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MIGRAINE HEADACHES

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1.0 BACKGROUND

Migraine is a common condition that affects an estimated 14% to 16% of the general population. There is insufficient data available to estimate the prevalence of migraine in the air force population, specifically. Migraine is likely underreported by aircrew, due to the potential career implications of disclosure. However, migraine can carry considerable risk to aeromedical duties, as aircrew members can quickly become incapacitated cognitively or visually, with this disability lasting for hours to days.

A broad differential diagnosis should be considered for any aircrew presenting with headache. Headaches may represent a primary headache disorder and presumed migraine should be distinguished from other headache types such as tension-type headache and trigeminal autonomic cephalalgias. The presence of typical aura without headache and retinal migraine should also be identified.

Headaches may also be secondary to an underlying disorder or exposure, including—but not limited to—subarachnoid hemorrhage, cerebral infarction, giant cell arteritis, cerebral venous thrombosis, idiopathic intracranial hypertension, increased cerebrospinal fluid pressure, intoxication, substance withdrawal, intracranial infection, meningitis or encephalitis, hypoxia, hypercapnia, hypothyroidism, and psychiatric disorders.

Once migraine is confirmed, the risk assessment for migraine is primarily based on information derived from clinical history (Table 2), as there are few relevant physical exam and imaging findings, apart from those required to rule out secondary causes of headache. The risk assessment for migraine includes consideration of both: 1) the risk of impairment (and jeopardization of aeromedical duties and safety) that each headache may cause; and 2) the risk of future headache recurrence. The recommendations for fitness to fly are based on an evidence-based literature review and consideration of other organizational approaches. (Ref A).

2.0 INITIAL ASSESSMENT

Initial assessment includes:

- a detailed history,
- physical exam,
- imaging, and
- specialist referrals.

2.1 HISTORY

The initial assessment of a new headache / presumed migraine requires a very detailed history that has 4 purposes:

1. assist in ruling out various pathologies,
2. assist in confirming the diagnosis of migraine or other primary headache,
3. clarifying the presence and severity of aura
4. provide requisite information to conduct a risk assessment to enable an aeromedical disposition

2.1.1 Rule-out ominous pathology:

The differential for headaches is wide and includes many uncommon but grave, and aeromedically relevant conditions which must be excluded prior to assuming a diagnosis of migraine. Every patient presenting with headache should initially be assessed for the presence of red flags. This can be accomplished by considering the SNOOP4 mnemonic which outlines the associated features of various causes of “headaches” (Table 1 derived from Ref B) and imaging (see para 2.2.1)

Table 1: SNOOP4 Mnemonic for Ominous Pathology

Red flag	Clinical features	Etiologies to exclude
S Systemic signs, symptoms or disease	Fever, weight loss, HIV, immunosuppression, malignancy, pregnancy or postpartum	Metastatic disease, CNS infection, CVST, RCVS, IIH
N Neurologic symptoms or signs	Neurologic deficits or atypical or prolonged neurologic symptoms, or both	Neoplastic, inflammatory, infectious or vascular CNS disease
O Onset (late)	Headache onset after age 50 yr	Neoplastic, inflammatory or infectious CNS disease; giant cell arteritis
O Onset (sudden)	Thunderclap headache with onset to maximum intensity in < 60 s	Subarachnoid hemorrhage, CVST, RCVS, arterial dissection
P Papilledema	Optic disc swelling (with or without pulsatile tinnitus, diplopia, transient visual obscuration, weight gain)	Raised intracranial pressure (mass lesion, hemorrhage, edema, CVST, IIH)
P Postural aggravation	Headache worsened or triggered by standing or lying down	Intracranial hypotension (cerebrospinal fluid leak), intracranial hypertension (IIH, mass lesion)
P Precipitated by valsalva	Headache triggered by valsalva (coughing, exercise or intercourse)	Chiari malformation, mass lesion (e.g., posterior fossa)
P Pattern change or progressive	Change in previously stable pattern (loss of headache-free periods) or progressively worsening headache with evolving clinical symptoms	Any secondary cause

CNS = central nervous system,
 CVST = cerebral venous sinus thrombosis,
 IIH = idiopathic intracranial hypertension,
 RCVS = reversible cerebral vasoconstriction syndrome.

2.1.2 To rule-in migraine:

Screening is positive for migraine if the patient has 2 or more of these features with a positive predictive value of 0.93 (Ref C), using the mnemonic “PIN”:

1. Photophobia,
2. functional Impairment and
3. Nausea

2.1.3 To clarify Aura

Visual symptoms have numerous underlying etiologies that should be distinguished from aura. The presence of aura or other transient focal neurological phenomena is the distinguishing factor between common (no aura) and classic (with aura) migraines. Furthermore, a typical aura is not always followed by a headache. This aura without headache is distinguished from the separate phenomenon of retinal migraine. Retinal migraine is an extremely rare cause of transient monocular visual loss. Cases of permanent monocular visual loss associated with migraine have been described. Appropriate investigations are required to exclude other causes of transient monocular blindness (Ref J). It is not appropriate to simply document that the member described an aura; it is imperative that the member’s own words be included in the description of the event, to enable future file review.

