3.0 CARDIOLOGY

Last Revised: FEB 2016 Last Reviewed: FEB 2016

Significant changes: 1) Addition of section on long QT syndrome

3.1 AORTIC INSUFFICIENCY

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case basis on Designated Personnel for mild and moderate severity, for non-ejection seat aircraft, maritime/helo/transport only

AEROMEDICAL CONCERNS: Acute complications from aortic insufficiency are rare. Chronic complications include left ventricular dilation and heart failure. There are theoretical concerns that the regurgitant flow of blood back into the LV may predispose the individual to GLOC, but this has not been confirmed. A secondary concern is that weight training to improve G-tolerance is relatively contraindicated, although such training is highly desirable in the tactical community.

WAIVER: Aortic insufficiency associated with a structural abnormality of the valve is CD, with no waiver for candidates. Designated individuals can receive waiver recommendations limited to non-ejection seat aircraft, maritime/helo/transport only. Traditionally, AI has been felt not to occur in normal subjects, but NAMI and the Air Force Aeromedical Consult Service have detected a limited degree of AI in a number of patients without detectable valvular pathology. On echo, these "physiologic" AI cases typically have a very small AI jet that does not extend out of the LVOT. In these cases, the condition is NCD, and as such does not require a waiver.

BICUSPID AORTIC VALVES: Because congenital bicuspid aortic valves can degenerate and progress to aortic stenosis or insufficiency, a bicuspid aortic valve is CD. Waivers will not be considered for applicants. If an incidental finding in designated aircrew, condition may be waiverable with possible restriction on aircraft or flight profile.

DIAGNOSIS/ICD-10 Code:
I35.1 Nonrheumatic aortic insufficiency

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	Annual Submission

Flight Surgeon comment regarding interval history & symptoms.
Specialist Evaluation: Cardiology or Internal Medicine, unless otherwise specified by code 53HN.

3.2 AORTIC STENOSIS

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case basis on Designated Personnel for mild severity, for non-ejection seat aircraft, maritime/helo/transport only

AEROMEDICAL CONCERNS: Aortic stenosis (AS) is generally well compensated over long periods of time. The cardinal manifestations of AS are angina, syncope and congestive heart failure. Angina is due either to CAD or the increased myocardial oxygen demands complicated by LVH. Syncope is frequently exercise related, and is generally the result of the inability of the heart to increase cardiac output. The compensatory LVH may also predispose the member to dysrhythmias, and result in syncope or sudden death.

WAIVER: Any degree of aortic stenosis is CD for aviation. Waivers to flight status may be considered only for designated individuals with mild AS (pressure gradient < 25 mm Hg). They are restricted to non-ejection seat aircraft, maritime/helo/transport only.

DIAGNOSIS/ICD-10 Code:
I35.0 Nonrheumatic aortic stenosis

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history & symptoms.
Specialist Evaluation: Cardiology or Internal Medicine, unless otherwise specified by code 53HN.

3.3 MITRAL REGURGITATION

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers for Designated Personnel are considered on a case-by-case basis

AEROMEDICAL CONCERNS: Reduced exercise tolerance and sudden attacks of acute pulmonary edema in severe cases.

WAIVER: Waiver can be considered for mild mitral regurgitation provided it is not associated with mitral stenosis or connective tissue disease. Mild MR without abnormalities of the mitral valve, abnormalities of left atrial size or abnormalities of LV size will be NCD. Higher grades of valvular insufficiency, or valvular insufficiencies with structural abnormalities will be considered for waiver recommendation on a case-by-case basis.

DIAGNOSIS/ICD-10 Code:
I34.0 Nonrheumatic mitral insufficiency

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history & symptoms.
Specialist Evaluation: Cardiology or Internal Medicine, unless otherwise specified by code 53HN.

3.4 MITRAL STENOSIS

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR							
WNR	X	X	X	X	X	X	X
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	These cases should be forwarded to PEB for retention determination.						

AEROMEDICAL CONCERNS: Mitral stenosis has a varied clinical presentation. Hemoptysis can occur, and ranges from simply blood streaked sputum to frank hemorrhage; although dramatic, it is rarely life-threatening. Atrial fibrillation is a frequent sequela of MS. Hemodynamic decompensation may result from atrial fibrillation, with or without a rapid ventricular response rate, as ventricular filling is highly dependent on atrial contraction (atrial kick), and/or a long diastolic filling time. MS may also present with chest pain. The dilated left atrium is prone to clot formation, and embolic events are not uncommon.

WAIVER: Any degree of mitral stenosis is CD, with no waiver recommended. Valve replacement surgery is not waived.

DIAGNOSIS/ICD-10 Code:
I34.8 Other nonrheumatic mitral valve disorders

3.5 MITRAL VALVE PROLAPSE

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I SG 1	Class I SG 2	Class I SG 3	Class II	Class III	Class IV
CD	X	X	X	X	X	X	X
NCD							
WR	X[1]	X[2]	X[2]	X[2]	X[2]	X[2]	X[2]
WNR							
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case basis for Class III & IV applicants only
2. Waivers are considered on Designated Personnel on a case-by-case basis for mild severity, not requiring medication, and without history of arrhythmia

AEROMEDICAL CONCERNS: MVP syndrome symptoms vary in severity and are manifold in presentation. Arrhythmias are seen in a subset of MVP patients; most commonly premature ventricular beats, paroxysmal supraventricular and ventricular tachycardias. Non- anginal chest pain often causes patients to seek medical attention. Palpitations, syncope and light-headedness have been reported, and sudden death is a rare complication. Of those patients who develop ventricular arrhythmias, approximately 50% have a history of syncopal or presyncopal episodes.

WAIVER: Candidates are not recommended for waiver, except for class III or IV. Designated personnel with minimal regurgitation, who do not require medication or have a history of significant arrhythmias, may be considered for waiver.

DIAGNOSIS/ICD-10 Code:
I34.8 Other nonrheumatic mitral valve disorders

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Echocardiogram, Exercise stress testing and Holter monitor.
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history & symptoms.
Specialist Evaluation: Cardiology or Internal Medicine, unless otherwise specified by code 53HN.

