MHA Cardiac Protocol

Pre-Employment Screening for Candidates

For candidates applying as Home Team uniformed officers (HUS/HAS-ICA), it is important to trace and check if there has been any prior cardiac screening during National Service for males.

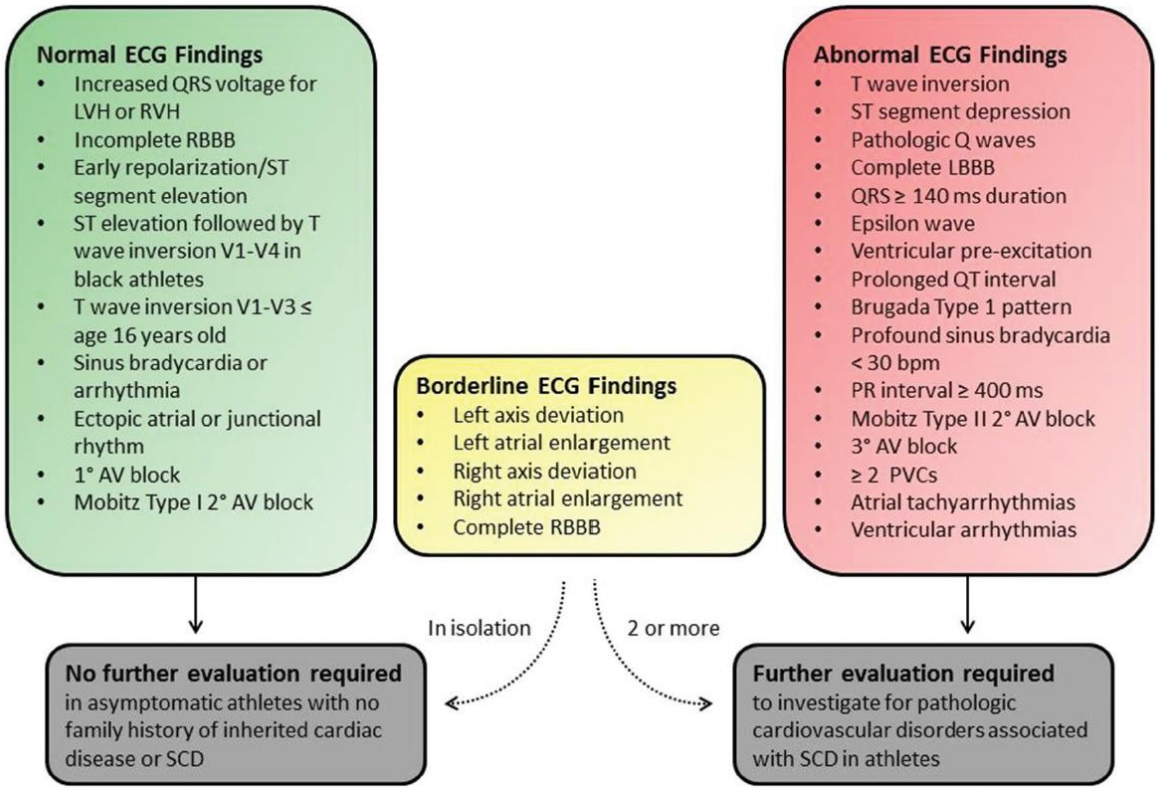


Table 1 International consensus standards for ECG interpretation in athletes: definitions of ECG criteria

Abnormal ECG findings in athletes

These ECG findings are unrelated to regular training or expected physiological adaptation to exercise, may suggest the presence of pathological cardiovascular disease and require further diagnostic investigation.

ECG abnormality	Definition
T wave inversion	≥1 mm in depth in two or more contiguous leads; excludes leads aVR, III and V1
► Anterior	► V2-V4 – excludes: black athletes with J-point elevation and convex ST segment elevation followed by TWI in V2-V4; athletes < age 16 with TWI in V1-V3; and biphasic T waves in only V3
► Lateral	► I and AVL, V5 and/or V6 (only one lead of TWI required in V5 or V6)
► Inferolateral	► II and aVF, V5-V6, I and AVL
► Inferior	► II and aVF
ST segment depression	≥0.5 mm in depth in two or more contiguous leads
Pathological Q waves	Q/R ratio ≥0.25 or ≥40 ms in duration in two or more leads (excluding III and aVR)
Complete left bundle branch block	QRS ≥120 ms, predominantly negative QRS complex in lead V1 (QS or rS) and upright notched or slurred R wave in leads I and V6
Profound non-specific intraventricular conduction delay	Any QRS duration ≥140 ms
Epsilon wave	Distinct low amplitude signal (small positive deflection or notch) between the end of the QRS complex and onset of the T wave in leads V1-V3
Ventricular pre-excitation	PR interval <120 ms with a delta wave (slurred upstroke in the QRS complex) and wide QRS (≥120 ms)
Prolonged QT interval*	QTc ≥470 ms (male) QTc ≥480 ms (female) QTc ≥500 ms (marked QT prolongation)
Brugada type 1 pattern	Coved pattern: initial ST elevation ≥2 mm (high take-off) with downsloping ST segment elevation followed by a negative symmetric T wave in ≥1 leads in V1-V3
Profound sinus bradycardia	<30 beats per minute or sinus pauses ≥3 s
Profound 1° atrioventricular block	>400 ms

Pre-employment Cardiac Screening Protocol 2018 (adapted from Pre-enlistment Cardiac Screening (SAFE) Protocol)

Characteristic of Resting ECG		Plan
Axis	Left axis deviation (-30 to -90)	No further workup needed if isolated finding 2DE only if two or more borderline findings are present[1]
	Right axis deviation (≥120)	
Heart Blocks	1st degree AV block (PR interval 200-400ms), positive family history of IHD/heart block	TMX (if no FHx: PES A[2])
	Profound 1st degree AV block (≥400ms)	TMX
	2nd degree Mobitz type 1 AV block	PES B
	2nd degree Mobitz type 2 AV block	Refer Cardiology
	3rd degree AV Block	Refer Cardiology
	Left anterior fascicular block/ Left posterior fascicular block ± incomplete RBBB	2DE, TMX
	Complete RBBB + LAFB	2DE, TMX
	Complete RBBB + LPFB	2DE, TMX, Refer Cardiology
	Incomplete RBBB (QRSD 90-119)	If no Brugada features and no family history of sudden cardiac death, PES A[2]
	Incomplete RBBB, with Brugada features or family history of sudden cardiac death	2DE, 1-space up ECG Refer Cardiology
	Complete RBBB (QRSD≥120)	No further workup needed if isolated finding 2DE only if two or more borderline findings are present[1]
	Complete LBBB (QRSD≥120)	2DE, Refer Cardiology
	Profound non-specific intra-ventricular delay (QRSD≥140)	2DE, TMX, Refer Cardiology
Heart Rate	Sinus tachycardia (≥100bpm)	Repeat ECG 2/52: if persistent sinus tachycardia, for ambulatory blood pressure and thyroid function test If ABP shows persistent sinus tachycardia, holter and refer Cardiology
	Sinus bradycardia HR 30-60bpm, asymptomatic	PES A[2] (if asymptomatic with good effort tolerance) TMX (if poor effort tolerance)
	Sinus bradycardia HR<30bpm or sinus pause ≥3s	TMX

