FSG 100-05
AIRCREW MEDICAL FITNESS POST COVID-19

Document Status:	Current
Document Type:	Flight Surgeon guideline
FSG Number:	FSG 100-05
Original Source:	AUMB
Approval:	Aerospace Medicine Authority
SME:	ASCS
OPI:	Air Div Surg
Effective Date:	14 August, 2020
Last Updated	14 April, 2022

References:

A. Temporary Changes to trained Aircrew PHA During Covid-19 Crisis http://winnipeg.mil.ca/cms/Libraries/Flight_Surgeon_Guidelines/FSG_100-04_Temporary_Aircrew_Medicals_During_COVID-19_Emergency.sflb.ashx
B. Flight Surgeon Guideline 100-01 Aircrew Medical Selection http://winnipeg.mil.ca/cms/Libraries/Flight_Surgeon_Guidelines/FSG_100-01.sflb.ashx
C. AMA Directive 100-01 Medical Standards for CF Aircrew http://winnipeg.mil.ca/cms/Libraries/Flight_Surgeon_Guidelines/AMA100-01.sflb.ashx
D. DFHP Advisory 6636-80: COVID-19: Force Health Protection Recommendations http://cmp-cpm.mil.ca/en/health/policies-direction/policies/6636-80.page
E. DFHP Instruction 6635-33: Contact Tracing for COVID-19 http://cmp-cpm.mil.ca/en/health/policies-direction/policies/6635-33.page
F. Interim national case definition: Coronavirus disease (COVID-19) https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/national-case-definition.html
G. National Defence Flying Orders B-GA-100-001/AA-000 http://winnipeg.mil.ca/cms/en/DComd-FG/Dir-Aerospace-Rdns/AirForceStandards/DICP/B-GA-100.aspx
H. FSG 1900-01 Medications and Aircrew: http://winnipeg.mil.ca/cms/Libraries/Flight_Surgeon_Guidelines/FSG_1900-01.sflb.ashx
I. FSG 300-01 Temporary Flying Restrictions: http://winnipeg.mil.ca/cms/Libraries/Flight_Surgeon_Guidelines/FSG_300-01.sflb.ashx
J. RCN Surgeon Communication (29 Jul 21; 14 Jan 2022): Return to Diving Fitness After Respiratory Infection with COVID-19 Illness

Record of Amendments approved by AUMB

Date (DD/MM/YY)	Reason for Change
08/12/20	Grounding period reduced from 28 to 10 days (from symptom onset/positive test) and symptom-free for 72 hrs, for mild cases of COVID-19.
28/04/21	Addition of Ref E – DFHP Instruction 6635-33 re Contact Tracing in COVID-19. Update to conditions required to conduct on-site pilot applicant assessmentsat CFEME. Updates to definition of moderate case (Table 1). Updates to investigations/consults required for mild cases (cognitive testing)moderate and severe cases (CFEME Consult; +/- Cardiac MRI) (Table 2). Recommended operational restrictions for return to flight post COVID-19infection were also added. Annex A was revised to include specific return to flight criteria for the 6MWT.
13/01/22	Update to management of a close contact to no longer require a negative test to return to aircrew duties if not required by local/ P/T policy. Update to allow any clinician to perform the ungrounding assessment, with review and concurrence by a BAv Med provider or FSurg. Reduction in investigation requirements for fully vaccinated mild and asymptomatic cases (removal of ECG, CXR) addition of alternate exertional pulse O2 testing (1MSTS). Guidance for completion of initial aircrew medicals removed (no longer applicable).
14/04/2022	Update to allow fully vaccinated aircrew to return to flight duties at 7 days (para 11) Ground based controllers do not require an in-person assessment to return to ground based duties (para 16) Change of SpO2 starting cut off for 1MSTS from 94% to 96%. (Annex A)
20/12/2022	Removal of the requirement for exertional pulse oximetry for aircrew applicants and untrained aircrew (paras 2/3)

TABLE OF CONTENTS

GENERAL

1. With the changing landscape of the COVID-19 Pandemic, to include the altered epidemiology of new variants and current vaccination status of the CAF, there is a requirement to revisit the current guidance on return to aircrew duties after a diagnosis of COVID-19. This FSG provides revised guidance to account for the changing impact of emerging variants on the health and safety of aircrew, in light of new medical evidence and file review of RCAF aircrew returned to flight post COVID thus far in the pandemic. Further revisions with amendments will be posted on the Div Surg website and App.

