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FSG 900-01
DIABETES IN AIRCREW

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References:

- A. Diabetes Canada Clinical Practice Guidelines Expert Committee. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. *Can J Diabetes*. (2018) ;42(Suppl 1):S1-S325.
- B. Haworth D, Gray G, Zoltenko R, Bashirzadeh AJ. Permanent medical grounding in Royal Canadian Air Force pilots (2008–2017). *Aerosp Med Hum Perform*. (2021); 92(11): 913–918.
- C. [FSG 100-2 Aircrew Medicals](#)
- D. Harper, C. R., et al. "Study of simulated airline pilot incapacitation: phase II. Subtle or partial loss of function." *Aerospace Medicine*. (1971). 42(9): 946-948.
- E. Cox, D. J., Kovatchev, B. P., Gonder-Frederick, L. A., Summers, K. H., McCall, A., Grimm, K. J., & Clarke, W. L. (2005). Relationships Between Hyperglycemia and Cognitive Performance Among Adults With Type 1 and Type 2 Diabetes. In *Diabetes Care* (Vol. 28, Issue 1, pp. 71–77). American Diabetes Association. <https://doi.org/10.2337/diacare.28.1.71>
- F. Sommerfield, A. J., Deary, I. J., & Frier, B. M. (2004). Acute Hyperglycemia Alters Mood State and Impairs Cognitive Performance in People With Type 2 Diabetes. In *Diabetes Care* (Vol. 27, Issue 10, pp. 2335–2340). American Diabetes Association. <https://doi.org/10.2337/diacare.27.10.2335>
- G. [FSG 600-1 Aircrew Cardiovascular Risk Screening](#)
- H. Charles E. Leonard, X. H., Colleen M. Brensinger, Warren B. Bilker, Serena Cardillo, James H. Flory, Sean Hennessey. 2017. "Comparative risk of serious hypoglycemia with oral antidiabetic monotherapy: A retrospective cohort study." *Pharmacoepidemiology & Drug Safety* **27**(1): 9-18.
- I. "Recommendations on the Proper Use of SGLT2 Inhibitors." (2020). *Journal of Diabetes Investigation* **11**(1): 257-261.
- J. Alice Y. Y. Cheng, I. G. F. (2005). "Oral antihyperglycemic therapy for type 2 diabetes mellitus." *Canadian Medical Association Journal* **172**(2): 213-226.
- K. Mitchell, S. J., et al. (2017). "A UK Civil Aviation Authority protocol to allow pilots with insulin-treated diabetes to fly commercial aircraft." *The Lancet Diabetes & Endocrinology* **5**(9): 677-679.
- L. Fitzgerald, D. J., et al. (2010). "Insulin-dependent diabetes and aeromedical certification - the Australian perspective." *Medical Journal of Australia* **193**(8): 469-471
- M. [AMA 100-01 Medical Standards for Aircrew](#)

Record of Amendments approved by AUMB

Date (DD/MM/YY)	Reason for Change
07/03/24	Complete revision with updated medications including GLP-1 agonists and SGLT-2 inhibitors. Harmonization with FSG 1900-1 and revised administrative guidance including recommendations for category specific MELs.

Table of Contents

GENERAL	1
DIAGNOSIS OF DIABETES	3
CLINICAL MANAGEMENT OF TYPE 2 DIABETES	3
RISK FACTOR MODIFICATION	4
PHARMACOLOGICAL MANAGEMENT	5
FIRST LINE THERAPY	6
ADD-ON THERAPY CONSIDERATIONS	6
ADMINISTRATIVE MANAGEMENT OF TYPE 2 DIABETES	8
AIRCREW SELECTION	8
GROUNDING ON INITIAL DIAGNOSIS IN TRAINED AIRCREW	8
RESTRICTIONS DURING MEDICATION INITIATION/TITRATION	8
CONSIDERATIONS FOR PERMANENT CATEGORY AFTER STABILIZATION	9
MODIFICATION TO AIRCREW PHA FOR DIABETIC AIRCREW	11
CLINICAL AND ADMINISTRATIVE MANAGEMENT OF TYPE 1 DIABETES	11
DOCUMENTATION REQUIREMENTS FOR AEROMEDICAL SUMMARIES/PHA	12
REPORTING AND MANAGEMENT OF COMPLICATIONS OF DIABETES AND MEDICAL THERAPY	12
ANNEX A: PHARMACOTHERAPY FOR DIABETES IN AIRCREW (“TREATMENT LADDER”)	1
ANNEX B: OVERVIEW OF DIABETES MANAGEMENT IN AIRCREW	1
ANNEX C: MODIFICATION TO AIRCREW PHA VALIDITY IN DM	2
ANNEX D: HYPOGLYCEMIA RECORD	1
ANNEX F- PERIPHERAL ARTERY DISEASE ASSESSMENT	1

