness (EDS), manifested by the inability to sustain attention to tasks, reduced reaction time, and poor executive function, including multitasking and situational awareness. Aviation personnel perform a variety of complex tasks requiring a high degree of mental and physical acuity. OSA causes Excessive Daytime Sleepiness (EDS) with demonstrable deficits in cognitive and psychomotor performance. By their nature, military aviation operations can impose sleep deficit and disruption even in healthy members due to shifting sleep-wake cycles, sustained wake periods, and circadian rhythm shifts with crossing time zones. With an underlying sleep disorder the potential for a critical effect on aviation safety and mission effectiveness is magnified substantially.

DISCUSSION: Obstructive sleep apnea (OSA) is a disorder of ventilation that occurs during sleep in which the soft tissues of the upper airway collapse during inspiration thereby obstructing or limiting air flow into the lungs. When the airway obstruction is of sufficient duration an arousal is triggered. Arousal facilitates adequate inspiration and the patient resumes sleep. This process repeats itself in a cyclical fashion and results in fragmented, non-restorative sleep. In severe cases, this cycle can occur hundreds of times over the course of the night.

Multiple factors contribute to tissue collapse and obstruction of the airway, including loss of pharyngeal muscle tone with sleep, the relative negative pressure of the airway with inspiration (Bernoulli effect), gravity when the member is supine, and excessive or redundant tissue, such as enlarged tonsils and polyps.

Individuals are typically amnestic to arousals and may be unaware that they have OSA. Clinical suspicion for OSA should arise when symptoms consistent with the disorder, such as EDS, are coupled with collateral information from a bed partner who witnesses prominent snoring, breathing interruptions, gasping or choking. It is often the bed partner who insists on a medical evaluation. Non-specific symptoms of OSA may include morning headache, dry mouth on awakening, irritability, impaired mental or emotional functioning.

The strongest risk factors for OSA include age, male gender, obesity, and certain craniofacial anatomic features and soft tissue abnormalities affecting the upper airway.

The American Academy of Sleep Medicine (AASM) considers the evidence that OSA is a risk factor for several chronic medical conditions to be substantial. These include systemic hypertension, coronary artery disease, congestive heart failure, and stroke. Moreover, accumulating evidence suggests that OSA is also a risk factor for type 2 diabetes, independent of obesity. Thus, while our primary aeromedical concern is the cognitive impairment that arises from sleepiness and mood disorders, OSA may also be an insidious contributor to potential events of sudden incapacitation such as myocardial infarction and stroke.

Clinical suspicion for OSA should prompt a referral to Sleep Medicine. If EDS is present, the member should be grounded until treatment results in resolution.

DIAGNOSIS: The International Classification of Sleep Disorders, 3rd Edition (ICSD-3), published in 2014 by the American Academy of Sleep Medicine, sets forth the following diagnostic criteria for OSA:

(A plus B) or C satisfies the criteria:

A: The presence of one or more of the following:

i. The patient complains of sleepiness, nonrestorative sleep, fatigue, or insomnia symptoms.
ii. The patient wakes with breath holding, gasping, or choking.
iii. The bed partner or other observer reports habitual snoring, breathing interruptions, or both during the patient's sleep.
iv. The patient has been diagnosed with hypertension, a mood disorder, cognitive dysfunction, coronary artery disease, stroke, congestive heart failure, atrial fibrillation or type 2 diabetes mellitus.

PLUS:

B: Polysomnography (PSG) or Out-of-Center Sleep Testing (OCST) demonstrates:

i. Five or more predominantly obstructive respiratory events (obstructive and mixed apneas, hypopneas, or respiratory effort related arousals [RERAs]) per hour of sleep during a PSG or per hour of monitoring (OCST).

OR

C: PSG or OCST demonstrates:

ii. Fifteen or more predominantly obstructive respiratory events (apneas, hypopneas, or RERAs) per hour of sleep during a PSG or per hour of monitoring (OCST).