Migraine with visual aura can be distinguished from nonspecific visual symptoms using The Visual Aura Rating Scale (VARs) Ref D as follows:

- | | |
|--|----------|
| 1. duration 6–60 minutes | 3 points |
| 2. develops gradually over 5 minutes or more | 2 points |
| 3. scotoma present | 2 points |
| 4. zigzag line present | 2 points |
| 5. unilateral | 1 point |

A score of ≥ 5 indicates aura (vs non-specific visual symptoms) with 91% sensitivity and 96% specificity.

Aura characteristics are highly variable between individuals and can vary between attacks within the same person. The most common type of aura is visual, however other types are also possible including sensory, aphasic, and motor. Sensory, motor, and aphasic aura were nearly always experienced in association with visual aura and are aeromedically more concerning because of the impairment that may result.

2.1.4 To inform risk assessment for disposition

There are few measurable lab or imaging findings on which to base risk stratification for migraines. Most such assessments will be normal, and if not, other pathology may need consideration. Furthermore, accurately predicting either the timing or the presentation of future events is difficult. As a result, risk assessment and aeromedical disposition for migraines is currently based primarily on components of history, often self-declared, the aeromedical relevance of which are outlined in Table 2.

Table 2. Components of migraine history relevant for aeromedical risk assessment (Ref A)

History	Aeromedical Relevance
Age of migraine onset	Age of migraine onset less than 20-years-old has been associated with lower migraine remission rates
Frequency of migraine attacks	Migraine-free periods can represent true migraine remission or headache-free episodes before migraine recurrence. A minority (estimated 10% to 42%) of patients experience true migraine remission Higher risk migraines include those with high and/or increasing frequency of occurrence.
Duration of each migraine	Untreated or unsuccessfully treated migraines typically last 24 to 39 hours in the unscreened general population. Higher risk migraines include those of long durations.
Prodromal symptoms (before the headache)	Up to 88% of individuals with migraine experience prodromal symptoms before headache onset which may be impairing: phonophobia, photophobia, nausea, vomiting, light-headedness, vertigo, motion sickness, difficulty concentrating, drowsiness, neurologic signs, fatigue, mood changes, and neck stiffness Higher risk migraines include those that have an impairing prodrome
Associated symptoms experienced <u>during the headache</u>	During migraine headache, an estimated 29% to 35% of individuals experience concomitant vomiting, 61% to 73% nausea, 65% to 80% photophobia, 74% to 76% phonophobia, and 11% neurologic signs Higher risk migraines include those that are accompanied by symptoms that may impair aeromedical duties and jeopardize safety
Aura symptoms, including: visual, sensory, speech, language, and motor disturbances Assess duration of aura	20% to 46% of individuals with migraine experience aura. Visual disturbances are present in >90%. Typical duration of aura is 30 minutes; however, aura can last >4 four hours. Aura can occur alone without headache. Aura symptoms can vary within the same individual from migraine to migraine Higher risk migraines include those that are associated with aura, or aura occurs without headache
Change over time, progression	Most headache sufferers experience persistence of their migraine disorder rather than remission. Factors associated with progression to chronic daily headache or chronic migraine: female sex, history of overuse headaches, overweight or obese, depression and anxiety disorders. High risk migraine includes those which increase in frequency and/or duration over time or are decreasingly responsive to mitigation techniques (i.e., sleep)

Triggers	Up to 90% identify ≥ 1 trigger. In the military, many migraine triggers are unavoidable: stress, fatigue, circadian disturbances, noise, barometric pressure changes, lights, glare, hypoxia, vertigo, menstruation, odours, and thermal stress (heat or cold). Other triggers include neck pain, alcohol, exercise, sexual activity, and specific foods. Higher risk migraines include those that are consistently triggered by factors that are unavoidable (bullet point 2)
Past medical history	Comorbid restless legs syndrome has been associated with greater headache severity; higher occurrence of phonophobia, photophobia, nausea, and vertigo; and greater disability There is a strong bidirectional relationship between migraine and insomnia. Comorbid insomnia has been associated with increased migraine pain intensity, attack frequency, and risk of chronicity Migraineurs have an increased risk of myocardial infarction, angina, and ischemic stroke. The presence of a patent foramen ovale has been identified in some migraineurs. Chronic pain disorders are associated with chronicity of migraines. Comorbid anxiety and depression are each associated with greater migraine-related disability. Comorbid depression increases risk of progression from episodic to chronic migraine Comorbidities and the impact of multiple medical conditions should trigger a clinical review with consideration of aeromedical risk after maximum medical management
Family history of migraine	Family history of migraine increases the risk of an individual developing migraine and is associated with a younger age of migraine onset, <i>but</i> the prognostic impact of family history on migraine course and severity is controversial and not well elucidated