Intervals	Isolated short PR interval (<120ms) with no delta waves or palpitations	PES A[2]
	Short PR interval (<120ms) without delta waves, with palpitations	TMX, 2DE, Holter/TTECG, refer Cardiology
	Short PR interval (<120ms) with delta waves	TMX refer Cardiology
	Prolonged QTc (≥450ms) For both Male and Female	Check electrolytes (Ca, Mg, renal panel, thyroid function tests), TMX long- QTc protocol Refer Cardiology
	Short QTc	QTcB≤330ms, refer Cardiology QTcB 331-359ms AND positive family history of sudden cardiac death/personal history of palpitations/syncope, refer Cardiology
Segments and waves	ST segment depression (≥0.5mm in depth in 2 or more contiguous leads)	2DE
	Left atrial enlargement (negative portion of P wave in lead V1≥0.1mV in depth and ≥0.04s in duration)	No further workup needed if isolated finding 2DE only if two or more borderline findings are present[1]
	Right atrial enlargement (peaked P wave in leads II and III or V1≥0.25mV in amplitude)	No further workup needed if isolated finding 2DE only if two or more borderline findings are present[1]
	Abnormal Q wave ≥0.04s in duration or ≥25% of the height of the ensuing R wave in two or more leads (Excluding III and aVR)	2DE
	T-wave inversions in two or more contiguous leads (Excludes leads aVR, III and V1) ➢ anterior V2-V4 ➢ Lateral I,AVL,V5-V6 ➢ Inferolateral II AVF,V5-V6 I AVL ➢ Inferior: II AVF	Asymptomatic: 2DE If ≥25yo/poor effort tolerance: 2DE, TMX If symptomatic with chest pain on exertion: 2DE, TMX and refer Cardiology
	Right ventricular hypertrophy – R/S in V1 >1, and R in V1 >0.5mV	2DE
Rhythm	Atrial fibrillation or Atrial Flutter	Symptomatic: refer A&E Asymptomatic: 2DE, Holter, TMX, refer Cardiology
	Premature ventricular complexes (PVCS) including couplets or triplets or non-sustained ventricular tachycardia	Polymorphic: refer Cardiology Monomorphic (<1/10 on rhythm strip): PES B Monomorphic (>1/10 on rhythm

		strip): TMX, 2DE, Holter, refer Cardiology
Symptoms	Palpitations	2DE, Holter/TTECG, refer Cardiology
	Chest pain	TMX +/- 2DE +/- Refer Cardiology (Based on Chest Pain Protocol)
	Syncope	2DE Refer Cardiology +/- TMX (Based on FAAINT Protocol)

[1]In the presence of two or more borderline findings, refer for 2DE if the following is seen:
1. LAD or RAD
2. LAE
3. RAE
4. Complete RBBB

[2]PES A if no other concomitant medical condition

Family History:
Positive Family History of Sudden Cardiac Death (i.e. first degree relative aged 40 years and below that died or heart arrested suddenly and unexpectedly) – refer Cardiology

Chest Pain Protocol

History taking for Chest Pain:

Does the chest pain last for minutes?

- If yes, proceed to the following questions
  - Is the chest pain retrosternal? Y/N
  - What brings on the chest pain? Exertion/ Lying Down/ After Meals/ Anytime
  - What makes it better? Sitting up/ Lying Down/ Resting/ Medication

Referral Protocol for chest pain:

- If the chest pain fulfills all 3 criteria (Retrosternal, brought on by exertion, relieved by rest): Refer for TMX (frontloaded), 2DE (frontloaded), refer Cardiologist

- If the chest pain fulfills 1-2 of the above criteria: Refer for TMX only

FAAINT Protocol for Vasovagal Syncope

- **F**ainting episodes
o ≥ 3 episodes in any one year within the last 2 years (Refer Cardiologist for further evaluation of recurrent vasovagal syncope, order 2DE and TMX)

- **A**ssociated symptoms
o Chest pain OR palpitations preceding or during syncope (Refer Cardiologist – as per chest pain or palpitations protocol)
o Occurs with upright posture or after exposure to emotional stress/ pain/ medical stimuli (e.g. blood taking/ bleeding) and is typically preceded by symptoms such as nausea, pallor, giddiness, diaphoresis (more likely Vasovagal syncope – refer only if recurrent)

- **A**ctivities
o Syncope whilst lying down without typical stimuli or occurring without any warning (2DE [frontloaded), TMX [frontloaded), refer Cardiologist)
o Syncope during exertion (to exclude structural heart disease/malignant arrhythmias: 2DE [frontloaded), TMX [frontloaded), refer Cardiologist)
o Syncope after exertion (more likely Vasovagal syncope – refer only if recurrent)

- **I**njuries
o Injuries as sequelae of syncope: Especially head injuries (Refer Cardiologist if any significant injuries/head injuries sustained from syncope episode)

- **N**ear Syncope vs. True Syncope
o Near syncope defined as episodes where serviceman says that he has not truly lost consciousness, i.e. experiences darkening of vision, but still able to hear others talking in the surrounding (Near-syncope episodes not considered as true syncope and does not require further evaluation in the absence of other cardiac symptoms)

- **T**ime
o Duration taken for serviceman to regain consciousness (Few seconds vs. minutes)

o Time taken to recover back to baseline mental status after syncope episode: Longer duration signifies a more severe episode (depending on clinical judgment if referral is indicated)

Refer to Cardiologist for further evaluation if serviceman fulfills any of the following (to refer for 2DE [frontloaded), TMX [frontloaded), and cardiologist review):

- ≥ 3 episodes in any one year within the last 2 years
- Syncope with associated symptoms such as chest pain/palpitations
- Syncope during exertion
- Syncope whilst lying down or occurring without any warning
- Syncope with associated injuries as sequelae
- Syncope with ≥ 5 minutes loss of consciousness/ long recovery time
- Syncope with ECG abnormalities that in itself require further workup
- Syncope with significant FHx (SCD/ inherited cardiac disease) [Add random lipids (For FH)]

Consideration for tilt table is only to be recommended by the cardiologist. The diagnosis of vasovagal syncope is clinical and can be made even in the absence of a tilt table assessment.