Polysomnography (PSG) is the current standard for evaluation of suspected OSA, though both AASM and the Centers for Medicare and Medicaid Services (CMS) now consider Out-of Center Sleep Testing (OCST) an acceptable alternative to PSG for diagnosis of OSA.

Naval Aviation personnel who require aeromedical certification shall undergo PSG for evaluation of suspected OSA. Referral to a quality sleep medicine center required. (MTF vs civilian center preference should be consistent with TriCare access standards).

A PSG report from a sleep center documents an Apnea-Hypopnea Index (AHI) and/or a Respiratory Disturbance Index (RDI). AHI is calculated by dividing the total number of apnea and hypopnea events observed overnight by the number of hours of sleep recorded. If a RDI is documented, then Respiratory Effort Related Arousals (RERAs) were included in the calculation. An AHI or RDI greater than or equal to 5 is a prerequisite to a diagnosis of OSA though additional information is required for diagnosis (see below). An AHI or RDI greater than or equal to 15 is, by itself, diagnostic of OSA.

The Centers for Medicare & Medicaid Services (CMS) criteria for the diagnosis and treatment of OSA differs slightly from the ICSD-3, as follows: An AHI or RDI greater than or equal to 15 or, An AHI or RDI greater than or equal to 5, when the beneficiary has a documented co-morbidity related to OSA. The following conditions are recognized by CMS as co-morbidities related to OSA when present in this context:*

- Excessive Daytime Sleepiness/somnolence (EDS)
- Hypertension
- Ischemic heart disease
- History of stroke
- Impaired cognition
- Mood disorders
- Insomnia

A diagnosis of Upper Airway Resistance Syndrome (UARS) may be made by the sleep medicine specialist in cases when respiratory events are predominantly RERAs. While not causing hypoxia, RERAs result in sleep fragmentation and EDS. UARS has been subsumed under the OSA diagnosis in ICSD-3.

When sleep medicine consultation leads to a diagnosis of UARS, aeromedical standards and waiver requirements of OSA apply.

An OSA diagnosis is further classified according to severity according to the following:

Mild OSA = AHI or RDI ≥ 5 and < 15 with OSA symptoms or a co-morbidity
Moderate OSA = AHI or RDI ≥ 15 and ≤ 30
Severe OSA = AHI or RDI > 30

TREATMENT: Positive Airway Pressure (PAP) is the treatment of first choice in Moderate or Severe OSA and may be waivered for use by designated aviation personnel if sufficient efficacy is documented. Types of PAP include Continuous (CPAP), Bilevel (BiPAP), or Autotitrating (APAP), with or without pressure relief (reduction of pressure on exhalation).

PAP has been successfully deployed in the aircraft carrier and submarine environments. Approval for use of PAP aboard ship must be obtained from the Commanding Officer of the ship in advance (usually on recommendation of the Senior Medical Officer).

Alternatives to PAP may be indicated for selected patients with mild disease, though this is rare. These include surgical procedures to alter the anatomy and compliance of the upper airway, Oral Appliances (OA) worn during sleep, obligatory non-supine sleep in patients with strong positional exacerbation of respiratory events, weight loss, avoidance of alcohol, and combinations of these. Research into medical therapies is ongoing.

Hypoglossal nerve stimulation has recently been approved by the FDA for treatment of Moderate or Severe OSA where patients are unable to tolerate PAP. These devices are not currently authorized for use by aircrew.

A follow-up PSG is indicated at an appropriate interval after initiation of treatment to assess the results of surgical or OA treatment. If surgical treatment was undertaken, post-operative PSG should be delayed until healing is complete. If treated with an OA, a PSG must be done with the OA in place after final fit has been achieved.

WAIVER: Because of the persistent nature and impact on psychomotor and cognitive performance, OSA is considered disqualifying (CD). Waivers in designated personnel may be considered in cases when successfully treated. Waivers will not be considered in applicants.