3.6 VALVULAR CONDITIONS (OTHER)

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR							
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case basis

AEROMEDICAL CONCERNS: The major concern is the relationship with mitral and aortic valve pathology. Pulmonic or tricuspid stenosis can both produce fatigue or shortness of breath. Tricuspid insufficiency is associated with arrhythmias.

WAIVER: Asymptomatic cases with mild functional abnormalities of the tricuspid or pulmonary valves may be considered for waiver in the absence of other pathology.

DIAGNOSIS/ICD-10 Code:
I36.8 Other nonrheumatic tricuspid valve disorders
I37.8 Other nonrheumatic pulmonary valve disorders

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Exercise stress testing and Holter monitor.
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history & symptoms.
Specialist Evaluation: Cardiology or Internal Medicine, unless otherwise specified by code 53HN.

3.7 ARRHYTHMIAS (PAC/PVC/OTHER)

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR							
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case basis

AEROMEDICAL CONCERNS: The concerns usually relate to presence of underlying heart disease. There is also a risk of progression to the development of symptoms or yet more severe arrhythmias which could be disabling in flight.

WAIVER: A waiver is not recommended for ventricular fibrillation or flutter. Most other conditions that have not been specifically addressed are waiverable provided there is no evidence of underlying heart disease. Some conditions require the flier to be grounded while undergoing evaluation while others allow a continuation of flying status. When in doubt, discuss the case with NAMI before making any decisions.

DIAGNOSIS/ICD-10 Code:
I49.1 Atrial premature depolarization
I49.3 Ventricular premature depolarization
I49.49 Other premature depolarization

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Patients with sinus pause (>2.5 sec), single or paired premature atrial contractions (PAC), single or paired junctional premature beats, supraventricular premature beat, idioventricular rhythm, uniform ventricular premature contraction (PVC), multiform PVC, or fused PVC should have a Holter monitor while remaining on flying status.
   a. If this is normal, no further evaluation is necessary.
2. Patients with sinus bradycardia (<40 bpm) should have a rhythm strip performed during exercise, if it cannot be accounted for by a vigorous exercise program
   a. If the individual cannot achieve 100 bpm or double the heart rate, a Holter monitor and exercise stress test should be carried out while the aviator is grounded.
3. Patients with paired PVC's or PVC with R on T phenomenon require Holter monitor, exercise stress test and echocardiogram while grounded.
   a. If paired or frequent ectopic beats are seen on Holter monitoring (comprising >1% of all beats or >25% of all beats in any hour, or more than 5 per minute, or if multifocal), an echocardiogram and exercise stress test should be performed.
4. In cases where ectopic beats comprise 10% or more of all beats or >25% in any hour or more than 10 pairs of ectopic beats are seen in 24 hours, the individual should be grounded and undergo complete cardiology evaluation.

- Released from *internal medicine or cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *internal medicine or cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Internal medicine or cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).

- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history & symptoms.
Specialist Evaluation: Cardiology or Internal Medicine, unless otherwise specified by code 53HN.

3.8 ATRIAL FIBRILLATION (AFIB)

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Yes, if ablation performed to allow time for complete evaluation and waiver process						

1. Waivers are considered on a case-by-case basis on Designated Personnel following a single episode of atrial fibrillation with a documented precipitating factor (e.g. Holiday Heart), a return to full flight status is possible after 6 months without recurrence. No medications are waivered. Waivers are not recommended in paroxysmal/recurrent cases without successful ablation.

AEROMEDICAL CONCERNS: Loss of atrial contribution to cardiac output with or without rapid ventricular response may result in hemodynamic symptoms and impaired exercise capacity with implications for aviators in high performance aircraft. Symptoms of atrial fibrillation often include palpitations and lightheadedness, and may include near-syncope, dyspnea, or chest pain, although many episodes of atrial fibrillation are asymptomatic. There is a significantly increased risk of thrombosis and embolic phenomena in the setting of both paroxysmal and chronic atrial fibrillation. Chronic medications for maintenance of sinus rhythm or for ventricular rate control may impair hemodynamic response to +Gz loading.

REMEMBER: SINCE THE MINIMUM TIME OF OBSERVATION FOR RECURRENCE IS GREATER THAN 60 DAYS, A GROUNDING PHYSICAL IS REQUIRED AT THE TIME OF DIAGNOSIS; A LOCAL BOARD OF FLIGHT SURGEONS IS NOT AUTHORIZED TO RETURN TO FLIGHT STATUS.

Radiofrequency catheter ablation for atrial fibrillation is also CD. Paroxysmal atrial fibrillation following successful ablation may be considered no sooner than 6 months post-procedure for all designated classes with the exception of Class I, SG1 which requires at least 12 months observation post-procedure. Waiver requires that the member remain asymptomatic off all antiarrhythmic medication with no recurrence of atrial fibrillation after ablation and a normal cardiac evaluation as outlined below. Due to significantly lower success rates, waivers for ablation of permanent atrial fibrillation are generally not recommended.

DIAGNOSIS/ICD-10 Code:
I48.91 Unspecified atrial fibrillation

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

Single episode of Afib (resolved):

1. Exclusion of secondary causes is mandatory, including an exact detailed history of the event(s) (i.e. alcohol use, thyroid disorders, stimulant use, sleep, stress, etc.).
2. Complete cardiology consultation is required, to include:
   a. Exercise treadmill testing
   b. Echocardiography
   c. Ambulatory EKG monitor (event monitor) obtained 3-6 months post-event (ideally sometime during final observation month) off all antiarrhythmic medication. Monitoring for minimum of 10 days is preferred.
   Note: If ambulatory EKG is not available a 48 hour Holter may be substituted.

Recurrent/Paroxysmal Afib treated with radiofrequency catheter ablation:

1. Exclusion of secondary causes is mandatory, including an exact detailed history of the event(s) (i.e. alcohol use, thyroid disorders, stimulant use, sleep, stress, etc.).
2. Complete cardiology consultation is required, to include:
   a. Exercise treadmill testing
   b. Echocardiography
   c. At least one ambulatory EKG monitor (event monitor). *Monitor should be applied for minimum of 10 days* and off all antiarrhythmic medication. Monitors obtained for waiver consideration at the 6 month mark should be obtained no sooner than 5 months post-ablation.