MHA Health Screening Program for all Home Team Uniformed Officers

Schedule of Requirements for MHA Health Screening Program

Eligible Groups/Panel \ Age (yr)			25	30	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Mandatory	**Panel I** (Basic Review)		√	√	√ At age 35, then annually thereafter															
- Regular servicemen - IPPT-eligible NSmen aged ≥35 yrs	**Panel IIa**(Multiphasic Screen) Not applicable for NSmen		√		√					√			√			√			√	√ At age 50, then annually thereafter
Voluntary - DXOs & HTD civilian employees	**Panel IIb**[15] (Advanced Cardiac Investigations)	0 coronary risk factor								√					√ At age 45, then annually thereafter					
		1 coronary risk factor								√		√			√ At age 45, then annually thereafter					
		2 coronary risk factors			√		√		√	√ At age 40, then annually thereafter										
		≥ 3 coronary risk factors	√	√	√		√		√	√ At age 40, then annually thereafter										

Table 1: Coronary Risk Factors

NON-MODIFIABLE RISK FACTORS	
1	Indian ethnicity
2	First degree family history of CHD (male < 55 years of age, female < 65 years of age)
MODIFIABLE RISK FACTORS	
1	Currently smoking
2	Excessive alcohol consumption (> 3 standard drinks or > 45g of alcohol per day)
3	Sedentary lifestyle (exercise < 2 times per week)
4	Obesity (BMI ≥ 30)
5	Blood pressure ≥ 140/90 mm Hg, or hypertension on treatment
6	Dyslipidaemia [Total cholesterol > 6.2 mmol/L (240 mg/dL) or HDL < 0.9 mmol/L (35 mg/dL) or LDL > 4.1 mmol/L (160 mg/dL)]
7	Diabetes mellitus (N.B. This is considered as **2 coronary risk factors**)

Validity for Panel 1

Table 2: Panel 1 Investigations

Investigation	Validity Period
Resting ECG	3 months
Urine dipstick	6 months
Fasting lipids	6 months
Fasting glucose	6 months

*Panel 1 Investigation Timeline: 25, 30, and annually from the age of 35

Validity for Panel 1a

Table 3: Panel 1A Investigation

Investigation	Validity Period
Full Blood Count	6 months
Creatinine	6 months

*Panel 2a Investigation Timeline: 25, 35, 3-yearly from the age of 40 and annually from the age of 50 for regulars

Table 4: Schedule for Panel 2A/2B Screen

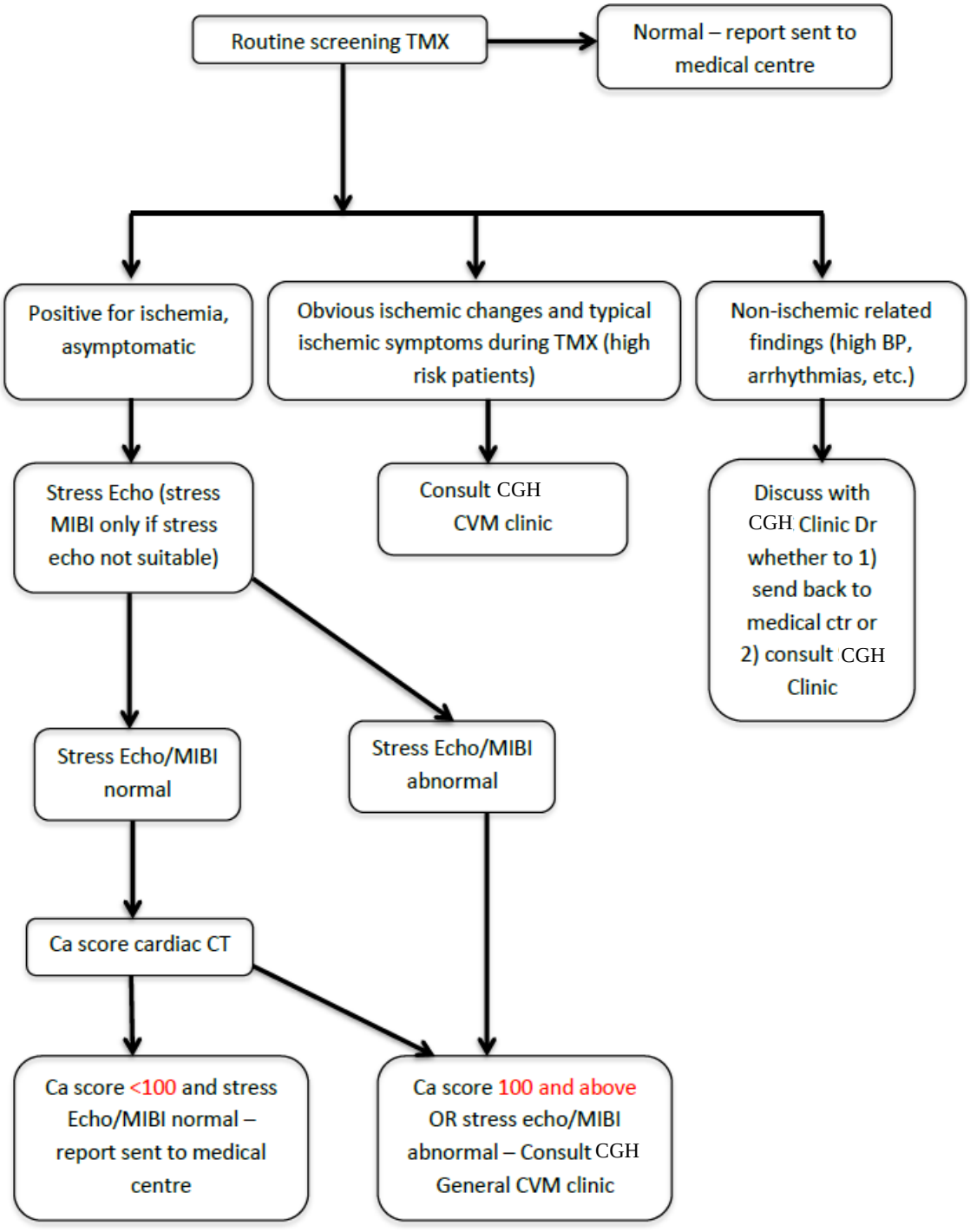
Number of Coronary Risk Factors	Age												
	25	30	35	36	37	38	39	40	41	42	43	44	45 and after
0								√					√ At age 45, then annually thereafter
1								√		√			√ At age 45, then annually thereafter
2			√		√		√	√ At age 40, then annually thereafter					
≥ 3	√	√	√		√		√	√ At age 40, then annually thereafter					