INFORMATION REQUIRED:

1. Neurology/sleep specialist consultation with polysomnography (PSG).
2. PAP titration results (if performed).
3. Statement affirming subjective treatment effectiveness: to be eligible for a waiver, member should have no residual excessive sleepiness.
4. Objective evidence of treatment effectiveness:
   a. For CPAP: Positive Airway Pressure AHI and compliance data based on machine data, showing ≥5 hours of use on 90% of nights over the preceding 30 days, at a minimum.
   b. For Treatment With Surgery: post-treatment PSG showing resolution of significant sleep disordered breathing.

c. For Treatment With Mandibular Advancement Device or Dental Appliance: post-treatment PSG showing resolution of significant sleep disordered breathing, and results of one of the following objective assessments of vigilance:
d. Maintenance of Wakefulness Test (40-minute protocol)
e. Neuropsychological evaluation including a test of sustained attention such as Connor's Continuous Performance Test (CPT II) AND measures of executive function

5. Objective weight measurement
6. Documentation and assessment of the presence or absence of other medical conditions known to be associated with OSA, for example:
   a. Excessive Daytime Sleepiness/somnolence (EDS)
   b. Impaired cognition
   c. Hypertension
   d. Mood disorders or insomnia
   e. Ischemic heart disease
   f. History of stroke

WAIVER CONTINUATION: Annual submission shall include documentation that the aircrew member:

1. continues to be free of symptoms of EDS,
2. continues to satisfy treatment compliance standards (if applicable),
3. has not gained more than 10% of their body weight at the time of OSA diagnosis, and,
4. has not, since the previous submission, developed or experienced relapse or exacerbation of an OSA-related co-morbidity (see above).

If any of the above conditions are not met the aviator should be re-evaluated for exacerbation of OSA and adjustments to treatment, if indicated. Grounding is appropriate until treatment is optimized, compliance is confirmed, and adequate vigilance is again demonstrated.

ICD-10 CODES:

G47.3 Sleep apnea
G47.31 Primary central sleep apnea
G47.33 Obstructive sleep apnea
G47.8 Other Sleep Disturbance

AEROMEDICAL CONCERNS: The symptoms develop abruptly and are unrelated to any particular activity. Symptoms depend on the distribution of the blood vessel concerned and can range from distracting to incapacitating.

WAIVER: TIA's are permanently disqualifying.

INFORMATION REQUIRED:

1. Neurology consultation
2. MRI scan
3. ECHO (to include bubble-contrast and if negative, trans-esophageal ECHO)
4. Cerebral angiography
5. ESR
6. Lupus anticoagulant
7. Antiphospholipid antibodies
8. CBC (including platelet count)
9. Coagulation studies (PT, PTT)
10. Protein S
11. Homocysteine levels

TREATMENT: Treatment depends upon the underlying cause, if identified. If no surgically correctable etiology, then ASA, low-dose Coumadin, or ticlopidine may be appropriate. Life-style changes and treatment of risk factors (smoking, obesity, HBP, diabetes, hyperlipidemia, alcohol excess, sedentary behavior) need be explored.

DISCUSSION: About 25% of patients with TIA do not appear to have any identifiable serious disease. Approximately 30% have a potential cardiac cause and diabetes is present in 6-28% of patients with TIA. The risk of developing cerebral infarction following TIA is 5-7% a year, with a further 5% a year developing myocardial infarction. The risk of stroke and/or death is 10% a year. These risks rise with age, blood pressure, and the presence of ischemic heart disease. In cases of purely retinal TIA (amaurosis fugax), the 7 year cumulative rate of cerebral infarction is 14% and the 5 year cumulative rate of recurrence is 37%.