GENERAL

1. Diabetes is one of the most common conditions managed in primary care and excellent clinical practice guidelines already exist (Ref A). Nevertheless, as abnormalities in blood glucose resulting from either the disease or the treatment may result in neurologic and ophthalmic deficits causing both subtle and sudden incapacitation there are special clinical and occupational considerations relevant to aircrew that are not well addressed in general guidelines. Diabetes represents 3.7% of groundings in the CAF (Ref B) so the early identification and management of this highly prevalent condition is a high priority from both a clinical and operational perspective.
2. Routine screening for diabetes is covered in the aircrew PHA as per FSG 100-2 (Ref C). The focus of this FSG is the management of aircrew identified as being at high risk of diabetes or in whom a diagnosis has been made.

3. Hypoglycemia is the most likely side effect of diabetic medications that can lead to acute incapacitation. Common symptoms of hypoglycemia are summarized in table 1 (Ref D). As blood sugar drops below the low normal range, patients may begin to experience generalized autonomic or neurogenic symptoms. As blood sugar drops lower, there are potentially incapacitating central nervous system manifestations such as disorientation, slurred speech, somnolence, personality changes and loss of consciousness. Common hypoglycemia symptoms are summarized in table 1. It is important to note that the warning symptoms of hypoglycemia can become suppressed in patients who have frequent hypoglycemic episodes, and it is critical that all aircrew are asked about their awareness of any “lows” at each assessment. Loss of awareness of lows can indicate poor glycaemic control and should trigger grounding and specialist assessment.

Table 1: Manifestations of Hypoglycemia

Neurogenic	Neuroglycopenic
Early, warning signs	Cognitive impairment
Agitation	Mental status change
Weakness	Dizziness
Palpitations	Visual changes
Tremor	Difficulty concentrating
Sweating	Confusion
	Seizure

4. Acute hyperglycemia can lead to polyuria, dehydration, nausea, fatigue, changes in visual acuity, and altered cognition. Transient elevation in blood glucose above 15 mmol/L impairs information processing speed, working memory, attention and mood. These signs can be gradual in onset and early identification is essential (Ref E,F)

5. Chronic complications of diabetes in aircrew. The long-term health impacts of diabetes are significant both in terms of patient health and in terms of complications that can be incompatible with aircrew duties. The insidious onset of organ damage such as retinopathy, neuropathy and asymptomatic cardiovascular disease that can be disqualifying for aircrew duties and that are preventable with adequate surveillance is one of the reasons for more robust screening in this population.

DIAGNOSIS OF DIABETES

6. Diagnostic criteria for aircrew are the same as for the general population (Ref A). For asymptomatic patients with a single abnormal result, a confirmatory test is required. In patients presenting with symptoms, a single abnormal result is sufficient for diagnosis:
 - a. FBG >7.0;
 - b. 2hr 75g OGTT >11.1;
 - c. Hemoglobin A1c > 6.5%; and
 - d. Random BG >11.1
7. In rare cases, the initial presentation of diabetes will be symptomatic and may include nausea/vomiting, abdominal pain, fatigue, increased thirst, and frequent urination. Aircrew who come to medical attention due to a presentation with acute complications such as DKA or hyperosmolar hyperglycemic syndrome (HHS) require review by internal medicine or endocrinology before any consideration of return to aircrew duties as these patients represent a much higher risk population than those identified at an early stage due to screening.
8. Emerging evidence has shown the distinction between type 1 and 2 diabetes to be much less clear than once believed. Autoimmune conditions can coexist with the risk factors comprising the metabolic syndrome and the distinction can be important for management and prognosis. Referral to IM/Endocrinology should be strongly considered for all aircrew newly diagnosed with diabetes on routine screening. **IM/Endocrinology consultation is mandatory for aircrew who present with symptomatic disease.**

METABOLIC SYNDROME

9. Metabolic syndrome is a highly prevalent condition characterized by abnormalities including abdominal obesity, hypertension, dyslipidemia and elevated blood glucose. It is important to note that **metabolic syndrome can exist without diabetes**. The syndrome is primarily a marker of elevated cardiovascular risk. Perhaps the best way to frame metabolic syndrome is that various individual abnormalities such as elevated lipids, obesity, etc which all confer elevated risk on their own, are multiplicative in overall risk as opposed to simply additive. Thus, the whole cardiovascular risk is “greater than the sum of its parts”. FSG 600-1 (Ref G) addresses cardiovascular risk assessment in detail.