INITIAL AIRCREW MEDICALS AND UNTRAINED AIRCREW

2. Initial aircrew medicals for applicants with a history of COVID-19 must include focused history, physical exam, and investigations as per para 14 and table 2 below. Any documentation relevant to COVID-19 (clinician notes, investigations, etc) should be requested and scanned to CFHIS if not already done. Exertional pulse oximetry is not required unless clinically indicated based on history, physical, or investigations (eg, a report of persistent reduced exercise capacity). Advanced diagnostic evaluation (e.g. Chest CT, echo, PFTs) should not be included on a routine basis but rather considered in consultation with a CFEME clinician.

3. Untrained aircrew who have already been awarded an air factor by CFEME should be managed in the same way as trained aircrew except that exertional pulse oximetry is not required unless clinically indicated based on history, physical, or investigations (eg, a report of persistent reduced exercise capacity).

TRAINED AIRCREW PROCESSING AND AIR FACTOR VALIDITY

4. On 26 March, 2020 The RCAF and RCN Surgeons approved a 60-day extension to aircrew/diver and submariner periodic health assessment validity. A second 60-day extension was approved on 14 January 2022 to address the resource limitations placed upon CFHS clinics by the omicron variant, and associated requirements to return large numbers of aircrew to duty post COVID-19 infection.

5. All aircrew, divers and submariners with a medical category expiring from 1 January to 30 April 2022 were authorized a 60 day blanket extension by the Aerospace Medical Authority/AMA (RCAF Surgeon) and the RCN Surgeon respectively. The Air Division Surgeon and Consultant in Diving and Submarine Medicine (CDSM) may also authorize up to an additional 30 day extension within their respective domains if required by a specific Wing / Base provided there is sufficient justification and oversight. This was promulgated through a CANAIRGEN.

AIRCREW WITH COVID-19 SYMPTOMS

6. Aircrew with symptoms of, or having an exposure suspected to be related to COVID-19, should be initially managed in accordance with clinical guidelines, local procedures, and applicable D FHP Advisories (Ref D, E)

7. This FSG applies to confirmed COVID-19 cases (positive PCR, or RADT), or

those who have a high probability of having COVID-19 based on symptoms and risk assessment, that are unable to access COVID-19 testing. Testing of RCAF aircrew reporting symptoms consistent with COVID-19 should be deemed an operational

priority. Probable and confirmed COVID-19 positive aircrew should be made unfit aircrew duties until an assessment has been complete by a clinician IAW para 19 of this document. If the assessing clinician is not BAv Med or FSurg qualified, the file must be reviewed and concurred with a clinician holding one of these qualifications before un-grounding occurs.

8. National Defence Flying Orders B-GA-100-001/AA-000 (Ref G) preclude aircrew from self-medication, and consultation with a Flight Surgeon is recommended if medications are required. FSG 1900-01 Medications and Aircrew (Ref H) may apply. http://winnipeg.mil.ca/cms/Libraries/Flight_Surgeon_Guidelines/FSG_1900-01.sflb.ashx

9. All aircrew grounded because of COVID-19 will require assessment by a local clinician prior to return to duty, with case review by a BAv Med or FSurg. The clinician should clearly document in the past medical history section of the CFHIS record that the member has a history of testing positive for COVID-19 (or is a presumed positive case) and the date of the positive test or best approximation.

MANAGEMENT OF CLOSE CONTACTS OF COVID-19 CASES

10. Aircrew who are considered a high risk close contact with a confirmed case should be managed IAW DFHP Advisory 6636-80 (Ref D) and Instruction 6653-33 (Ref E) and federal/provincial/territorial/local public health requirements. These members are permitted to return to aircrew duties following any mandated quarantine period provided they remain asymptomatic.

RETURN TO AIRCREW DUTIES POST COVID-19

11. Approval for return to aircrew duties can be considered no earlier than 7 days from symptom onset or positive test (in an asymptomatic individual) in an individual who has completed primary series vaccination, to include at least 72 hours symptom-free before assessment by a clinician. Return to the workplace should follow local isolation and PHM policies.

12. Thereafter, given the emerging but as yet unclear long-term sequelae of COVID-19 in multiple organ systems, the process for return to flying is stratified based on the severity of the COVID-19 illness (Table 1). Once the severity of illness is determined, Table 2 is to be referenced for required investigations. To ensure consistency, development of this recommendation included consideration of commentary from various other national and international partners (RAF, USAF, RCN, USN).