ICD-9 CODE:

G45.0 Vertebro-basilar artery syndrome
G45.3 Amaurosis fugax
G45.4 Transient global amnesia
G45.8 Other transient cerebral ischemic attacks and related syndromes
G45.9 Transient Ischemic Attack (TIA)

Total duration of Loss of consciousness (LOC), Alteration of consciousness (AOC), and Post-traumatic amnesia (PTA) less than 5 (five) minutes, with normal neuroimaging (Head CT or Brain MRI).

AEROMEDICAL CONCERNS: This category of TBI poses little risk to the future health of the aircrew member aviator, but the potential for mild post-concussive syndrome (PCS) symptoms does exist. A thorough history of symptoms and careful neurological examination by the flight surgeon are the standard.

WAIVER: If the member is asymptomatic and the exam is normal, this condition is NCD. NO waiver is required.

INFORMATION REQUIRED: A thorough neurological examination must be completed and documented; this applies to ALL TBI cases. This information includes:

1. Alertness and orientation (mental status exam if indicated)
2. Cranial nerves I – XII
3. Motor strength
4. Sensation (detailed if indicated; light touch, pinprick, vibration, proprioception)
5. Gait
6. Cerebellar testing (e.g. rapid alternating movement, Romberg, finger-nose)
7. Reflexes (including Babinski, frontal release signs, etc., if indicated)

ICD-9 CODE:

S06 Intracranial injury
S06.0 Concussion
S06.1 Traumatic cerebral edema
S06.1X0 Traumatic cerebral edema without loss of consciousness
S06.1X1 Traumatic cerebral edema, loss of consciousness 30 minutes or less

DEFINED AS:

- GCS >12 on initial assessment, and
- Loss of Consciousness 5-30min, and
- Post-traumatic Amnesia <= 1hr, and
- Alteration of Consciousness <= 24 hrs, and
- Negative Brain Imaging. Findings on brain imaging attributable to the injury precludes a diagnosis of Mild TBI.

**Consider upgrading an otherwise MILD TBI patient who was HOSPITALIZED to MODERATE TBI, given the increased risk for developing post-traumatic epilepsy (PTE) in that patient population.

AEROMEDICAL CONCERNS:

1. Post-concussive symptoms that may be distracting or adversely impact performance, e.g.,
   - Headaches
   - Dizziness
   - Memory/concentration difficulties
   - Sleep disturbances
   - Affective symptoms
   - Fatigue
2. Cognitive impairment.
3. Increased risk of seizure (minimal for Mild TBI).

Clinically these may appear to be mild injuries, although a surprising percentage of these patients (up to 11%) have significant craniocerebral damage (basilar skull fractures, linear as well as depressed skull fractures, sinus fractures, intracranial hemorrhages, fronto-temporal contusions), which would upgrade the severity level of their injury.

WAIVER: A waiver for a designated aircrew member will be considered as soon as the required work-up is complete providing the member is asymptomatic. Applicants will be considered two (2) years post injury if the examining Flight Surgeon is satisfied with his/her own detailed evaluation.

INFORMATION REQUIRED:

1. Neurology consultation
2. Comprehensive neuropsychological evaluation (including cognitive and affective symptom testing). If evidence of a mood/anxiety disorder, Psychiatry/Psychology/Mental/Behavioral Health consultation .
3. Brain imaging study (CT or MRI)

TREATMENT: Current VA/DoD Clinical Practice Guidelines for the assessment, management, and disposition of mild TBI is available at: http://www.dvbic.org/. These represent an evidence-based, regularly updated approach to TBI, but are applicable to the general military population. They should be adapted as appropriate for aeromedical risk management.

DISCUSSION: Immediate seizures (within seconds to minutes of injury, often referred to as "concussive convulsions") are not a factor in determining the risk for the development of post-traumatic epilepsy (PTE). The risk of developing PTE is not appreciably greater in the mildly head injured population than in the general population. There is a risk of post-traumatic cognitive problems (e.g. memory and information processing skills), and recovery should be documented prior to requesting a waiver.