CLINICAL MANAGEMENT OF TYPE 2 DIABETES

10. In general, the initial clinical management of newly diagnosed type 2 diabetes in aircrew will be the same as for the general population and will consist of risk stratification, lifestyle modification with or without pharmacotherapy. The specific recommendations for pharmacotherapy in aircrew differ from those for the general population due to the unique occupational environment and attendant safety considerations in which these individuals operate.

11. Medication initiation and adjustment is discussed in detail below and a summary of the recommended treatment approach, including observation periods after initiating or modifying medications is provided in Annex A.

RISK FACTOR MODIFICATION

12. Once the diagnosis of diabetes has been made, the next step is to identify comorbid conditions and modifiable risk factors. Frequent medical follow-up in the initial treatment period is needed to ensure good control of the patient's diabetes before return to aircrew duties. Recommended visit frequency is at least every 4-6 weeks to review progress on lifestyle interventions with monitoring of HbA1c every 3 months until stability reached. Annex B shows the process whereby patients are managed until stable at targets without complications from their medication regime at which point the frequency of visits can be decreased.

13. It is very important that patients actively self-monitor for symptoms, particularly for hypoglycemia during periods of medication initiation or dose adjustment. All hypoglycemia events should be recorded including symptoms, circumstances and actions required. See Annex D for sample symptom tracking log. A logging glucometer must be used when patients are on medications with an elevated hypoglycemia risk (eg secretagogues, basal or bolus insulin) and should be brought to every clinical visit for review. For further clarity, aircrew who require a logging glucometer (see Table 2) shall bring a printed report of their glucometer readings to each diabetes assessment and this log shall be scanned into CFHIS. Local W/B Surgeons may issue clarifying instructions for local practice regarding recording of glucometer logs as needed.

14. Due to the long-term complications of hyperglycemia, all patients require regular assessment for complications and potentially modifiable risk factors. The periodicity for medical examinations in aircrew with diabetes are detailed in Annex C and include:

- a. Cardiovascular (Ref G) and respiratory exam, including blood pressure, weight, and waist circumference; and
- b. Peripheral arterial disease (Annex E) (Ref A); and
- c. Bloodwork: HbA1c, Cr, ACR, Lipid profile; and
- d. Eye exam (which will be to the same standard as routine aircrew eye exams)

15. Cardiovascular risk assessments should be carried out in accordance with Ref G (Aircrew Cardiovascular Risk Screening). Any aircrew demonstrating signs or physical symptoms of vascular disease, such as peripheral artery disease, carotid bruits, ECG abnormalities or TIA/stroke should be evaluated as per the high cardiovascular risk category.

16. Targets (Ref A):
 - a. A1c < 7%; and
 - b. LDL <2;
 - c. BP <130/80; and
 - d. Waist Circumference:
 - (1) Male < 101 cm ;
 - (2) Female < 88 cm;
 - (3) Male (East Asian) < 90 cm
 - (4) Female (East Asian) < 80 cm

17. Lifestyle Modification. An initial 3-6 month trial of lifestyle modification may be attempted in aircrew diagnosed with pre-diabetes or mild elevation in A1C (less than 7.5) provided that there are NO high-risk features (see Annex B). This trial period does not require grounding if the member is completely asymptomatic, but consideration should be given to a TCAT with a G3T6 limitation to ensure medical follow-up as clinical follow-up should be no less than monthly during this trial period. A trial of life-style modification should have specific objectives and include at least the following elements:
 - a. weight loss goal;
 - b. exercise goals;
 - c. dietician consultation and goal setting around diet modification; and
 - d. assessment of other cardiovascular risk factors (eg smoking, lipids)

PHARMACOLOGICAL MANAGEMENT

18. The main considerations for diabetic medications in aircrew are glucose lowering efficacy and side effect profile. Annex A shows the recommended approach to pharmacotherapy in aircrew as well as the available anti-hyperglycemic medications and their associated observation periods. Insulin is a special case which is discussed separately. Additional detail on the approach to pharmacologic treatment is presented below.

19. Medication Efficacy. The risk of medication interactions and side effects increases with the number of medications used concomitantly and thus the recommended approach to pharmacotherapy is based on using more efficacious medications with a favorable safety profile to minimize polypharmacy. As a result, medications with relatively minor impact on

the HbA1C such as alpha-glucosidase inhibitors (acarbose) or thiazolidinediones (e.g. rosiglitazone) are not considered to be first- or second-line agents in aircrew. Additionally, the thiazolidinediones may have an overall undesirable side-effect profile and are much less commonly used in clinical practice.