Validity for Panel 2A/2B

Table 5: Panel 2A/B Investigation

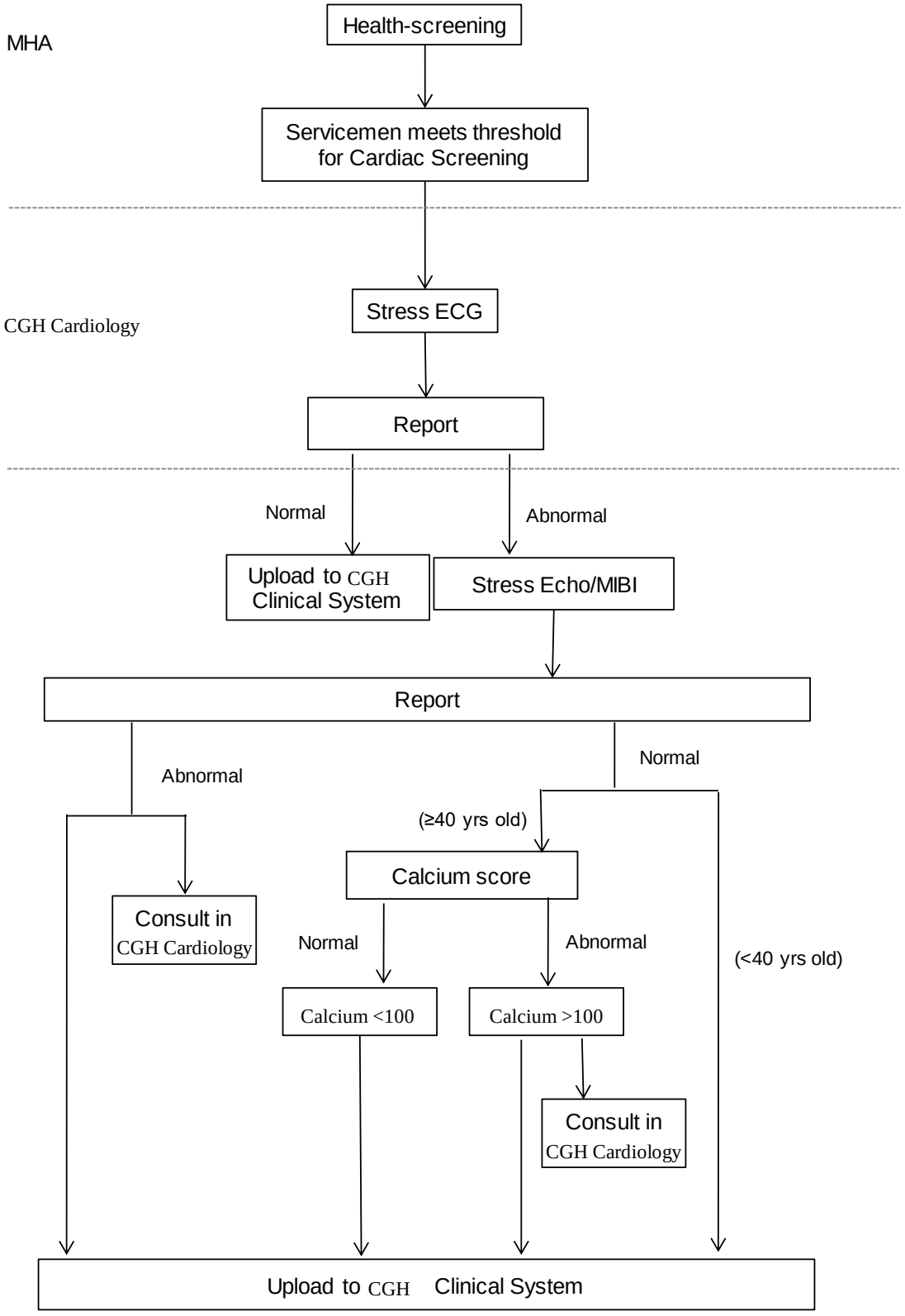
Investigation	Validity Period
Stress ECG	1 year
Stress Echocardiogram	3 years
MIBI	3 years
Invasive Coronary Angiogram	5 years
CT Coronary Calcium Scan	Not applicable