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

If ablation not performed:

1. Flight surgeon exam with assessment for symptoms and EKG is required. Additional testing/monitoring requirements may be requested by NAMI on a case-by-case basis.
2. Flight Surgeon comment regarding interval history & symptoms.
3. Specialist Evaluation: Cardiology, unless otherwise specified by code 53HN.

If ablation performed:

1. Ambulatory EKG monitor (event monitor): *for minimum of 10 days* at 6 month intervals required for 2 years post-ablation for continuation of waiver.
   a. After 2 years, ambulatory EKG monitor (event monitor) required at 12 month intervals for continuation of waiver. (If ambulatory EKG is not available a 48 hour Holter may be substituted).
   b. Any evidence of recurrence requires grounding. A second waiver is unlikely but may be reconsidered after a second ablation procedure.
2. Flight Surgeon comment regarding interval history & symptoms.
3. Specialist Evaluation: Cardiology, unless otherwise specified by code 53HN.

3.9 ATRIAL FLUTTER (AF)

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Yes, recommended since member grounded for 6 months pending full evaluation						

1. Waivers are considered on a case-by-case basis on Designated Personnel following a single episode of atrial flutter with a documented precipitating factor (e.g. Holiday Heart). No medications are waivered. 6-month grounding required during evaluation. Waivers are not recommended in recurrent cases.

AEROMEDICAL CONCERNS: Acute atrial flutter may result in a runaway ventricular response rate. AF may be associated with chest pain, syncope or near syncope. There is a significantly increased incidence of embolic phenomena.

REMEMBER: SINCE THE MINIMUM TIME OF OBSERVATION FOR RECURRENCE IS GREATER THAN 60 DAYS, A GROUNDING PHYSICAL IS REQUIRED AT THE TIME OF DIAGNOSIS; A LOCAL BOARD OF FLIGHT SURGEONS IS NOT AUTHORIZED TO RETURN TO FLIGHT STATUS.

DIAGNOSIS/ICD-10 Code:
I48.92 Unspecified atrial flutter

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Exclusion of secondary causes is mandatory, including an exact detailed history of the event(s) (i.e. alcohol use, thyroid disorders, stimulant use, sleep, stress, etc.).
2. Complete cardiology consultation is required, to include:
   a. Exercise treadmill testing
   b. Echocardiography
   c. Three Holter monitors at monthly intervals

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

EKG.
Flight Surgeon comment regarding interval history & symptoms.
Specialist Evaluation: Cardiology, unless otherwise specified by code 53HN.

3.10 ATRIAL SEPTAL DEFECT (ASD)/PATENT FORAMEN OVALE

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X[1,2]	X[1,2]	X[1,2]	X[1,2]	X[1,2]	X[1,2]
NCD							
WR							
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Hemodynamically stable ASD or PFO is NCD. Hemodynamically stable is defined as:
   a. Asymptomatic
   b. No right ventricular enlargement on echocardiogram
   c. No fixed splitting of S2
   d. Normal EKG
   e. Normal chest radiograph
2. Cases not meeting stable criteria above are CD and waivers will be considered on a case-by-case basis on Designated Personnel.

AEROMEDICAL CONCERNS: Physiologically, it is difficult to differentiate between patent foramen ovale (no murmur, no change in S2) and atrial septal defects (murmur, fixed split in S2). For the purposes of this discussion, the two conditions will be both considered "atrial septal defects". Atrial septal defects predispose individuals to several conditions, however, the known frequency of the condition in military aviation personnel and the relative lack of demonstrated pathology argue against any significant effect. It has been postulated that ASD predisposes to decompression sickness (DCS). Valvular dysfunction can occur and pulmonary hypertension may develop.

DIAGNOSIS/ICD-10 Code:
Q21.1 Atrial septal defect

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Routine Submission**

Flight Surgeon comment regarding interval history & symptoms.

3.11 ATRIOVENTRICULAR CONDUCTION DISTURBANCES

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
NCD							
WR							
WNR	X[2]	X[2]	X[2]	X[2]	X[2]	X[2]	X[2]
LBFS	No	Yes	Yes	Yes	Yes	Yes	Yes
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. First degree A-V block and Mobitz type I second degree A-V block (Wenckebach) are NCD as long as non-invasive work-up as below is normal.
2. Mobitz type II second degree and third degree A-V block are CD, waivers not recommended.

AEROMEDICAL CONCERNS: There is a risk of bradycardia with decreased +Gz tolerance, syncope or sudden death in some conduction disturbances.

DIAGNOSIS/ICD-10 Code:
I44.0 Atrioventricular block, first degree
I44.1 Atrioventricular block, second degree

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. First degree A-V block:
   a. Local evaluation should include a repeat EKG or rhythm strip performed during exercise, which may be calisthenics. The heart rate may need to be increased over 80-100 bpm.
      (1) If the PR interval shortens (it does not have to be normal) with increased heart rate no further evaluation is necessary, condition is NCD.
      (2) If PR interval remains prolonged despite increased heart rate, a non-invasive cardiac evaluation including exercise stress testing, echocardiography, and Holter monitor is required. Up to this stage, the aviator may remain on flying status during evaluation. If the tests are normal, no further evaluation is needed, condition is NCD.
2. Second degree A-V block (Mobitz Type I) requires:
   a. Cardiology consultation, including exercise stress testing, echocardiography, and Holter monitor.

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

EKG.
Flight Surgeon comment regarding interval history & symptoms.

3.12 CORONARY ARTERY DISEASE

Last Revised: JAN 2016 Last Reviewed: FEB 2016

Significant changes: 1) Added documentation of ASVCD risk to waiver requirements.

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS		No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case on Designated Personnel

AEROMEDICAL CONCERNS: The major concern is the risk of sudden death or incapacitation in flight – acute coronary syndromes are unpredictable and often catastrophic at initial presentation. Characterization of two hazards is important in minimizing this risk – the presence of hemodynamically significant stenosis (coronary artery narrowing) and the total burden of disease or plaque (most commonly atherosclerosis). Prevention (either primary or secondary) of excess hazards depends upon adequate identification of aviators at risk followed by treatment of modifiable factors. The risk control measures for CAD are revascularization of any significant lesions and aggressive risk factor modification. Advances in screening, diagnostic modalities, and treatment of CAD increase the likelihood that aviators with asymptomatic CAD (not strictly disqualified by the above standards) will present for aeromedical disposition. Advances in the treatment of symptomatic CAD also open the potential for recommending aviators to return to aviation duty when both the lesion and underlying disease process can be controlled to acceptable levels of risk.