20. Safety/Side Effect Profile. The major safety concern in diabetes pharmacotherapy is hypoglycemia and there are significant differences between medications in this regard. Sulfonylureas were one of the first class of oral hypoglycemic agents available and are still commonly used in clinical practice however given the availability of newer agents with a much better safety profile (Ref H), the sulfonylureas are no longer recommended for use in aircrew. The available classes of medication are discussed in further detail below and summarized in Annex A.
21. Observation Periods. Annex A outlines the required grounding periods required for monitoring of potential side effects when switching or adding anti-hyperglycemic agents.

FIRST LINE THERAPY

22. Metformin is the first line agent for aircrew given its tolerability, cost and safety profile.

ADD-ON THERAPY CONSIDERATIONS

23. Second line therapies are selected based on patient factors including co-morbidities where a particular agent has shown increased risk reduction (eg cardiovascular disease). Some second line agents require special authorization on the CAF formulary and those criteria must also be considered in medication selection. Each class of drug is discussed in detail below and a suggested treatment ladder is provided in Annex A.
24. Incretins. These include DPP-4 antagonists and GLP-1 mimetics which stimulate insulin release primarily in response to elevated blood glucose and have their greatest effect after meals. As such, they present a lower risk of hypoglycemia than the sulfonylureas. For this reason, they are generally the next line agents after metformin. Among the incretins, the first choice is the DPP-4 inhibitor **sitagliptin (Januvia)**. Semaglutide (Ozempic) is an injectable GLP-1 mimetic and may be approved if the patient is not at target despite trials of **both** metformin with a DPP-4 inhibitor AND metformin with a SGLT-2 inhibitor.

Note: DPP-4 and GLP-1 agents share a similar mechanism of action and cannot be used together.

25. SGLT-2 Inhibitors. SGLT2-Inhibitors function by eliminating glucose in the urine. Patients must be advised to remain hydrated due to the diuretic effects of SGLT-2 and to hold the medication on “sick days” particularly if they have any diarrhea or vomiting. These agents should be used with caution in aircrew at elevated risk for dehydration such as Tac Hel and fast jet. There is a mildly increased risk of urogenital infections so SGLT-2 inhibitors should be used with caution in patients with a history of recurrent UTI (Ref I).

26. Insulin secretagogues. The main class of oral agents with increased risk for hypoglycemia are insulin secretagogues, as these medications directly and continuously stimulate insulin secretion. There are two main classes of insulin secretagogue:
- a. Sulfonylureas (eg gliclazide, glyburide) pose the highest risk for hypoglycemia, especially with missed meals. Rates of serious hypoglycemia per 1000 person-years was 68.0 in sulfonylureas, compared to 11.9 in Metformin (Ref J). These agents are generally not approved for use in aircrew although exceptions can be made on an individual basis when no other acceptable alternatives exist. In these cases, specialist involvement, close monitoring and additional MELs will be required (see table 2); and
 - b. Meglitinides (e.g. repaglinide). Lower risk of hypoglycemia than the sulfonylureas, they are still not recommended for routine use in aircrew.
27. Insulin can be used as a last line for agent when patients are not at their glycemic target despite maximum doses and combination of the agents listed above. Short acting or bolus insulin has a significant risk of hypoglycemia and is generally disqualifying for aircrew although limited exceptions may be considered by ASCS with very close specialist follow-up and specific monitoring protocols when operationally feasible. Protocols for aircrew requiring bolus insulin will have to be individualized based on crew duties and operational considerations (platform type, mission profile, etc).
28. Long-acting basal insulin has a hypoglycemia risk that is higher than the recommended oral agents discussed above but is still considered safer than sulfonylureas. Basal insulin may be considered in aircrew, particularly non-pilot aircrew, who are not at target despite maximal recommended therapies. These aircrew require close monitoring and specific MELs as per table 2 (eg must have a glucometer available) that may not always be practical in all military operational environments. **Specialist involvement** (IM/endocrinology) and **ASCS review is mandatory before a patient can be considered for return to aircrew duties on any form of insulin**. Protocols for glucose monitoring on insulin have been established (Refs K,L) but require individual review and approval. At a minimum:
- a. Members requiring basal and/or bolus insulin should have specific MEL's (see table 2). All members on insulin will be required to carry equipment for point of care glucose testing, including glucometer, test strips, and logbook to record values.
 - b. Glucose checks must be completed 30 minutes prior to take off, landing or starting controlling activities, as well as every hour in flight or while controlling. If glucose less than 5 patient should ingest 15g carbohydrates, recheck in 15 minutes. If glucose over 15 arrangements should be made for corrective insulin. If unable to measure glucose during flight 15 grams of carbohydrate should be consumed. Aircrew using any form of insulin shall carry readily accessible carbohydrate containing snacks sufficient for the anticipated duration of the mission including possible diversion/contingency. It

is difficult to anticipate the requirements for every scenario in a guideline, but this point shall be specifically addressed by the treating flight surgeon at every PHA with a diabetic aircrew member using insulin.