13. The recommended testing at the time of return to aircrew duties is intended to:
   a. confirm medical fitness for return to aircrew duties;
   b. confirm resolution of illness; and
   c. evaluate risk of cardiopulmonary sequelae.

TABLE 1: CLASSIFICATION OF COVID-19 SEVERITY*

Severity	Respiratory Symptoms	Cardiac Symptoms	Assessment findings /Nature of Treatment
Mild	None or only on significant exertion	None	CXR normal (if completed) Self-isolation at home
Moderate	With minimal exertion or with ADLs	Transient chest pain, palpitations, pre-syncope	CXR or CT may been abnormal but no ground glass, cavitation etc. Required supplemental O2 (determine FiO2 needed) or had pneumonia
Severe	At rest	Persistent or prominent chest pain, palpitations, pre-syncope or syncope	Hospitalized CXR or CT with severe findings

***based on worst symptomatology on presentation or throughout clinical course**

14. Prior to return to operations, all fully vaccinated aircrew who are grounded for COVID-19, regardless of severity, shall be assessed locally by a clinician to include, as a minimum:

a. History that includes documentation of the presentation, progression, assessment, treatment and resolution of the illness, including status of return to physical activity;
b. Physical exam that includes respiratory, cardiac (with attention to third heart sounds, evidence of mitral or tricuspid regurgitation, lower leg edema), ENT, focal neurological (if required by history), and assessment of cognitive function by history and observation;
c. Exertional pulse oximetry (1 Minute Sit-to-Stand Test (1MSTS) or 6 Minute Walk Test (6MWT) - see Annex A thru C) with resting and exercise SpO2; and
d. CXR and resting ECG <u>only if indicated</u> based on abnormalities in vitals, physical exam, or exertional pulse oximetry.

<u>Partial primary series or unvaccinated aircrew will additionally require:</u>

e. CXR; and
f. Resting ECG.

15. If the severity of illness was mild or asymptomatic, physical exam and test results are normal, and the member has returned to pre-COVID-19 physical activity, then fitness for unrestricted duty may be approved locally.

16. Ground based controllers do not require an in-person assessment to return to the ground based portion of their duties. Individuals must respect the local return to duty policy post-COVID and must be asymptomatic for 72 hrs and have returned to normal levels of activity. An in-person assessment should be complete before resuming in-flight duties.

17. SAR techs must also meet the requirements for return to dive duties as promulgated by the RCN Surgeon and CDSM (Ref J).

18. Additional testing is required prior to return to aircrew duty for those with abnormal test results, persistent symptoms (> 14 days), or a history of moderate or severe illness or coagulopathy (See Table 2). Flight Surgeons should seek advice from the office of the Air Division Surgeon who may consult CFEME clinicians as required. The investigations required for return to flight may be adjusted based on aircrew MOSID and/or case- specific information.

19. The following additional limitations should be considered for the aircrew returning to flying post-COVID-19 infection:

a. Fast jet (ejection seat) pilots should complete one dual flight prior to returning to solo flight, wherever feasible. If this is not possible, these pilots should conduct a thorough +Gz warm-up at the beginning of the first solo flight to ensure that they do not experience respiratory difficulties during +Gz manoeuvres; and

b. Given the likelihood of persistent positive PCR test following recovery from COVID-19 infection, aircrew and CoC should be aware of the possibility to remain positive on PCR testing 90 days post infection when scheduling international flights in this time period. Host nation entry requirements are continually evolving, and it remains the responsibility of squadron ops to ensure aircrew meet any vaccination and testing requirements.

20. Given the potential for sequelae to emerge at some point despite the initial severity of the case, and for persistent symptoms in those who were symptomatic, the next interval PHA following a diagnosis of COVID-19 should be a Type 1 AC PHA. Aviation Medicine providers should pay particular attention to exercise tolerance, fatigue and mental health symptoms in history. Additional investigation should be complete as clinically indicated.