Effective treatment requires long term medications. Medications used have potential adverse effects or toxicities. Effects of the aviation environment on medication toxicity are generally unknown. Monitoring of treatment may require periodic testing not commonly available in operational settings.

DIAGNOSIS/ICD-10 Code:
I25.9 Chronic ischemic heart disease, unspecified

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Statement from member documenting tobacco cessation (if applicable).
2. Documentation of ASCVD Risk found at http://tools.acc.org/ASCVD-Risk-Estimator/.

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history & symptoms.

Specialist Evaluation: Cardiology, unless otherwise specified by code 53HN.

Waiver may be terminated if any of the following occur:

1. BMI > baseline or not at target
2. Noncompliance with medications
3. Unwillingness to comply with exercise program or tobacco cessation
4. Failure to promptly report recurrence of symptoms

3.13 HYPERLIPIDEMIA

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD							
NCD	X	X	X	X	X	X	X
WR							
WNR							
LBFS	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EXCEPTIONS							
LIMDU/PEB	Not required.						

AEROMEDICAL CONCERNS: Risk of ischemic heart disease with increased plasma cholesterol and with increased low density lipoprotein (LDL).

Before any therapy is initiated, exclude all causes of secondary hyperlipidemia such as hypothyroidism, diabetes, cholestasis, alcohol abuse, gout, renal failure, nephrotic syndrome, myeloma and systemic lupus erythematosus.

See MEDICATIONS section regarding antihyperlipidemic medications.

DIAGNOSIS/ICD-10 Code:
E78.4 Other hyperlipidemia

3.14 HYPERTENSION

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	Yes	Yes	Yes	Yes	Yes	Yes
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case on Designated Personnel

AEROMEDICAL CONCERNS: Untreated hypertension is associated with long term changes in the cardiovascular system that in to have the effect of significantly reducing life span. Untreated hypertension also predisposes individuals to cerebrovascular accident, myocardial infarction, ophthalmologic disease and renal failure. The magnitude of the blood pressure elevation is directly proportional to the risk of developing complications and is increased by other risk factors such as hyperlipidemia or cigarette smoking. A diagnosis of **White Coat Hypertension** may be warranted, however, must be supported by a completely normal 24-hour ambulatory blood pressure monitor**.** If the blood pressure exceeds standards at the time of exam, three day blood pressure checks (at two different times each day) are indicated. Previously high readings which are then normal on three day follow-up DOES NOT relieve the examining flight surgeon from re-evaluation if the blood pressure is high during subsequent physical exams (or sick-call visits).

Blood pressure exceeding 139 mmHG systolic or 89 mmHG diastolic is CD and a waiver will not be recommended. If the systolic pressure is 150 mm or less and/or the diastolic 100 mm or less, member may continue to fly for a maximum of six months with Flight Surgeon's approval if asymptomatic and no evidence of end organ damage. This allows for a trial of weight reduction, diet modification, exercise, etc. Clearance Notice should clearly state the necessity to re-evaluate for effectiveness of non-pharmacologic measures every three months and be issued for duration of only 90 days and the reason (pending blood pressure reduction measures). At the end of a total of six months, if member is within aviation standards (<140/90), they are PQ. If not within standards, member is NPQ, and grounded for any remaining work-up and the initiation of therapy. **Blood pressure out of standards will not be waived**; the approved medications are outlined below. Unrestricted waivers are possible if adequate control of blood pressure is achieved (BP<140/90), there is no evidence of end-organ damage, and there are no significant medication side effects in designated personnel.

LIFESTYLE MODIFICATION: The cornerstone of blood pressure management begins with lifestyle modification. Proper diet and adequate aerobic exercise will improve cardiovascular fitness and decrease the effects that hypertension can cause. When lifestyle modifications alone are insufficient to control a patient's blood pressure, medical therapy will need to be initiated. Diet and exercise remain important adjuncts to therapy and should be encouraged at a level appropriate to the patient's age, current level of conditioning, and stage of hypertension.

MEDICAL THERAPY: After appropriate evaluation of an aviator with HTN (and a trial of diet and exercise therapy if blood pressure is less than 150/100) the use of **Angiotensin Converting Enzyme (ACE) Inhibitors** and **Hydrochlorothiazide (HCTZ)** can be used as **first line** agents for treatment of HTN in aviation personnel. ACE inhibitors are preferred as they have a low incidence of aeromedically significant side effects and are generally well tolerated. There are no dose restrictions on these medications as long as manufacturer recommended maximum doses are not exceeded. Use of **Angiotensin II Receptor Blockers (ARBs)** medications can be used if aviators are intolerant to ACE inhibitors secondary to cough. The documentation should clearly state the reason for such medication

use (i.e. “member developed side effect of cough while on ACE and was switched to ARB with resolution”).

Amlodipine, a calcium channel antagonist, may be considered as a **second line** therapy either alone or in combination with ACE inhibitors, ACE-II or HCTZ. All **second line therapy waivers** are restricted to **SG3, Class II non-tactical aircraft and all Class III and IV.**

Beta blockers are not compatible with waivers for Service Groups 1 or 2. Senior officers (LCDR and above) may be waived to SG3 or Class II flying duties in non-tactical aircraft. Air controllers and UAV operators are usually waived. All SG1 or SG2 or tactical NFOs are NPQ, no waiver. Beta blockers are incompatible with physiologic compensation required in response to G forces so requests should state "transport/maritime/helo aircraft only." If beta blockers are used, we prefer the use of the more cardioselective agents.

All personnel requesting a waiver should have their blood pressure adequately controlled (<140 systolic and <90 diastolic), be free of side effects, and have no complications from their hypertension. All waiver requests outside these guidelines should consult NAMI Internal Medicine.

DIAGNOSIS/ICD-10 Code:
I10 Essential (primary) hypertension

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Documentation of good blood pressure control
2. Documentation of an absence of end organ damage
3. Initial evaluation and waiver submission will include:
   a. CBC
   b. CHEM 7 (serum electrolytes, glucose, urea nitrogen and creatinine)
   c. TSH
   d. Fundoscopic examination
   e. Urinalysis
   f. ECG
   g. An echocardiogram may be required if there is any suggestion of ventricular hypertrophy by exam or ECG
   h. Any pathology detected will require specialist evaluation
   i. The WS-HTN (Hypertension Worksheet) must be completed and uploaded as a supporting document within AERO.

- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding blood pressure control.

1. CHEM 7
2. ECG
3. Urinalysis
4. The WS-HTN (Hypertension Worksheet) must be completed and uploaded as a supporting document within AERO.

3.15 HYPERTROPHIC CARDIOMYOPATHY

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case on Designated Personnel.

AEROMEDICAL CONCERNS: These patients have significant risk of developing dysrhythmias. Angina may also be a complicating factor, and can be due either to superimposed coronary artery disease or ischemia from extrinsic compression of the penetrating branches of the major epicardial vessels. If the hypertrophic changes involve the LV outflow tract, a functional outflow tract obstruction can result, with the attendant reduction in cardiac output and exercise tolerance. There is an annual mortality of 3.4% without surgery. Surgery for obstructive myopathy (myotomy, myectomy) has a mortality of 5-10% and the long term gain is uncertain.

WAIVER: True primary hypertrophic cardiomyopathy (e.g., IHSS) is rare, and is not usually discovered until post-mortem. This condition is disqualifying for general duty, and no waivers are recommended either for accession to general duty or special duty. Waiver will only be considered in the very mildest of cases with no hemodynamic and minimal echocardiographic abnormalities and after the exclusion of underlying pathology. If the myopathy is secondary to other pathology, the underlying condition is the basis of disqualification. If the hypertrophic changes are documented to have resolved after treatment, a waiver recommendation may be considered. The majority of patients with idiopathic cardiomyopathy are disqualified from military flying. If a waiver is requested, refer to NAMI for evaluation.

DIAGNOSIS/ICD-10 Code:
I42.1 Obstructive hypertrophic cardiomyopathy

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Cardiology consultation is required, which should include:
   a. Echocardiography and cardiac catheterization if indicated
   b. Exclusion of underlying secondary causes for hypertrophic cardiomyopathy such as hypertension, pulmonary hypertension, valvular disorders, and hyperthyroidism

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history and cardiac symptoms.
Specialist Evaluation: Cardiology, unless otherwise specified by code 53HN.

3.16 INTRAVENTRICULAR CONDUCTION ABNORMALITIES

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR							
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. See Waiver comments below

AEROMEDICAL CONCERNS: Left bundle branch block (LBBB) is usually associated with coronary artery disease. Right bundle branch block (RBBB), especially as a new finding, may also be associated with heart disease, particularly atrial septal defects.

WAIVER:

1. **RBBB, LAHB, LPHB** are NCD if a non-invasive workup (Holter monitor, treadmill and echocardiogram) is normal.
2. **LBBB** is CD. No waiver recommended for non-designated personnel. A waiver is possible for designated aviators with LBBB in the documented absence of coronary artery disease and if asymptomatic.
3. Bifascicular blocks (LAHB or LPHB with RBBB) are CD, no waiver recommended.
4. **Trifascicular blocks** (1st degree AVB with RBBB and either LAHB or LPHB) are CD, no waivers.
5. **Incomplete RBBB** is NCD, with no workup required. Please refrain from using the term "Nonspecific intraventricular conduction delay".

DIAGNOSIS/ICD-10 Code:
I45.10 Unspecified right bundle-branch block
I44.7 Left bundle branch block, unspecified

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Complete cardiology evaluation is necessary for LBBB, RBBB, left posterior hemiblock and left anterior hemiblock (LAH) if this is a sudden change from previous ECGs.
2. If LAH is found:
   a. If younger than 35 years and no previous recordings are available, an echocardiogram should be performed to rule out congenital heart disease.
   b. If older than 35 with no previous ECGs available, a treadmill test as well as an echocardiogram should be performed.
   c. Pending these evaluations, persons with LAH may remain on flying status.
   d. If the studies are normal, no further evaluation is required.
   e. If LAH develops slowly over some years as a result of progressive left axis deviation, no further evaluation is required.
   f. A standard treadmill in any patient with any conduction defect may be unreliable. Stress echocardiography or thallium stress test is preferred.

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).

- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history and cardiac symptoms.
Specialist Evaluation: Cardiology, unless otherwise specified by code 53HN.

3.17 LEFT VENTRICULAR HYPERTROPHY

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. For Designated Personnel, see Waiver comments below

AEROMEDICAL CONCERNS: An increase in left ventricular mass has been shown in several series to be associated with dysrhythmias, angina or sudden death. Idiopathic or secondary cardiomyopathies are discussed separately.

WAIVER: In our population, LVH based on ECG criteria is usually a false positive. Current criteria, based on the general population, are not valid for our young, athletic population. The electrocardiograph criteria established by the U.S. Air Force School of Aviation Medicine for diagnosis of LVH by voltage will be used to screen naval flight personnel.

LVH by Voltage:
For all aviators - A diagnosis of LVH by voltage is considered NCD provided the echocardiogram is normal. It is not required that the aviator be grounded pending echocardiogram interpretation.
USAFSAM LVH by voltage criteria:

1. S in V1 or V2 plus R in V5 or V6:
   >55mm if age 35 or younger
   >45mm if older than 35
2. No ST/T changes

True LVH:
Applicants - True LVH in applicants is CD and waivers are not recommended (WNR).
Designated Aviators - True LVH in designated aviators CD, with waiver recommended if the aviator is normotensive (with or without antihypertensive medication) and has a normal ejection fraction. Please submit the information required below with an Aeromedical Summary.

DIAGNOSIS/ICD-10 Code:
I51.7 Cardiomegaly

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Echocardiography
2. Internal Medicine or Cardiology evaluation to include exercise history, CAD risk factors.
3. Serial Blood Pressures

- Released from *cardiology or internal medicine* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology or internal medicine* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology or internal medicine* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	Annual Submission

Flight Surgeon comment regarding interval history, cardiac symptoms, and exercise tolerance.

1. EKG - comparison with previous EKG
2. Serial Blood Pressures
3. If there are any significant changes from initial evaluation, an echocardiogram should be obtained

3.18 PERICARDITIS

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I SG 1	Class I SG 2	Class I SG 3	Class II	Class III	Class IV
CD	X	X	X	X	X	X	X
NCD							
WR	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR							
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case

AEROMEDICAL CONCERNS: Pericardial effusion can lead to acute cardiovascular compromise secondary to cardiac tamponade. Less severe cases can produce pain and shortness of breath that can be distracting in flight.