2.2 PHYSICAL ASSESSMENT, IMAGING AND REFERRAL

In all cases a complete physical exam with a focus on the ocular and neurologic systems is required. Because the presence of a patent foramen ovale has been associated with migraines, the result of cardiac exam should also be documented: auscultation may reveal a faint systolic murmur, although PFOs may not be clinically audible. Suspicion of a PFO based on family history of clinical exam should lead to cardiology referral and discussion with a CFEME clinician. CFEME has the capacity to perform echo bubble studies.

After the detailed history and physical, the next steps in assessment will depend on whether it is the first episode, or a suspected recurrence.

2.2.1 New onset migraine in aircrew

For initial occurrences of new onset headache or visual disturbance which may represent a suspected migraine, in addition to the history and physical exam the following are required prior to the risk assessment for return to flight:

- Referral to ophthalmology (not optometry) for assessment and visual field testing with automated perimetry eg Humphrey's field test (NOT by confrontation alone), with result scanned to CFHIS, and determination of need for additional testing (eg venogram)
- Neuroimaging with MRI. Because of the aeromedical significance of the differential etiologies, an MRI is required in all cases, including those who present with distant histories of similar phenomena but never fully investigated. CT is not ideal, because MRI is preferred for visualizing brain parenchyma and more sensitive for detecting subtle lesions.
- Referral to Neurology, preferable a Neurologist with Aeromedical experience for diagnosis and additional testing (eg EEG, lab work) if deemed necessary. Please contact CFEME or ASCS for contact information if needed.

2.2.2 Migraine recurrence in aircrew

For aircrew with a known history of migraine having a new recurrence that presents similarly to the previous occurrence, confirmation of prior complete diagnostic workup is required i.e. confirm MRI and consults available. New current imaging and referral should be considered when: prior workup is not available, the presentation is markedly different from prior presentations, the frequency has increased, or if there is any clinical concern. Aircrew who have been fully assessed and experience a recurrence will not require new grounding or employment restrictions provided their permitted frequency of migraines per year as recommended in Table 3 or 4 have not been exceeded. Aircrew who experience recurrence and an increased frequency of their migraine will need further review and temporary A3 restrictions. As risk assessment outcomes may change over time, recurrences should be documented as such (ie migraine recurrence) in CFHIS to enable tracking of frequency and symptom-free duration for future risk assessment.

2.2.3 Initial applicants

Aircrew applicants presenting for their initial aircrew medical examination whose last migraine was within the past 2 years should undergo a current non-contrast MRI head, neurology and ophthalmology consultation prior to initial air factor approval. In applicants with a more distant history of migraine but no recurrence in the last 2 years, results of prior assessment and imaging should be sought and fitness could be considered in those with class 1, 2, 3 medical events. History of a class 4 medical event is disqualifying for aircrew selection.

3.0 MEDICATION USE

National Defence Flying Orders B-GA-100-001/AA-000 (Ref F) preclude aircrew from self-medication, and consultation with a Flight Surgeon is required for medication use.

FSG 1900-01 Medications and Aircrew (Ref H) may apply.

http://winnipeg.mil.ca/cms/Libraries/Flight_Surgeon_Guidelines/FSG_1900-01.sflb.ashx

Medication can be used in migraines can be for multiple purposes:

1. Abortives are used for prevention of symptom progression in diagnosed migraines
2. Prophylactics are used to prevent recurrence of known migraines
3. Acute symptom management, usually use for pain and nausea management

3.1 Abortives

Up to 90% of Canadians with migraine in the general population use acute pharmacologic therapy to abort their headaches, triptans being one of the most common drug classes used. Notable adverse effects of triptans depend on formulation type, but include vertigo, neck pain, dysphoria, fatigue, and nausea. Ergot derivatives also have concerning adverse effects including nausea, vomiting, fatigue, muscular pain, hypertension, myocardial and peripheral vascular ischemia, and stroke.

Prescription abortive medication cannot be considered for Category 1 aircrew or pilot applicants. Oral triptans may be considered for approval for some Category 2 pilots (non-high-performance aircraft and duties that involve another qualified pilot), Category 3 (non-pilot Group A) and Category 4 (Group B) aircrew trades. Review by ASCS is required.