Routine Screening TMX Workflow

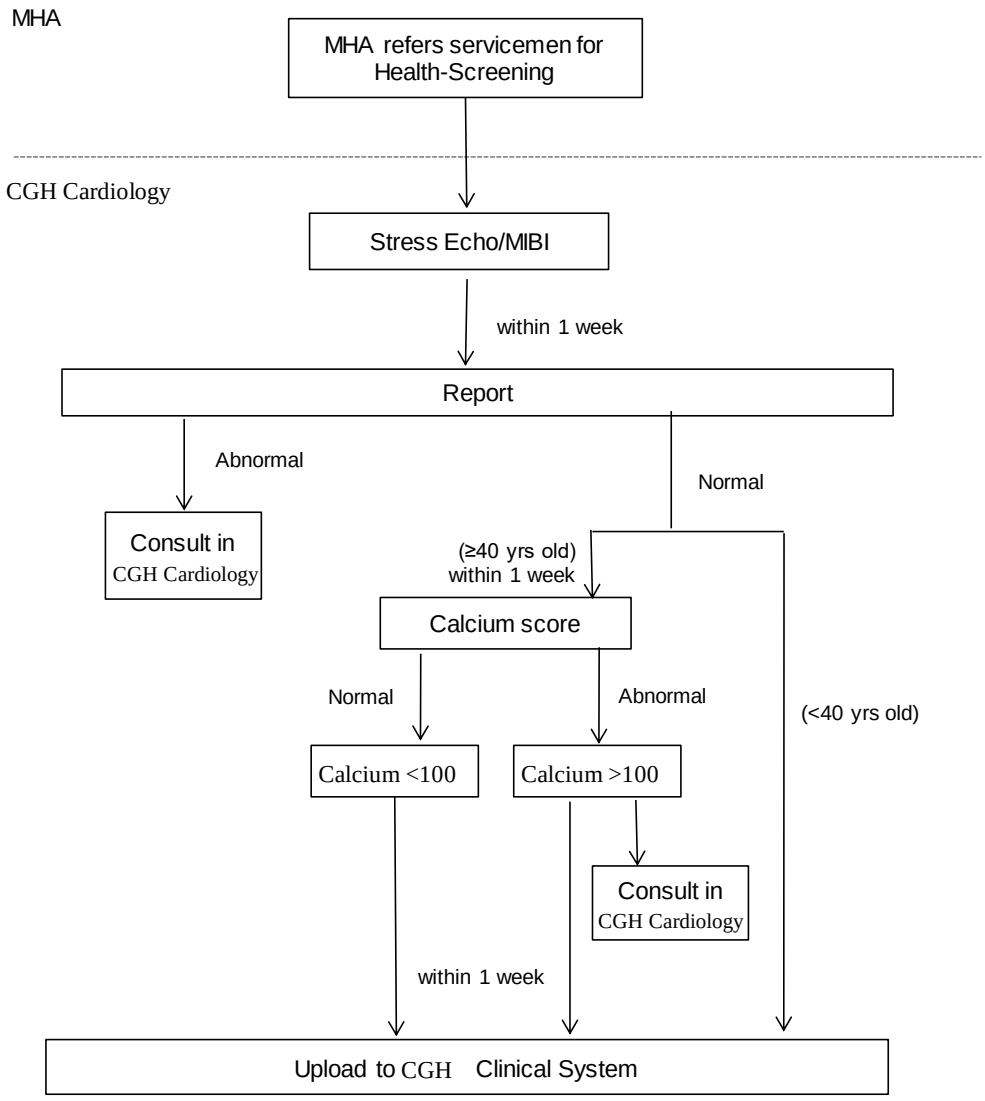


MHA Health Screening Protocol

If Home Team officer is referred for stress (treadmill) ECG as first appointment

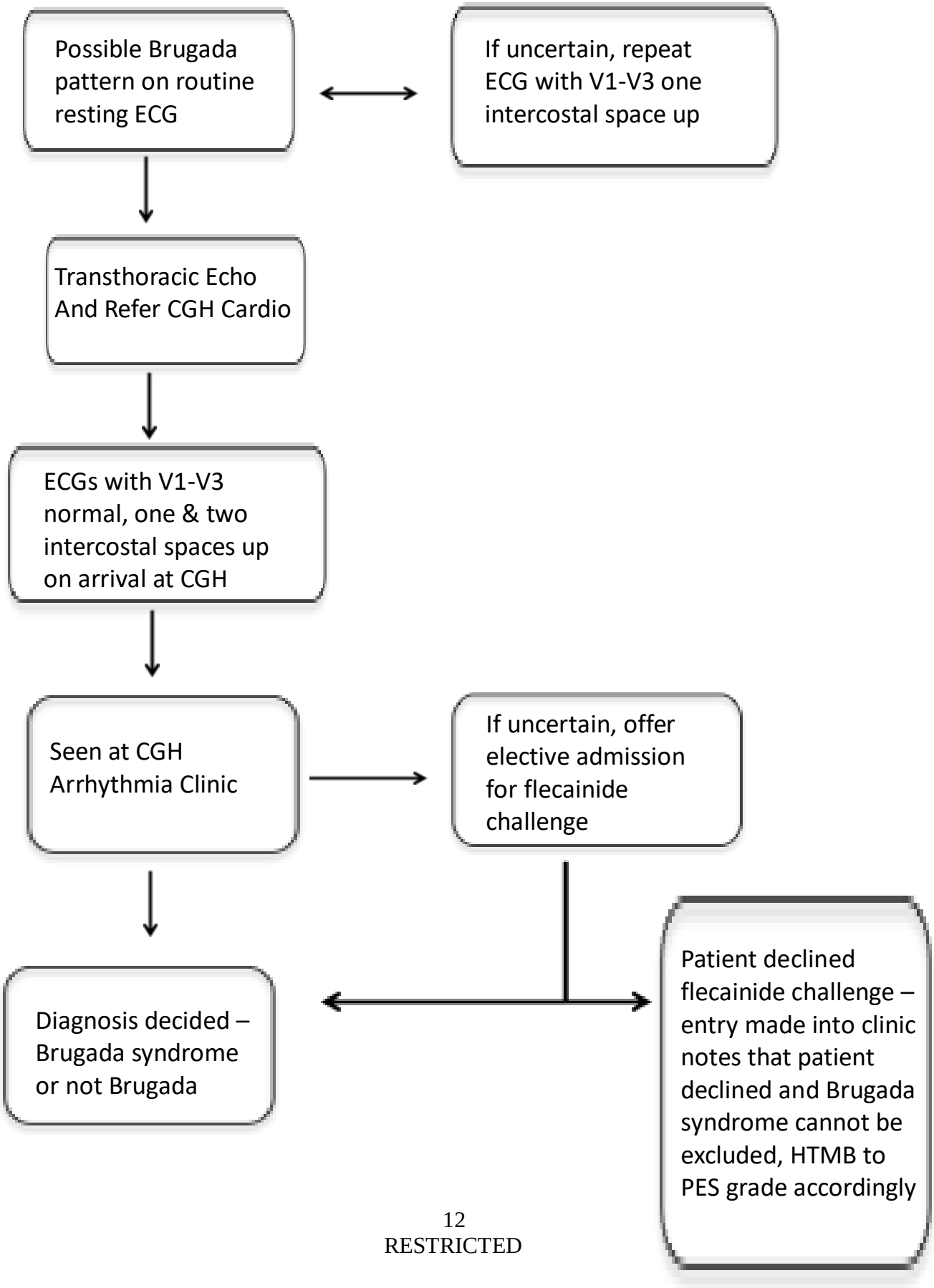


If Home Team officer is referred for stress echo / MIBI as first appointment

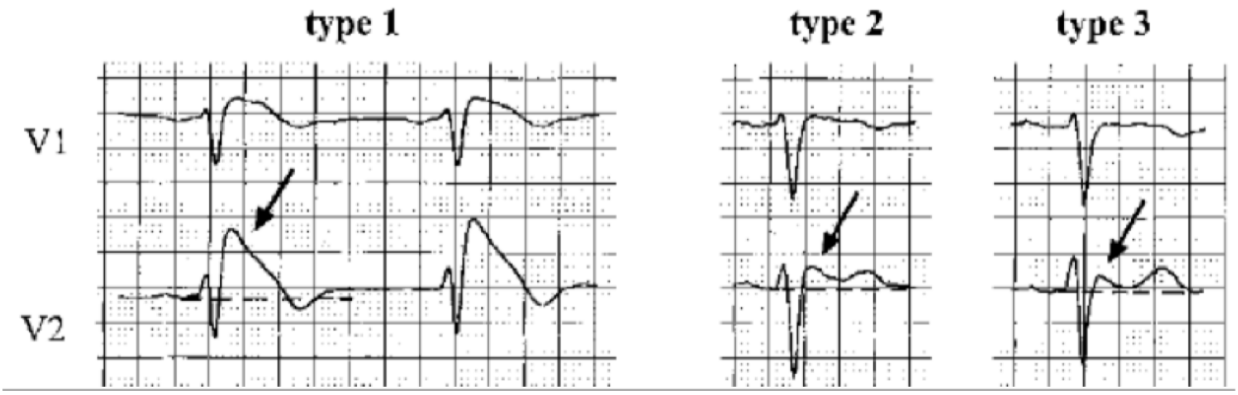


Detailed Cardiac Protocol

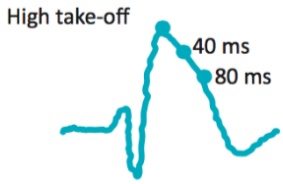
1) Suspected Brugada workflow



Typical Brugada ECG patterns:



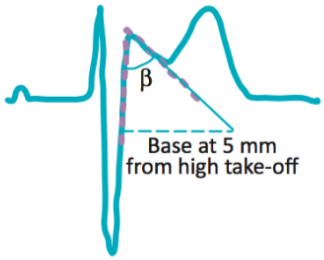
A. Type 1: coved pattern



This typical coved pattern present in V1–V2 shows the following:

1 At the end of QRS, an ascending and quick slope with a high take-off ≥2 mm followed by concave or rectilinear down sloping ST. There are few cases of coved pattern with a high take-off between 1 and 2 mm.
2 There is no clear r' wave.
3 The high take-off often does not correspond with the J point.
4 At 40 ms of high take-off, the decrease in amplitude of ST is ≤4 mm. In RBBB and athletes, it is much higher.
5 ST at high take-off > ST at 40 ms > ST at 80 ms.
6 ST is followed by negative and symmetric T wave.
7 The duration of QRS is longer than in RBBB, and there is a mismatch between V1 and V6.