WAIVER: The flier should be grounded during the acute illness. Idiopathic pericarditis can be considered for waiver after the acute episode resolves provided there has been no recurrence or sequelae. The disposition of cases secondary to underlying disease will depend on the disease concerned. Any pericardial effusions must be resolved by echocardiography before waiver recommendations will be made.

DIAGNOSIS/ICD-10 Code:
I30.8 Other forms of acute pericarditis

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Cardiology consultation is necessary to exclude connective tissue disorder, myocardial infarction, neoplasm or other disease processes. The workup should include:
   a. Echocardiography to rule out sequelae such as pericardial effusion or constrictive pericarditis.

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history, cardiac symptoms, and exercise tolerance.
Specialist Evaluation: Cardiology, unless otherwise specified by code 53HN.

3.19 PRE-EXCITATION SYNDROMES

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR							
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. See Waiver Requests comments below

AEROMEDICAL CONCERNS: Pre-excitation syndromes include Wolff Parkinson White (WPW) and Lown-Ganong-Lavine (LGL). WPW patterns with adverse symptoms and/or inducible to a dysrhythmia using electrophysiologic studies (EPS) are associated with increased risks of tachyarrhythmias, hemodynamic compromise (palpitations, lightheadedness, syncope), and sudden death. Ablation is recommended in symptomatic individuals and/or those with EPS-induced dysrhythmias.

Short PR with symptomatic palpitations and/or dysrhythmias, known as Lown-Ganong-Lavine (LGL), is associated with risks of tachyarrhythmias and hemodynamic compromise, and EPS is recommended.

Very short PR (< 0.1) without Delta wave, symptoms or dysrhythmia is associated with slightly elevated risks of dysrhythmia, and non-invasive studies are recommended for aviation personnel.

Short PR (≥ 0.1) without symptoms or dysrhythmias is not considered disqualifying (NCD) and requires no further evaluation. Individuals with short PR and no symptoms have the same risk of adverse cardiac events as the general population.

Pre-excitation syndromes are associated with other types of heart disease, such as hypertrophic cardiomyopathy or Ebstein's malformation. Uninvestigated and/or untreated pre-excitation syndromes are not compatible with flight safety or current care standards.

WAIVER REQUESTS and INFORMATION REQUIRED:

Class I: Applicants or Designated

1. Asymptomatic WPW pattern requires a cardiology evaluation, echocardiogram and EPS.
   a. WPW pattern alone with a normal echocardiogram and non-inducible EPS is considered disqualifying (CD), but a waiver is recommended (WR).
   b. If a dysrhythmia is induced by EPS and ablated, the patient must be retested with EPS immediately after the ablation during that same procedure to ensure dysrhythmias are no longer inducible.
      (1) Designated members are CD/WR and waivered to SG3 during the six-month post-ablation period. Waiver requests to SG1 or SG2 may be submitted six months post-ablation with documentation indicating they had no recurrence of dysrhythmias or symptoms.
      (2) Applicants are CD/WNR. Waivers are considered six months post-ablation, with documentation indicating no recurrence of dysrhythmias or symptoms.
2. WPW syndrome (WPW pattern with symptoms) or LGL (short PR with palpitations) are CD, and require a cardiology evaluation and echocardiogram. Ablation is required for waiver eligibility. Waiver recommendation is on a case-by-case basis, and local board of flight surgeons (LBFS) action is prohibited.

3. Very short PR (< 0.1) without Delta wave, symptoms or dysrhythmia requires a non-invasive cardiology evaluation (24 hour Holter, echocardiogram, stress test). If all tests are negative/normal, then the condition is not considered disqualifying (NCD). If any of the tests are positive/abnormal, then the condition is CD, requires a cardiology evaluation, and may require EPS and/or ablation. Waivers are considered on a case-by-case basis.
4. Short PR (≥ 0.1) without symptoms or dysrhythmia is NCD, and requires no further evaluation, treatment, or waiver.

Class II/III/IV: Applicant or Designated

1. Asymptomatic WPW pattern requires cardiology consultation, echocardiogram, 24-hour Holter monitor, and exercise stress testing.
   a. WPW pattern alone with normal studies is CD/WR.
   b. If cardiology studies determine EPS is indicated, and EPS does NOT cause inducible dysrhythmias, the individual is CD/WR.
   c. If cardiology studies determine that EPS is indicated and the EPS causes inducible dysrhythmias, then ablation is required. During ablation procedure, retesting is required to demonstrate that the dysrhythmia is non-inducible. The condition is CD/WR. Waiver requests are considered immediately; Class II, III and IV do not have a six-month post-ablation waiting period.
2. WPW syndrome (WPW pattern with symptoms) and LGL (short PR with palpitations) are both CD. Waiver requirements are the same as for Class I personnel with symptomatic dysrhythmias (See Class I Paragraph 2).
3. Very short PR (< 0.1) without Delta wave, symptoms or dysrhythmia requires a non-invasive cardiology evaluation (24 hour Holter, echocardiogram, stress test). If all tests are negative/normal, then the individual is NCD. If any of the tests are positive/abnormal, then the individual is CD, requires a cardiology evaluation, and may require EPS and/or ablation. Waivers are considered on a case-by-case basis.
4. Short PR (≥ 0.1) without symptoms or dysrhythmias is NCD, and requires no further evaluation, treatment, or waiver.

DIAGNOSIS/ICD-10 Code:
I45.6 Pre-excitation syndrome

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Cardiology consultation.

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history, cardiac symptoms or dysrhthmias, and exercise tolerance.

1. An EKG will be completed and compared to prior studies. In some cases, a Holter monitor may be substituted.
2. If dysrhythmias or symptoms recur, personnel are NPQ and waivers are terminated.

3.20 SINUS BRADYCARDIA

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
NCD							
WR							
WNR							
LBFS							
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. If the heart rate increases with exercise, the bradycardia is NCD, and no waiver is required.