Triptans cannot be used in flight, and a 24-hour period of grounding is required after use.

3.2 Prophylactics

Classes of medications commonly used for migraine prophylaxis include anticonvulsants, tricyclic anti-depressant, Beta-blockers and angiotensin receptor blockers, and monoclonal antibodies, none of which are approved for use in migraines without ASCS or CFEME review and subsequent AUMB approval.

Recently, several new classes of migraine-specific medications have become available including CGRP receptor antagonists and 5-HT_{1F} receptor agonists with increasing evidence of effectiveness in general populations but there is insufficient evidence to enable return to full duties given limited experience, and frequent side effects of dizziness, in some cases requiring label warning against driving within 8 hours of use. However, all such cases should be referred to AUMB for consideration and to enable case-specific review of emerging evidence.

3.3 Symptom Management

Non-sedating non-prescription pain management medications such as NSAIDs are acceptable for use. Requirement for opiates, anticonvulsants, and antidepressants is likely disqualifying for aircrew duties.

4.0 DISPOSITION DURING WORKUP

Suspected, probable and recurrence of confirmed cases of migraine *with visual aura or other neurological findings (eg numbness), or headache with disabling symptoms* are temporarily unfit flying until the required assessments have been completed, and should be advised to keep a headache diary tracking triggers, duration, severity etc.

If initial history indicates no visual aura, no neurological findings, and non-disabling symptoms, then A3 with-or-as co-pilot may be assigned for Category 1 and 2 aircrew while awaiting further evaluation and results. Category 3 and 4 aircrew may be returned to duty with enhanced surveillance with monthly followup either in-person or virtually to confirm stability. Recurrence during initial assessment may indicate frequent events or unavoidable triggers, and should prompt grounding until assessment is complete.

5.0 RISK ASSESSMENT AND RETURN TO FLYING

After detailed assessment is complete, additional testing is normal, and a diagnosis of migraine is confirmed, risk assessment using the risk matrix in Ref G can be undertaken in a 2-step process:

Step 1 requires classifying the severity/operational impact of the migraine presentation as:

- Class 1: Minimal impact on mission, minimal effect on performance Requires routine periodic medical follow-up.
- Class 2: May result in a mission abort or compromised effectiveness, Aircrew able to continue duties with minor to moderate performance compromise, Requires medical attention.
- Class 3: Likely to result in a flight safety hazard or compromise Major decrement in performance May require immediate medical attention.
- Class 4: Likely to result in a flight safety critical event. Total acute incapacitation. Requires immediate advanced medical care.

Although some common migraines without aura may be considered class 1 medical events, *most migraines will fall into class 2 or 3 medical events*. All migraines with aura will be class 2 or higher. Components of history in Table 2 should be reviewed and the presence of high-risk features should be considered class 3. Migraines requiring emergency-room assessment, opiates or other prescription medication for pain management or associated with other disabling features may be class 4 medical events and require careful review.

Step 2: requires information about the frequency / stability of migraine occurrence. This may be readily available for recurrences but not available for new-onset migraines until a sufficient migraine-free interval has passed. The allowable number of migraines per year to maintain risk of an incapacitating event to 1-2% /year and concurrent migraine-free

interval required prior to return to unrestricted flying duties are listed in Tables 3 and 4, based on aircrew trade.

Table 3: Requirements for Unrestricted Air Factor (A1 or A4) in Cat 1 aircrew:

Pilots (Fighters, Tactical Helicopter, Maritime Rotary Wing, SAR rotary wing, Instructors of pre-wings students) and SAR Technicians

Category 1 Aircrew	Unrestricted Air Factor Requirements	
	Allowable migraines/yr	Required migraine-free interval (months)
Class 1 migraine	≤ 3	4
Class 2 migraine	≤ 3	4
Class 3 migraine	1	12
Class 4 migraine	Unfit for A1	N/A

Table 4: Requirements for Unrestricted Air Factor (A1, A2 or A4) in Cat 2, 3, 4 aircrew:

Category 2,3,4 Aircrew	Unrestricted Air Factor Requirements	
	# migraines/yr	migraine-free interval (months)
Class 1 migraine	≤ 6	2
Class 2 migraine	≤ 3	4
Class 3 migraine	≤ 3	4
Class 4 migraine	≤ 3	4

6.0 REVIEW REQUIREMENTS

After local risk assessment is completed and an air factor recommendation is determined, all files should be forwarded to ASCS or CFEME for final disposition. Additional review at AUMB is also required in the following situations:

- Category 1 aircrew with class 4 migraines
- Any aircrew with migraine frequency of ≥ 7 /year or migraine-free intervals ≤ 2 months of any severity
- Medication use is being proposed.