29. Short acting/bolus insulin and insulin pumps. Short acting insulin has the highest risk of hypoglycemia and the requirement to self-administer short acting insulin in-flight may be operationally impractical in many cases. Insulin pumps may pose issues with ALSE and have similar risks for incapacitation to self-administered bolus insulin in addition to concerns about pump failure. Accordingly, all cases of rapid acting/bolus insulin including insulin pumps will be assessed on a case-by-case basis by ASCS.

ADMINISTRATIVE MANAGEMENT OF TYPE 2 DIABETES

AIRCREW SELECTION

30. As per AMA-100 (Ref M), diabetes is disqualifying for aircrew selection including occupational transfer to an aircrew occupation.

GROUNDING ON INITIAL DIAGNOSIS IN TRAINED AIRCREW

31. The overall approach to the combined clinical and administrative management of DM2 in aircrew is shown in Annex B. Once an aircrew member is diagnosed with diabetes there must be an assessment of occupational risk which generally requires a period of grounding during the initial assessment and stabilization period. In the case of members identified on screening who are otherwise asymptomatic with no significant risk factors, the flying and occupation limitations during initial assessment may be quite minor, particularly during a trial of diet and lifestyle modification. On the other hand, aircrew identified based on symptomatic presentations (eg DKA, HHS, overt complication of diabetes such as retinopathy) will require immediate grounding both due to the aeromedical implications of the presentation but also because it implies that the patient's diabetes is more likely advanced and by definition uncontrolled. These patients are at much higher risk and will generally be grounded for a longer period until completely stabilized.
32. In all cases a TCAT is required to ensure close medical follow-up during the initial period of evaluation and treatment initiation. The duration of this TCAT will typically be 6-12 months depending on the severity of the patient's presentation and associated risk factors which may make diabetes more difficult to control. Consider early consultation with ASCS in the case of trained aircrew with new diagnosis of diabetes.

RESTRICTIONS DURING MEDICATION INITIATION/TITRATION

33. There are two aspects to anti-hyperglycemic medication initiation and adjustment in aircrew. The first is identification of side effects, the most important of which is hypoglycemia, and the second is the achievement of long-term glycemic control which is primarily assessed by a stable HbA1C in the target range. Aircrew requiring medication adjustments or experiencing hypoglycemic episodes must be grounded/restricted from controlling. During periods of medication adjustment, both the aircrew member and the clinician have a role to play in close monitoring for treatment effect as well as side effects. The duration of

grounding for each medication is shown in Annex A. The HbA1C at diagnosis is significant because patients with longer duration and more severe hyperglycemia may be at increased risk for symptomatic **relative** hypoglycemia as their blood sugar is initially brought under control. As a result, aircrew with high-risk features at diagnosis (including absolute elevation in HbA1c) are managed with a more restrictive approach compared to aircrew who are identified earlier.

34. Patients who have shown tolerability of a medication/dose for the requisite period as per Annex A, can be returned to aircrew duties at the discretion of the Flight Surgeon with the exception of insulin which requires ASCS and specialist review. Further medication adjustments require additional periods of grounding as shown in Annex B. Assessment for removal of the TCAT with geographic limitations for frequent follow-up and investigations can begin once the following criteria for stability are met:
 - a. No medication changes or dose adjustments within the past 6 months;
 - b. 2 consecutive HbA1Cs values within target, at least 3 months apart; and
 - c. No hypoglycemic episodes within the past 12 months

CONSIDERATIONS FOR PERMANENT CATEGORY AFTER STABILIZATION

35. Once clinical and biochemical stability is achieved, and the member is ready for a review for transition to a permanent category after file review by both ASCS and DMedPol IAW existing procedures. Permanent MELs will be based on the treatment medications required to achieve glycemic control as well as the presence of other risk factors and will be decided on a case-by-case basis but general considerations for MELs are provided in table 2.