B. Type 2: saddle-back pattern



This typical saddle-back pattern present in V1–V2 shows the following:

1 High take-off of r' (that often does not coincide with J point) ≥2 mm.
2 Descending arm of r' coincides with beginning of ST (often is not well seen).
3 Minimum ST ascent ≥0.5 mm.
4 ST is followed by positive T wave in V2 (T peak > ST minimum > 0) and of variable morphology in V1.
5 The characteristics of triangle formed by r' allow to define different criteria useful for diagnosis.
   - β angle.
   - Duration of the base of the triangle of r' at 5 mm from the high take-off greater than 3.5 mm.
6 The duration of QRS is longer in Brugada pattern type 2 than in other cases with r' in V1, and there is a mismatch between V1 and V6.

Some standardised comments when offering flecainide challenge to patients:

(Counselling for the test is performed in the presence of patient and at least one of the parents/legal guardians if patient is not yet 21 years' old)

1. Flecainide challenge is a test to help doctors determine if a patient has Brugada syndrome, a cardiac condition with increased risk of cardiac arrest. Although not perfect, the test is very useful.

2. The flecainide challenge test is not mandatory, but clinically there are advantages to proceeding with the test as will be mentioned below.

3. We do not know for sure what your PES status will be if you choose not to proceed with the flecainide challenge – it is up to the Home Team Medical Board to decide.

4. If you proceed with flecainide challenge and are tested positive (i.e. diagnosed Brugada syndrome), our experience has been that Home Team Medical Board will downgrade you. Again the exact PES status is for Home Team Medical Board to decide based on established internal guidelines developed and updated regularly by a panel of experts (specialists).

5. If the flecainide challenge is negative, and you have no other cardiac issue – cardiac wise we have not found any abnormality and hence you can exercise as normal and Home Team Medical Board will not downgrade you for cardiac reasons.

6. Flecainide challenge has some risks, including risk of arrhythmias requiring defibrillation. However the CGH experience has been good and that the risk of any major adverse event occurring is low (<0.5%).

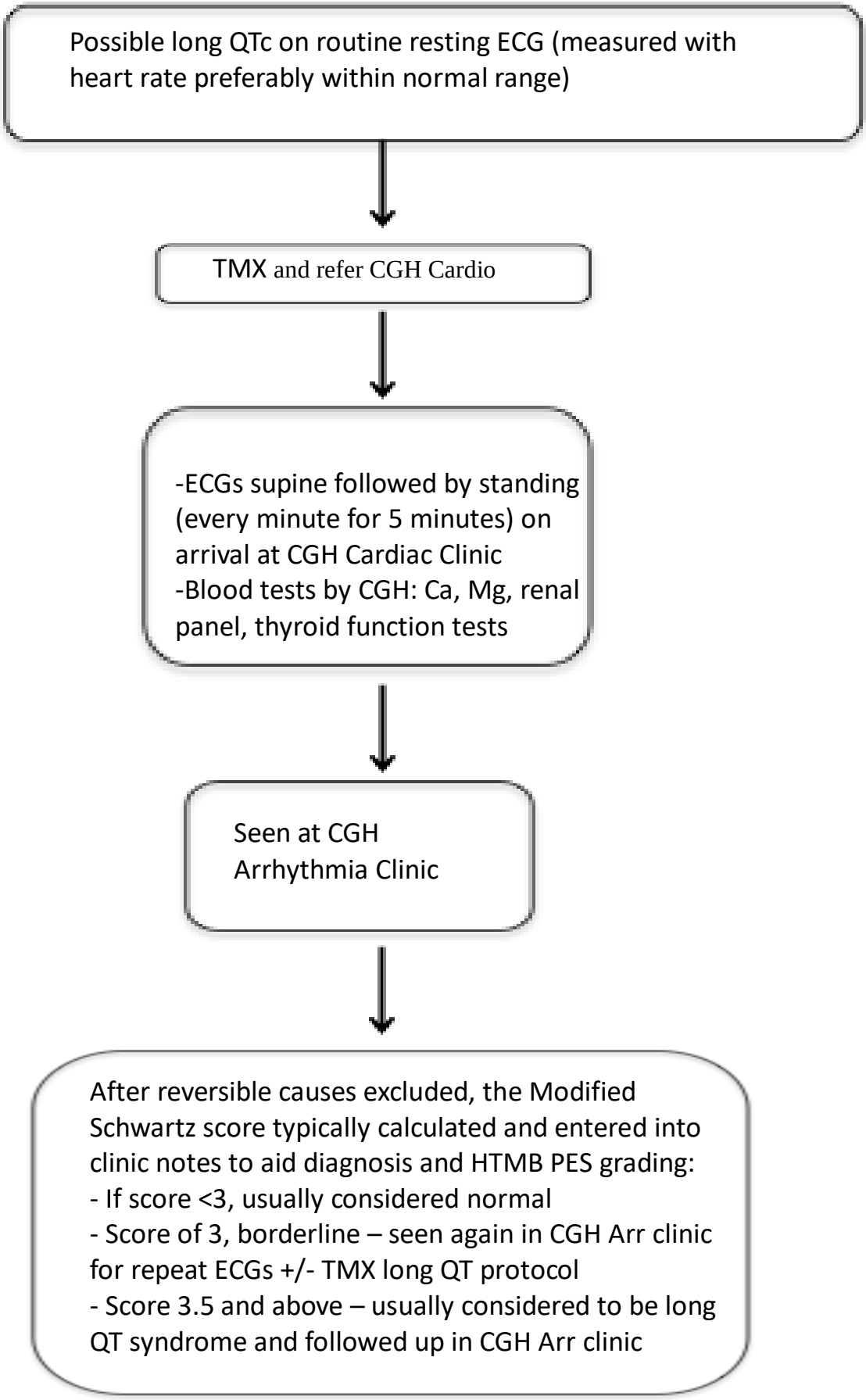
7. Benefits of flecainide challenge include:

a) Greater clarity as to the diagnosis which will impact management and possibly survival (patients with known Brugada syndrome can take precautions by avoiding medications or situations that potentially can trigger lethal arrhythmias)