AEROMEDICAL CONCERNS: Extreme sinus bradycardia may be a reflection of an underlying conduction system abnormality. There may be an inability to increase the heart rate in response to increased demand.
WAIVER: If the heart rate increases with exercise, the bradycardia is NCD, and no waiver is required.

DIAGNOSIS/ICD-10 Code:
R94.31 Abnormal electrocardiogram

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history.

1. An EKG with heart rate > 45

3.21 SINUS TACHYCARDIA

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR							
WNR	X	X	X	X	X	X	X
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

AEROMEDICAL CONCERNS: Sinus tachycardia may be a reflection of a significant metabolic abnormality. In candidates, consider anxiety as the root problem. Other causes include fever, hyperthyroidism, dehydration, anemia, hypoxia, pulmonary emboli, and pain.

WAIVER: The waiver recommendation will stem from the reason for the tachycardia. If the heart rate is persistently >100 bpm and no cause has been identified, both candidates and designated personnel are CD, no waiver.

DIAGNOSIS/ICD-10 Code:
R00.0 Tachycardia, unspecified

3.22 SUPRAVENTRICULAR TACHYCARDIA

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. For Designated Personnel, see Waiver comments below

Note: NAMI's definition of supraventricular tachycardia is 3 or more consecutive nonventricular ectopic beats at a heart rate of greater than 99 BPM. Excluded are atrial fibrillation/flutter and multifocal atrial tachycardia. Recurrent is defined as occurring more than once in any test or during any evaluation. Sustained tachycardia is defined as lasting more than 10 minutes.

AEROMEDICAL CONCERNS: The major concern in supraventricular tachycardia (SVT) is hemodynamic decompensation in flight leading to lightheadedness, dizziness, presyncope and loss of consciousness.

WAIVER: Only asymptomatic (with the exclusion of the sensation of palpitations as a symptom) cases will be considered for waiver as symptoms are an indication of hemodynamic compromise. **Service Group 1 waiver recommendations** can be considered for those with the following: episodes of single or recurrent, non-sustained SVT including those with coexisting mitral valve prolapse (MVP), left or right bundle branch block (LBBB or RBBB), mitral regurgitation (MR) and sarcoidosis; a single episode of sustained SVT including those with coexisting MVP, L/RBBB, MR or sarcoidosis. No evidence of CAD can be present if a waiver is requested. Disqualification is mandatory in cases of SVT with hemodynamic compromise, single sustained SVT with gradable CAD, recurrent, sustained SVT when the recurrence is at intervals <3 years and any SVT associated with a pre-excitation pattern on ECG. Waivers are not recommended for students or candidates. No waivers are recommended for Multifocal Atrial Tachycardia (MAT). Note: In the absence of P-waves, distinguishing between SVT with BBB vs. VT is difficult.

REMEMBER: SINCE THE MINIMUM TIME OF OBSERVATION FOR RECURRENCE IS GREATER THAN 60 DAYS, A GROUNDING PHYSICAL IS REQUIRED AT THE TIME OF DIAGNOSIS; A LOCAL BOARD OF FLIGHT SURGEONS IS NOT AUTHORIZED TO RETURN TO FLIGHT STATUS.

DIAGNOSIS/ICD-10 Code:
I47.1 Supraventricular tachycardia

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Cardiology consultation including:
   a. Echocardiogram
   b. Stress test
   c. Three 24-hour Holters during a 6 month grounding period
2. For cases of a single, asymptomatic, 3-10 beat run of SVT, only local evaluation is required. This should include:
   a. Thyroid function testing
   b. Echocardiogram
   c. Standard treadmill test
   d. Three 24-hour Holters at monthly intervals to identify cardiovascular risk factors

e. These studies will be forwarded to NAMI with the waiver request for review. If there is any abnormality, further cardiology evaluation will be required.

3. Note: If LBBB or RBBB is present, a standard treadmill EST is almost impossible to interpret. Preferred studies are stress echocardiogram, thallium stress test or Sestamibi

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history, cardiac symptoms or dysrhythmias, and exercise tolerance.

1. An EKG will be completed and compared to prior studies.

3.23 THROMBOPHILIA/VENOUS THROMBOSIS/PULMONARY EMBOLISM

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR							
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. See waiver comments below

AEROMEDICAL CONCERNS: Pain and swelling secondary to deep venous thrombosis (DVT) can be distracting in flight. The major risk is a pulmonary embolism producing chest pain, shortness of breath, hypoxia, cardiac arrhythmias or sudden death. Dyspnea occurs in nearly 90% of patients with symptomatic pulmonary emboli (PE) with syncope occurring occasionally.

WAIVER: In cases of first DVT/PE with or without obvious external predisposing conditions: Waiver will not be considered until a minimum of three months after the event, and will only be considered after the prescribed course of anticoagulation therapy (usually 3-6 months) has been completed, member is off all anticoagulants, ultrasound of the site or suspected site(s) of thrombosis is normal, and, if pulmonary embolism was present, pulmonary function tests are normal. In cases of first DVT/PE with an inheritable thrombophilia diagnosed, if Factor V Leiden or Prothrombin 20210A mutations are detected, waivers will be considered on a case-by-case basis if all previously described conditions are met. No waivers will be considered if Protein S, Protein C, or Antithrombin III deficiency are detected or in cases of recurrent DVT/PE or a recommendation for lifelong anticoagulation therapy. The development of pulmonary hypertension, the need for continued anticoagulation, or surgical procedures such as plication of the vena cava or insertion of filter devices is CD, no waiver. Superficial thrombophlebitis is NCD.

REMEMBER: SINCE THE MINIMUM TIME OF OBSERVATION FOR RECURRENCE IS GREATER THAN 60 DAYS, A GROUNDING PHYSICAL IS REQUIRED AT THE TIME OF DIAGNOSIS AND THEN A LOCAL BOARD OF FLIGHT SURGEONS IS NOT APPROPRIATE TO BE CONVENED.

DIAGNOSIS/ICD-10 Code:
I82.62 Acute embolism and thrombosis of deep veins of upper extremity
I82.40 Acute embolism and thrombosis of unspecified deep veins of lower extremity
I26.99 Other pulmonary embolism without acute cor pulmonale

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Internal medicine or hematology consultation
2. If there was a PE, confirmation of normal pulmonary function by PFTs is necessary.

- Released from *internal medicine or hematology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *internal medicine or hematology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Internal medicine or hematology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON
All associated documentation.