Table 2: Aeromedical Disposition for Well Controlled Type 2 Diabetes on Pharmacotherapy Based on Aircrew Category As Defined in AMA 100-1 (Annex B)

	Considerations for MELs by Aircrew Category			
Medication(s)	Category 1	Category 2	Category 3	Category 4
Metformin	No restrictions			
DPP4 inhibitor OR GLP-1 agonist +/- Metformin	Pilot: With or as co pilot* SAR Tech Only: No Restrictions	No restrictions		
DPP4 Inhibitor OR GLP-1 agonist + SGLT-2 inhibitor +/- Metformin	Pilot: With or as co-pilot* SAR Tech Only: No Restrictions	With or as co-pilot	No restrictions	
Basal Insulin +/- Metformin +/- other oral agent	Unfit*	- With or as co-pilot - Requires access to a medical device while performing aircrew duties**	Requires access to a medical device while performing aircrew duties**	Requires access to a medical device while performing aircrew duties**
Insulin secretagogues (sulfonylureas or metaglinides)***	Unfit	Generally unfit Case-by-case consideration with demonstrated stability - Requires access to a medical device while performing aircrew duties* - at a minimum requires with or as co-pilot limitation	- Requires access to a medical device while performing aircrew duties** - Requires monitoring protocol	- Requires access to a medical device while performing aircrew duties** - Requires monitoring protocol
Basal + Bolus insulin Regardless of oral medications	Unfit	Unfit - Case-by-case consideration only with demonstrated stability - Requires access to a medical device while performing aircrew duties** - requires access to medications while performing aircrew duties - requires monitoring protocol - all cases require ASCS review and ongoing oversight		

* Flexibility may be applied on a case by case basis for category 1 aircrew such as instructor pilots operating in environments where mission profiles/duration/predictable schedules may facilitate frequent glucose monitoring and reduce overall hypoglycemia risk to acceptable levels

** aircrew on any form of insulin or insulin secretagogues must have a recording glucometer available at all times while performing aircrew duties.

*** Consider **only** if all other agents have failed.

MODIFICATION TO AIRCREW PHA FOR DIABETIC AIRCREW

36. Due to the nature of diabetes and the risk of both sudden and subtle incapacitation from both the disease and the treatments, the frequency of medical assessment in diabetic aircrew is modified. All aircrew with DM will require **annual type 1 aircrew PHA with complete ophthalmologic examination** regardless of age or aircrew group. The abbreviated type 2 PHA is not applicable to aircrew with a diagnosis of diabetes requiring pharmacological therapy. See Annex C for details.
37. In patients with higher risk based on the combinations of medications or other risk factors, additional clinical assessments or aircrew diabetic assessments are required to ensure that there are no complications that could result in impairment before overt disease is detected on routine PHA assessments.

Table 3: Frequency and nature of medical follow-up based on treatment intensity

Medication(s)	Category 1+2	Category 3+4
Metformin	Exam q6 months HbA1C q3-6 months*	Exam q6 months HbA1C q3-6 months*
Incretin (DPP-4/GLP-1) +/- Metformin	Exam q6 months HbA1C q3-6 months*	Exam q6 months HbA1C q3-6 months*
Incretin (DPP-4/GLP-1) + SGLT-2 inhibitor +/- Metformin	Exam q3 months Aircrew diabetic assessment with HbA1C q3 months Specialist at least yearly	Exam q6 months Aircrew diabetic assessment with HbA1C q6 months* Specialist at least yearly
Basal Insulin +/- Metformin +/- other agents	Exam q3 months Aircrew diabetic assessment with HbA1C q3 months Specialist at least yearly	Exam q3 months Aircrew diabetic assessment with HbA1C q3 months Specialist at least yearly
Insulin secretagogues (Sulfonylureas or metaglinides)	Consider only if all other agents have failed. Generally not compatible with aircrew duties	Consider only if all other agents have failed. Generally not compatible with aircrew duties
Basal + Bolus insulin	Generally not compatible with aircrew duties	Specialist follow-up q3-6 months

* HbA1C measurement in should generally be at 3-month intervals. In patients on low-risk medications who have had stable values with no medication changes on at least 2 sequential measurements can be considered for less frequent monitoring (but in no case less than q6 months).

CLINICAL AND ADMINISTRATIVE MANAGEMENT OF TYPE 1 DIABETES

38. Type 1 diabetes is considered higher risk from occupational medicine perspective. These cases will all be managed on a case-by-case basis with the involvement of ASCS and specialist consultation services. Clinical management by an endocrinologist or aerospace medicine internist is required. Documentation requirements for aircrew PHAs in these patients are the same as for DM2 as outlined below. (Ref A)

DOCUMENTATION REQUIREMENTS FOR AEROMEDICAL SUMMARIES/PHA

39. The following items must be reported in every Aircrew PHA for aircrew with a diagnosis of diabetes:
- a. Details of any hypoglycemic events since the last PHA (see Annex B for example log) in particular comment about awareness of lows is required;
 - b. HbA1C;
 - c. Urine A/Cr;
 - d. Cardiovascular and respiratory exams, including BP
 - e. Peripheral neuropathy screening can be done with either a tuning fork or monofilament. See Ref A for. Note that both methods are relatively insensitive, particularly in our aircrew population with very low prevalence of neuropathy in the absence of other signs and symptoms. Thus formal neuropathy screening can be done at the discretion of the clinician.
 - f. Exam for peripheral artery disease (Annex D);
 - g. Weight and Waist circumference; and
 - h. Date and results of most recent diabetes specialist consultation (if applicable).