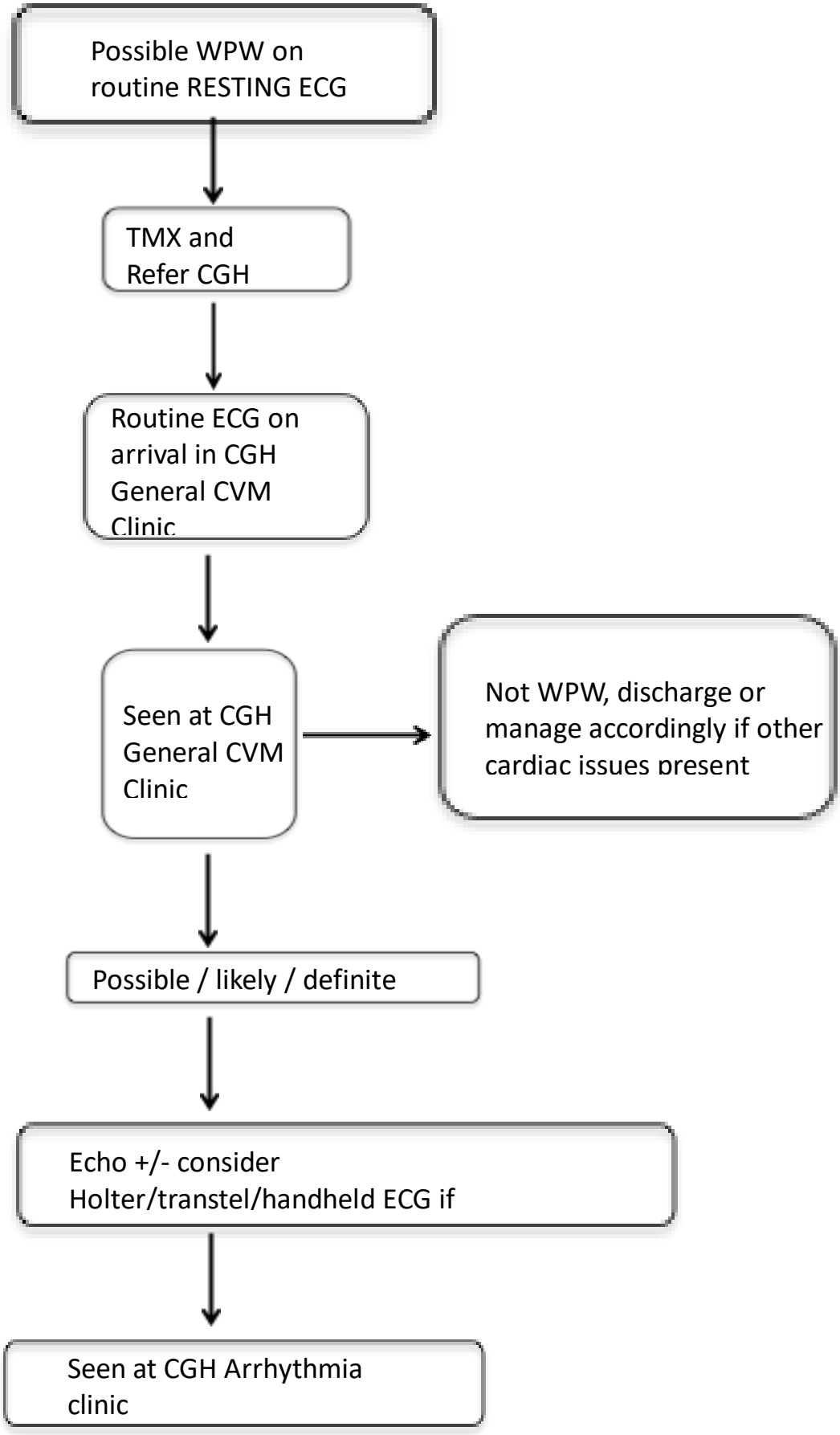
b) Cost is covered by MHA

c) May benefit additional family members because they may be screened as well if the diagnosis of Brugada is confirmed