FOLLOW UP REQUIREMENTS	Routine Submission

Flight Surgeon comment regarding interval history.

3.24 VENTRICULAR TACHYCARDIA

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR							
WNR	X	X	X	X	X	X	X
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB							

Note: NAMI's definition of ventricular tachycardia is 3 or more consecutive, ventricular, ectopic beats at a heart rate greater than 99 bpm. Recurrence is defined as occurring more than once in any Holter monitor or period of workup, or more than once in any subsequent evaluation.

AEROMEDICAL CONCERNS: Hemodynamic changes can result in a fall in blood pressure and a reduction in cerebral blood flow. The condition is often associated with underlying heart disease. There is also a risk of sudden death associated with the condition, usually from ventricular fibrillation.

WAIVER: Non-Designated and Designated Personnel: CD all DIF, no waiver for either sustained or non-sustained VT.

DIAGNOSIS/ICD-10 Code:
I47.2 Ventricular tachycardia

3.25 RAYNAUD'S PHENOMENON

Last Revised: JAN 2016 Last Reviewed: FEB 2016

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS		No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	Not required.						

1. Waivers are considered on a case-by-case for Designated Personnel.

AEROMEDICAL CONCERNS: Raynaud's Phenomenon is an episodic, reversible spasm of the vasculature in the extremities. Typically the hands are primarily affected. During an episode skin changes that occur include:

1. Pallor-caused by lack of oxygenated blood
2. Cyanosis-caused by pooling of poorly oxygenated blood
3. Rubor-occurs as the vasospasm ends

During a severe episode the vascular changes and associated pain can affect hand usage in the cockpit.

WAIVER: Civilian applicants with Raynaud's Phenomenon are CD, no waiver, per the Manual of the Medical Department (MANMED). Designated aviators with primary Raynaud's Phenomenon will be considered for waiver. Underlying pathology must be excluded and symptoms must be manageable in the performance of flight duties. Designated aviators diagnosed with secondary Raynaud's Phenomenon are CD, waiver considered on a case-by-case basis.

DIAGNOSIS/ICD-10 Code:
I73.00 Raynaud's syndrome without gangrene

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Internal medicine or rheumatology consultation.
2. A flight surgeon's analysis of the aviator's ability to perform normal and emergency duties must be included with the waiver submission request.

- Released from *internal medicine or rheumatology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *internal medicine or rheumatology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Internal medicine or rheumatology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history.

3.26 PROLONGED QT INTERVAL AND LONG QT SYNDROME

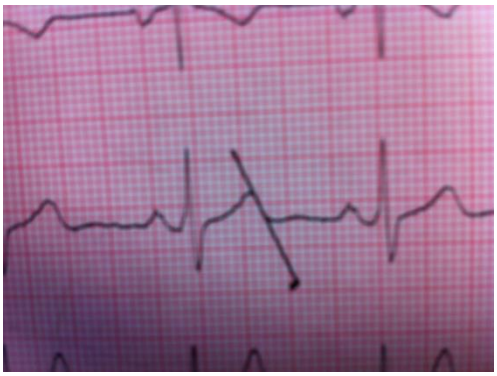
Last Revised: JAN 2016 Last Reviewed: FEB 2016

New entry.

	Applicant	Class I			Class II	Class III	Class IV
		SG 1	SG 2	SG 3			
CD	X	X	X	X	X	X	X
NCD							
WR		X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
WNR	X						
LBFS	No	No	No	No	No	No	No
EXCEPTIONS							
LIMDU/PEB	If required prior to waiver consideration						

1. For Designated Personnel, see waiver comments below.

AEROMEDICAL CONCERNS: Prolonged QT interval on ECG can result in syncope, arrhythmias such as ventricular tachycardia, and sudden cardiac death. The QT interval in a normal person can be prolonged by hypocalcemia, hypothyroidism, and medications. The congenital long QT syndrome (LQTS) may cause about 4000 deaths in the United States primarily in teenagers and young adults. Medications that can prolong the QT interval include anti-arrhythmics, antimicrobials (macrolides, fluoroquinolones, choloroquine), anti-psychotics, and anti-depressants (SSRI). An updated list was found at https://www.crediblemeds.org at the time of this revision.
The QT and QTc intervals measured by the ECG machine computer are frequently inaccurate. Any prolonged QT/QTc measured by the ECG computer should be manually measured and calculated using an on-line calculator. http://www.medcalc.com/qtc.html http://reference.medscape.com/calculator/qt-interval-correction-ekg
To manually measure the QT interval, use the tangent method by drawing a line tangent to the downslope of the T wave in Lead II. Measure the interval in msec from the beginning of the Q wave to the point where the tangent crosses the baseline.



If after manual measurement of QT, the QTc is greater than 439 msec, the prolonged QT interval is CD and the following policy and evaluation apply.

WAIVER:

1. Manual confirmed QTc <440 msec males (<460 msec females) - NCD
2. Manual confirmed QTc 440-499 msec males (460-499 msec females) - CD, Waiver considered on case-by-case basis. Submit the following information:
   a. Cardiology consultation
3. Manual confirmed QTc ≥500 msec males (≥500 msec females)- CD, Waiver unlikely.

DIAGNOSIS/ICD-10 Code:
I45.81 Long QT syndrome
R94.31 Abnormal electrocardiogram (for prolonged QT interval)

SERVICE MEMBER MUST COMPLETE PRIOR TO INITIATING WAIVER

1. Cardiology consultation.

- Released from *cardiology* care with recommendation of return to full duty, world-wide deployable, and no restrictions **documented** on last clinical note (electronic or paper).
- If *cardiology* recommends restrictions, then documentation of physical and/or mental limitations and expected duration (permanent vs temporary).
- *Cardiology* recommendation for follow on care **documented** on last clinical note (electronic or paper).
- Email or provide administrative information to include command UIC, command address, personal address, phone number, designator, flight hours (total and last 6 months), primary aircraft flown, and years of service.

AEROMEDICAL SUMMARY REQUIRED DOCUMENTATION BY FLIGHT SURGEON

All associated documentation.

FOLLOW UP REQUIREMENTS	**Annual Submission**

Flight Surgeon comment regarding interval history.

1. An EKG will be completed and compared to prior studies.