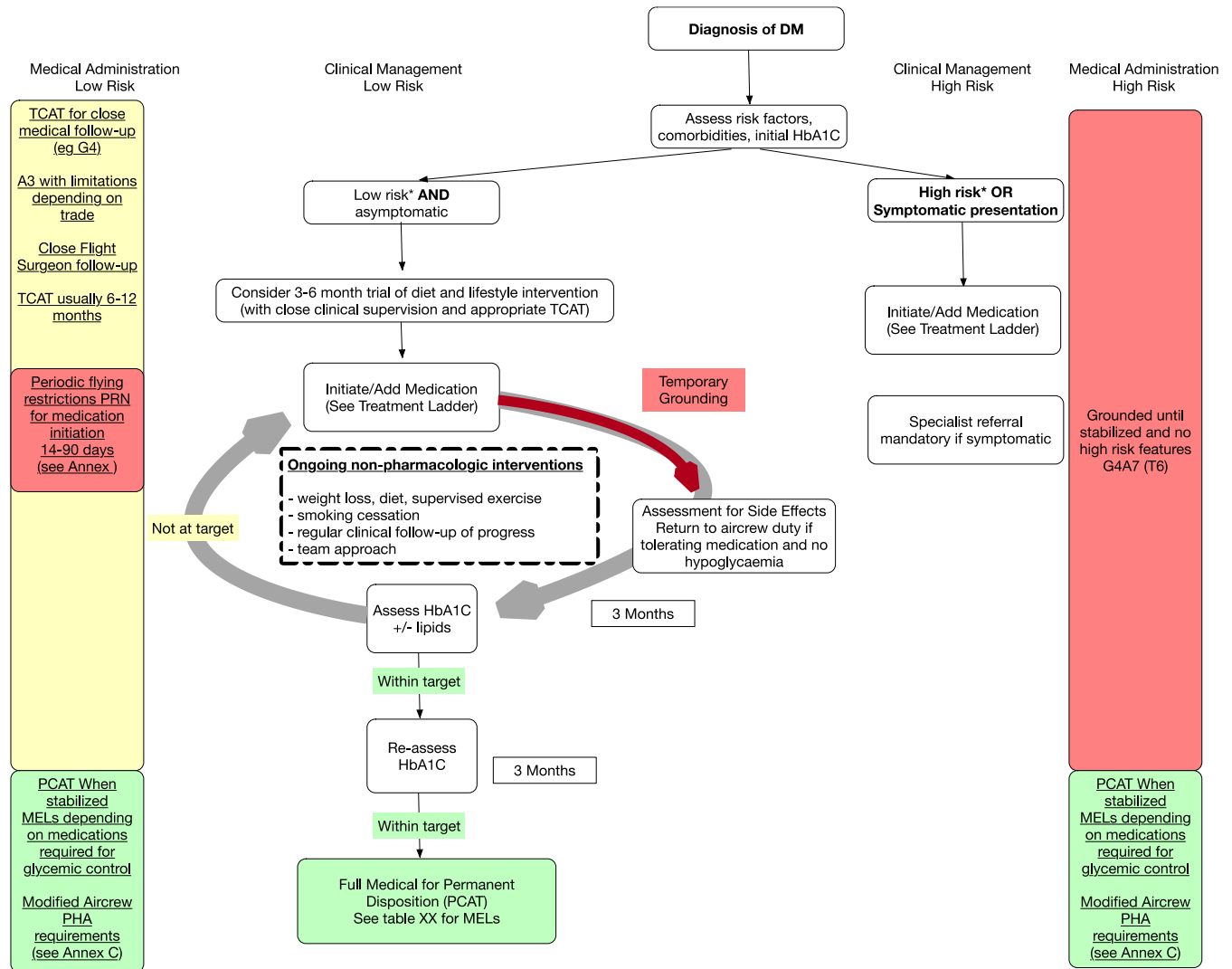
REPORTING AND MANAGEMENT OF COMPLICATIONS OF DIABETES AND MEDICAL THERAPY

40. Any episode of significant complications in diabetic aircrew who are already stabilized on therapy and have returned to flying duties such as symptomatic hypoglycemia or euglycemic DKA shall be reported to ASCS. Grounding and specialist consultation (endocrinology or internal medicine) is required if not already in process. Complications during medication initiation/titration in aircrew who are already grounded do not need to be reported but ASCS is always available for advice in these cases if needed.