TABLE 2: REQUIRED INVESTIGATIONS FOR AIRCREW POST COVID-19

Severity	Required Investigations	Disposition Authority
Mild or Asx	History, Physical Exam, and Exertional Pulse Oximetry as per para 14 above CXR and resting ECG only if indicated based on abnormalities in vitals, physical exam, or exertional pulse oximetry. If 1MSTS/6MWT is abnormal, it is at the clinician's discretion to request additional testing. Individual must remain grounded and a repeat test is to be performed in 1-2 weeks. If repeat testing is abnormal, further evaluation is required with PFTs and EST with notification to ASCS. If unvaccinated/partially vaccinated, CXR and resting ECG are required independent of exam results. Abnormal results should be referred to CFEME for Aviation Internal Medicine consult.	Assessment must be reviewed by local B Av Med or FSurg if assessing clinician does not hold these qualifications. ASCS does not require notification on grounding or ungrounding
Moderate	*As per MILD plus:* CXR Resting ECG Additional laboratory investigations as indicated to ensure resolution of previous abnormal findings. Imaging as indicated to follow-up previous abnormal imaging or as indicated by abnormal findings on CXR/exertional O2 testing.	Air Div Surg/ASCS (or CFEME for untrained aircrew).
Severe	*As per MODERATE plus:* CBC Chest CT, Cardiac Echo Full PFTs to include DLCO Aviation Internal Medicine consult (may require additional investigations)	Air Div Surg/ASCS (or CFEME for untrained aircrew) with AUMB discussion.

ANNEX A: PROTOCOL FOR THE ONE MINUTE SIT TO STAND TEST (1MSTS)

References:

1. Borg, G. Borg's Perceived Exertion and Pan Scales. Champaign, IL: Human Kinetics, 1998. https://www.sralab.org/sites/default/files/2018-04/Rating_of_perceived_exertion_-_Borg_scale.pdf
2. Kalin, A. et al. Direct and indirect evidence of efficacy and safety of rapid exercise for exertional desaturation in COVID-19: a rapid systematic review. Systematic Reviews; 2021 (10)77. https://doi.org/10.1186/s13643-021-01620-w
3. Niyogi, S.G et al One minute sit-to-stand as a potential triage marker in COVID-19 patients: A pilot observational study. Trends in Anaesthesia and Critical Care; 2021 (39) https://doi.org/10/1016/j.tacc.2021.04.007

Equipment required:

1. Chair which has a hard flat seat, and no arm rests;
2. Stopwatch/ timer; and
3. Pulse oximeter.

1MSTS test instructions:

1. Before beginning, measure the patients resting O2 saturation, heart rate, and level of breathlessness/ fatigue using Borg scale of fatigue level (6-20, per Annex B) and record in table.
2. Do not proceed with the test if resting O2 saturation is less than or equal to 96%.
3. Instruct the patient to sit in a chair with feet flat on the floor, hands on hips or hanging loosely.
4. Instruct the patient to stand up from the chair until their legs are straight without use of arms or hands, then return to a sitting position. This cycle counts as one sit-to-stand.
5. Continue sitting up and down on the chair as many times as possible for a duration of one minute. Resting is permitted during the one minute if required but patients should be instructed to put in as much exertional effort as they are able to during the 1 minute.
6. Stop the test at any time if the patient feels unwell, has chest pain, dizziness or severe breathlessness. Patient is unfit to return to aircrew duties.
7. At the end of one minute, record O2 saturation, heart rate and Borg scale of fatigue level (6-20, per Ref 4)

	Resting	At test completion
O2 saturation		
Heart rate		
BORG scale rating		
Total number sit-to-stands		

Criteria for return to aircrew duties: O2 desaturation of less than or equal to 4% from baseline at test completion is consider a pass. Patients should target a minimum of 20 sit-to-stands in 1 min to ensure adequate effort. There is no defined cutoff for Borg value and HR, but these criteria may be used to assess level of effort.

ANNEX B: BORG SCALE

The BORG scale is a simple way to allow individuals to subjectively rate their perceived effort of level or fatigue during exercise or exercise testing. The scale ranges from 6 (no effort) to 20 (maximum effort).