ICD-10 CODE:

S06 Intracranial injury
S06.1X1 Traumatic cerebral edema, loss of consciousness 30 minutes or less

DEFINED AS:

- GCS 9-12 on initial assessment, or
- Loss of Consciousness 30min-24hr, or
- Post-traumatic Amnesia 1-24hr.
- Total duration of altered Consciousness > 24hrs precludes a diagnosis of Mild TBI
- Negative or Positive Brain Imaging. Findings on brain imaging attributable to the injury precludes a diagnosis of Mild TBI.

**Consider upgrading an otherwise MILD TBI patient who was HOSPITALIZED to MODERATE TBI, given the increased risk for developing post-traumatic epilepsy (PTE) in that patient population.

AEROMEDICAL CONCERNS:

1. Post-concussive symptoms that may be distracting or adversely impact performance, e.g.,
   - Headaches
   - Dizziness
   - Memory/concentration difficulties
   - Sleep disturbances
   - Affective symptoms
   - Fatigue
2. Cognitive impairment.
3. Increased risk of seizure.

WAIVER: May be considered for a waiver after 12 months have elapsed since the time of injury. Applicants will be considered three (3) years post-injury if the examining Flight Surgeon is satisfied with his/her own detailed evaluation.

INFORMATION REQUIRED:

1. Neurology consultation
2. Comprehensive neuropsychological evaluation (including cognitive and affective symptom testing). If evidence of a mood/anxiety disorder, Psychiatry/Psychology/Mental/Behavioral Health consultation.
3. Brain imaging study (MRI)

TREATMENT: These patients should undergo initial CT scanning, and repeat scanning within 12 hours of the injury to detect “delayed” or progressive intracranial damage that would warrant a change of therapy. Medical management should be performed by Emergency Medicine, Internal Medicine, and/or Critical Care providers, according to the current standard of care. Neurosurgical management as indicated.

DISCUSSION: The risk of PTE in cases of moderate head injury at one and five years is 0.6% and 1.6%, respectively. Of those individuals who develop PTE, 80% do so within the first two years. The risk then declines to equal that of the normal population by 10 years post-injury.

ICD-10 CODE:

S06 Intracranial injury
S06.1X2 Traumatic cerebral edema, loss of consciousness 31 minutes to 59 minutes
S06.1X3 Traumatic cerebral edema, loss of consciousness 1 hour to 5 hours 59 minutes
S06.1X4 Traumatic cerebral edema, loss of consciousness 6 hours to 24 hours

10.16 TRAUMATIC BRAIN INJURY – SEVERE

Revised: April 2018 Reviewed: December 2017

DEFINED AS:

- GCS 3-8 on initial assessment, or
- Loss of Consciousness >24hr, or
- Post-traumatic Amnesia >=24hr, or
- Total Alteration of Consciousness > 24hrs, or
- Brain Imaging with significant findings attributable to the injury.

AEROMEDICAL CONCERNS:

1. Post-concussive symptoms that may be distracting or adversely impact performance, e.g.,
   - Headaches
   - Dizziness
   - Memory/concentration difficulties
   - Sleep disturbances
   - Affective symptoms
   - Fatigue
2. Cognitive impairment.
3. Increased risk of seizure.

In cases of severe traumatic brain injury, there are greater risks for the development of post-traumatic epilepsy (PTE) and the persistence of permanent neurological and neuropsychological sequelae.

WAIVER: After 30 months' grounding, designated personnel may be considered for waiver on a case-by-case basis. Applicants could be considered for waiver five (5) years post injury on a case-by-case basis with all supporting documentation of injury and a detailed Neurological examination.

INFORMATION REQUIRED:

1. Neurology consultation
2. Comprehensive neuropsychological evaluation (including cognitive and affective symptom testing). If evidence of a mood/anxiety disorder, Psychiatry/Psychology/Mental/Behavioral Health consultation.
3. Brain imaging study (MRI for waiver consideration)

Note that EEGs are no longer required as they have very poor predictive value for PTE.