**ANNEX A: PHARMACOTHERAPY FOR DIABETES IN AIRCREW
 (“TREATMENT LADDER”)**

Lifestyle management	Diet, Exercise, Education	No grounding
Add Biguanide	Metformin	14 days
Add DPP4i	Linagliptin, Saxagliptin, Sitagliptin	30 days
Add SGLT2i	Canagliflozin, Dapagliflozin, Empagliflozin	30 days
Discontinue DPP4i Add GLP1a	Semaglutide, Liraglutide	30 days
Add Basal Insulin	Glargine, detemir	-Minimum 90 days review by ASCS -specialist consult mandatory
Add Bolus Insulin (eg prandial/sliding scale)	Lispro, Aspart	-Generally disqualifying -Minimum 180 days -review by ASCS -specialist consult mandatory

ANNEX B: OVERVIEW OF DIABETES MANAGEMENT IN AIRCREW



Low Risk Features	High Risk Features
<ul style="list-style-type: none"> • HbA1C < 8.5 • Urine A/Cr < 2 • eGFR > 60 • No evidence of retinopathy • No peripheral neuropathy • No hypoglycemic events 	<ul style="list-style-type: none"> • A1c >8.5% • Presentation in DKA or HHS • Symptomatic hypoglycemia • Presence of retinopathy, neuropathy, or nephropathy

Note: ASCS guidance shall be obtained for all newly diagnosed diabetic aircrew. Email/phone contact is acceptable in the case of low risk cases, formal review of the PHA file is not required until the PCAT submission.

ANNEX C: MODIFICATION TO AIRCREW PHA VALIDITY IN DM

Assessment	Includes	Normal Validity (Non-diabetic)	Diabetic Aircrew
Type I Aircrew PHA	Questionnaire Audiogram Visual acuity Colour vision Height, Weight, Waist circumference Complete History and Physical Confirmation of valid ophthalmology, cardiovascular risk assessment, and laboratory investigations	1 year (Alternating with Type II)	1 year
Type II Aircrew PHA	Questionnaire Audiogram Visual acuity Colour vision Height, Weight, Waist circumference File Review by aviation medicine provider:	1 year	Not authorized (every PHA in diabetic aircrew will be Type I)
Aircrew Eye Exam	Optometrist or ophthalmologist including: Visual acuity: distance and near, manifest refraction, near and distant ocular muscle balance, intraocular pressures, dilated funduscopy, and visual fields by confrontation	Group A Up to age 40: 4 years Over age 40: 2 years Over age 46: 1 year Corrective lenses up to 46: 2 years Group B: with PHE	All Groups All Ages 1 year
Aircrew Cardiovascular Assessment	ECG CBC, A1c, lipid profile Review risk factors: smoking, FHx, Hypertension, DM2, lipid profile Cardiovascular risk score	Group A Up to age 40: 4 years Over age 40: 2 years Group B With PHE	Up to age 40: 2 years Over age 40: 1 year (Except A1C)
Enhanced Cardiovascular Screening	See FSG 600-1	N/A	See FSG 600-1
Aircrew Diabetes Assessment	Assess medications including current dose, compliance, and side effects. Nutrition Review Review of Hypoglycemia record Physical exam as per PHA Confirmation of valid ophthalmology, cardiovascular risk assessment, and laboratory investigations	N/A	3-6 months depending on medications and risk factors (See table 3)

ANNEX D: HYPOGLYCEMIA RECORD

Date/Time of Event	Time since last medication	Symptoms	Blood Glucose	Activity at time of event	Action Required?
<i>Eg. 2022/01/31 0900</i>	<i>1 hour</i>	<i>Light headed, nausea, etc.</i>	<i>2.8</i>	<i>Pre-flight prep</i>	<i>Consumed 15g carbs</i>

ANNEX F- PERIPHERAL ARTERY DISEASE ASSESSMENT

Part A

History	Physical Exam
Claudication	Abnormal pulses
Atypical lower extremity symptoms	Bruits
Impaired walking function	Non-healing lower extremity ulcer
Ischemic leg pain	Elevation pallor or dependent rubor
Non-healing wound	Delayed capillary refill
	Cool extremities
	Lower extreme gangrene

Part B

Patients with one or more of findings on physical exam (see table above) should undergo ABI testing (Ref Q). They should also be considered at risk for cardiovascular disease and be screened IAW FSG 600-1.