6	
7	Very, very light
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard
20	

Borg G. Borg's Perceived Exertion and Pan Scales. *Champaign, IL: Human Kinetics, 1998.*

ANNEX C: PROTOCOL FOR THE SIX-MINUTE WALK TEST (6MWT)

References:

1. Am J Resp Critical Care Med 2002 166(1). https://doi.org/10.1164/ajrccm.166.1.at1102
2. Singh et al. An official systematic review of the ERS/ATS: measurement properties offield walking tests in chronic respiratory disease. Eur Resp J 2014, 44(6) 1447-1478
3. Manttari A, Suni J, Sievanen H, Husu P et al. Six-minute walk test: a tool for predictingmaximum aerobic power (VO2 max) in healthy adults. Clinical Physiology and Functional Imaging. 2018;38 (6) 1038-45
4. Borg, G. Borg's Perceived Exertion and Pan Scales. Champaign, IL: Human Kinetics, 1998. https://www.sralab.org/sites/default/files/2018-04/Rating_of_perceived_exertion_-_Borg_scale.pdf
5. Enright PL, Sherrill DL. Reference equations for the six-minute walk in healthy adults.Am J Respir Crit Care Med 1998;158: 1384-87
6. Nes BM, Janszky I et al. Age-predicted maximum heart rate in healthy subjects: TheHUNT fitness study. Scan J Med Sci Sports 2013; 23(6), 697-704

Background: A major issue in those recovering from COVID-19 infection is whether ongoing mild fatigue and SOBOE represent lingering symptoms during recovery, or alternatively, ongoing functional impairment related to underlying lung dysfunction.

Purpose: The six-minute walk test is performed to obtain an objective basic functional assessment of an individual's aerobic capacity. This allows the HCP to distinguish between mild residual symptoms or ongoing functional cardiopulmonary impairment.

Test Protocol: The test is performed by having the individual walk as far as possible in six minutes on a measured, demarcated course in an indoor hallway. The preferred length of the course is 30 meters, but may be modified if necessary, but should not be less than 20 meters. The course should be marked every 3m, and the turnaround points marked with a cone e.g. traffic cone. The starting line should be clearly demarcated.

Equipment Required

a. Clipboard with data collection sheets
b. Blood pressure kit
c. Lap counter
d. Timer

Protocol

1. The patient should sit in a chair near the starting position for 10 minutes before starting the test. During this period, baseline information should be recorded
   a. Blood pressure.
   b. Pulse.
   c. SpO2.
   d. Borg scale of fatigue level (6-20, per Ref 4).

2. Provide instructions to the patient. “The object of this test is to walk as far as possible for 6 minutes around this demarcated course. You should walk as quickly as possible, but you should not run or jog. You are allowed to slow down or even stop if necessary and lean against the wall”. Demonstrate one revolution around the course pivoting briskly around the marker.

3. After obtaining baseline data, have the patient start. During the test
    a. After each two minute interval:
        i. Record the SpO2/HR and fatigue level (Borg scale).
        ii. Tell the patient how many minutes are left and “Keep up the good work or “You are doing well.”
    b. Stop at six minutes and record:
        i. SpO2/HR and fatigue level (Borg scale).
        ii. Total distance walked (m).

Six-Minute Walk Test Criteria for Aircrew to Return to Aircrew Duties

4. Based on normative data (Refs 2), the following criteria are recommended for aircrew undergoing the 6MWT as part of a return to duty assessment. These criteria are derived from Ref 2, with the lower limit of normal being defined as mean - 1 SD.

5. Aircrew who do not meet these criteria (i.e., have an abnormal 6MWT) may have ongoing cardio-pulmonary dysfunction (reflective or moderate or severe infection). All abnormal 6MWT must be forwarded to CFEME for IM Consult to determine if/which additional investigations are indicated. Further assessment may be required in discussion with CFEME and ASCS. Of note, Distance, Borg, and HR values should aim to be exceeded as an indicator of sufficient effort. Exceeded values in these three criteria do not constitute a fail. Similarly, the VO2 max an O2 sat criteria should exceed the lower limit in order to qualify as a passed test.

TABLE 1: 6MWT CRITERIA REQUIRED FOR RETURN TO FLIGHT POST COVID-19

	Males	Females
Distance (meters)	576	562
Borg Fatigue Level	12	13
Heart Rate	75% PMHR* [(0.64x age)-211] x 0.75	75% PMHR* [(0.64x age)-211] x 0.75
Calculated aerobic capacity(ml/kg/min)	27	26
O2 saturation	>94% at rest >90 % with exercise	>94% at rest >90 % with exercise

*PMHR = predicted maximum heart rate [(0.64x age)-211] x 0.75

Maximum aerobic capacity equation:

Males
VO2 max = 110.546 +0.063 (6MWD meters) – 0.250 (age) – 0.486 (BMI) – 0.420 (ht cms) -0.109 (HR)

Females
VO2 max = 22.506- 0.271 (wt kgs) + 0.051 (6MWD meters) -0.065 (age)