ICD-10 CODE:

S06 Intracranial injury
S06.1X5 Traumatic cerebral edema, loss of consciousness >24 hours with full return
S06.1X5 Traumatic cerebral edema, loss of consciousness >24 hours without full return

Permanently disqualifying for all aviation personnel (designated, student, or applicant):

1. Depressed skull fracture with LOC > 5 minutes
2. PTS > one month
3. LOC & PTA > 1 month
4. CSF leak > 7 days
5. Any intracranial bleeding (SDH, EDH, ICH, IVH, SAH)*
6. Dural penetration (traumatic or surgical)
7. Post-traumatic seizures

AEROMEDICAL CONCERNS: These patients are likely to have permanent, disabling residual neurological and neuropsychological impairments as well as an unacceptably high risk for Post-Traumatic Seizures (PTE).*

WAIVER: These members are permanently NPQ, no waiver.

TREATMENT: In addition to neuro-ICU and neurosurgical care, these patients require long-term neuro-rehab care as well.

*Glossary
SDH = Subdural Hematoma
EDH = Epidural Hematoma
ICH = Intracranial Hemorrhage
IVH = Intraventricular Hemorrhage
SAH = Subarachnoid Hemorrhage

ICD-10 CODE:

G96.0 Cerebral spinal fluid leak
G96.11 Dural Tear
R56.1 Post traumatic seizure
S02.0 Fracture of vault of skull S06 Intracranial injury
S06.1X5 Traumatic cerebral edema, loss of consciousness >24 hours with full return
S06.1X5 Traumatic cerebral edema, loss of consciousness >24 hours without full return
S06.5 Traumatic subdural hemorrhage
S06.6 Traumatic subarachnoid hemorrhage
S06.34 Traumatic hemorrhage of the right cerebrum
S06.35 Traumatic hemorrhage of the left cerebrum
S06.36 Traumatic hemorrhage of the cerebrum, unspecified
R41.3 Posttraumatic amnesia

10.18 SUMMARY: AEROMEDICAL DISPOSITION OF TRAUMATIC BRAIN INJURIES

Revised: July 2014 Reviewed: December 2017

Severity Ratings (assign severity according to highest criteria):

Severity	GCS	AOC	LOC	PTA	Imaging
Mild	13-15	<=24 hours	5-30 minutes	<= 1 hour	Negative
Moderate	9-12	>24 hours	>30 minutes, <24 hours	>1 hour, <24 hours	Negative or Positive
Severe	3-8	>24 hours	>=24 hours	>=24 hours	Negative or Positive

Aeromedical Disposition for designated aviation personnel:

Severity	FS Eval	Neurology Consul	Neuropsych Eval	Neuroimaging Study	Eligibility
Minor	X	--	--	CT or MRI	NCD if FS evaluation normal
Mild	X	X	X	CT or MRI	LBFS when workup complete
Moderate	X	X	X	MRI	NAMI review at 12 months
Severe	X	X	X	MRI	NAMI review at 30 months
Penetrating	--	--	--	--	No waiver

NOTES:

- In all but minor injuries, submission of pertinent contemporaneous medical records is required.
- Waiver eligibility times are contingent on acceptable workup results. Otherwise, additional time will be required.
- Any abnormalities or irregularities must be reviewed at NAMI (submit actual films or studies).
- Applicants with a **history of M*ild* TBI** more than **2 years** previously require only a normal detailed neurological examination by a Flight Surgeon to satisfy waiver criteria.
- Applicants with a **history of M*oderate* TBI** more than **3 years** previously require only a normal detailed neurological examination by a Flight Surgeon to satisfy waiver criteria.
- Applicants with a history of S***evere* TBI** more than **5 years** from injury will be considered for waiver on a case-by-case basis with all supporting documentation of injury and a detailed Neurological examination.