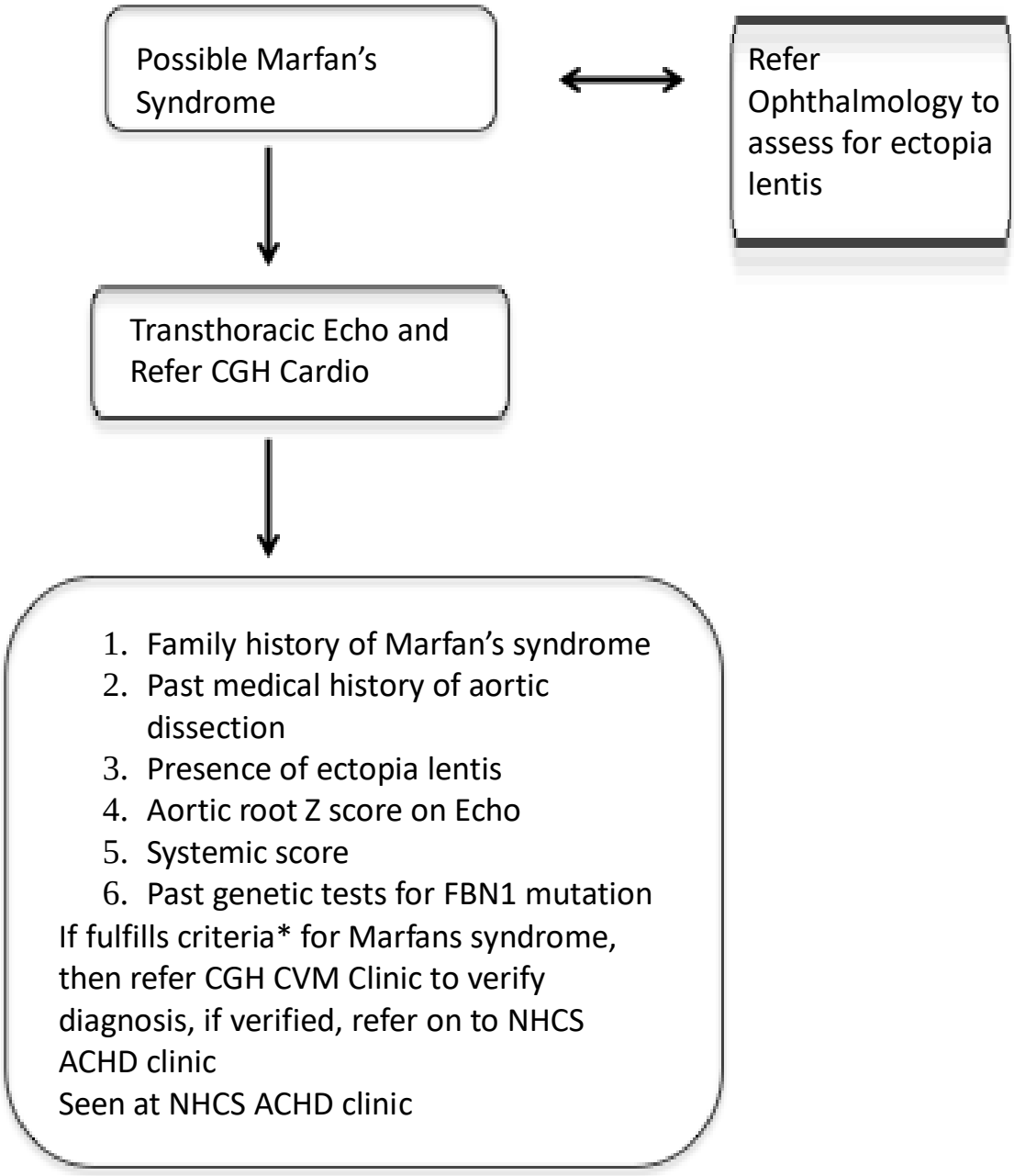
2) Suspected Long QT workflow



3) Suspected WPW workflow

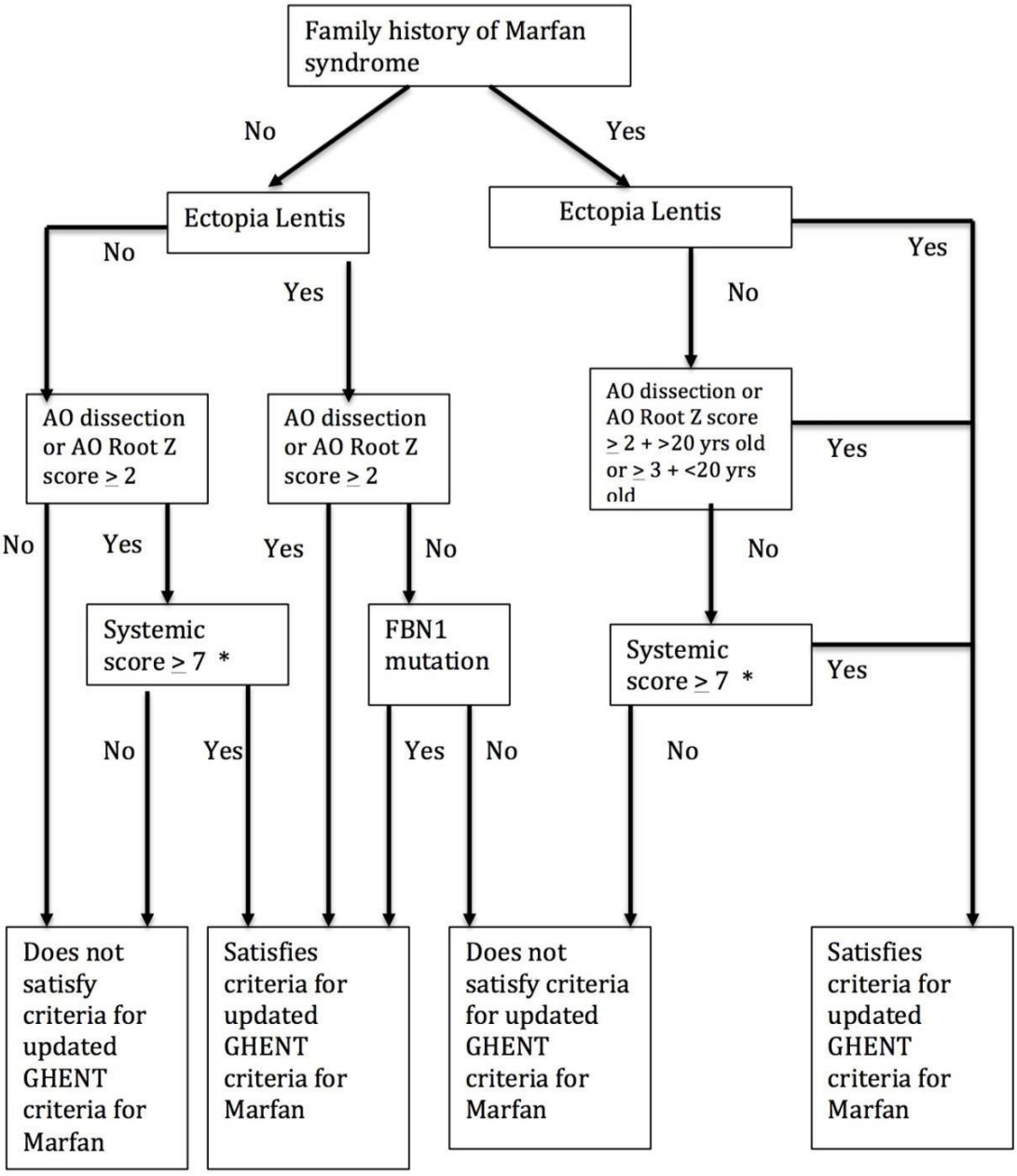


4a) Suspected Marfan's syndrome workflow



*See next page for Marfan's syndrome criteria

4b) MHA Marfan's Syndrome Workflow

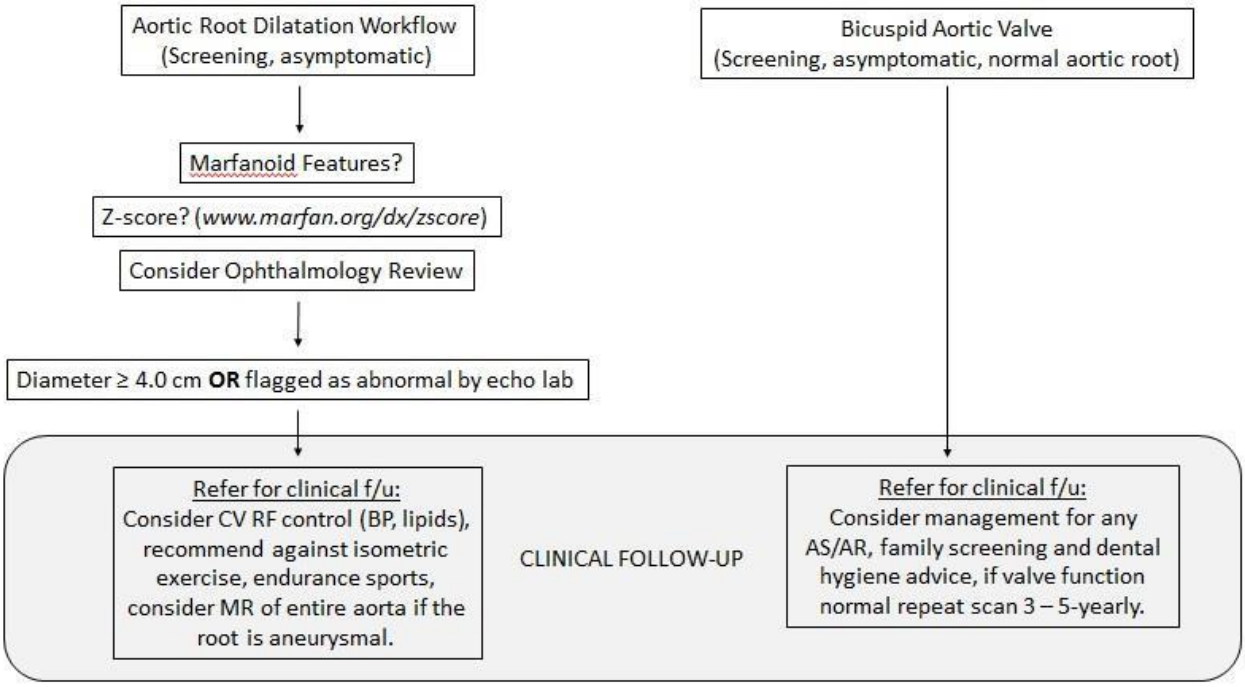


*Systemic score: total of:

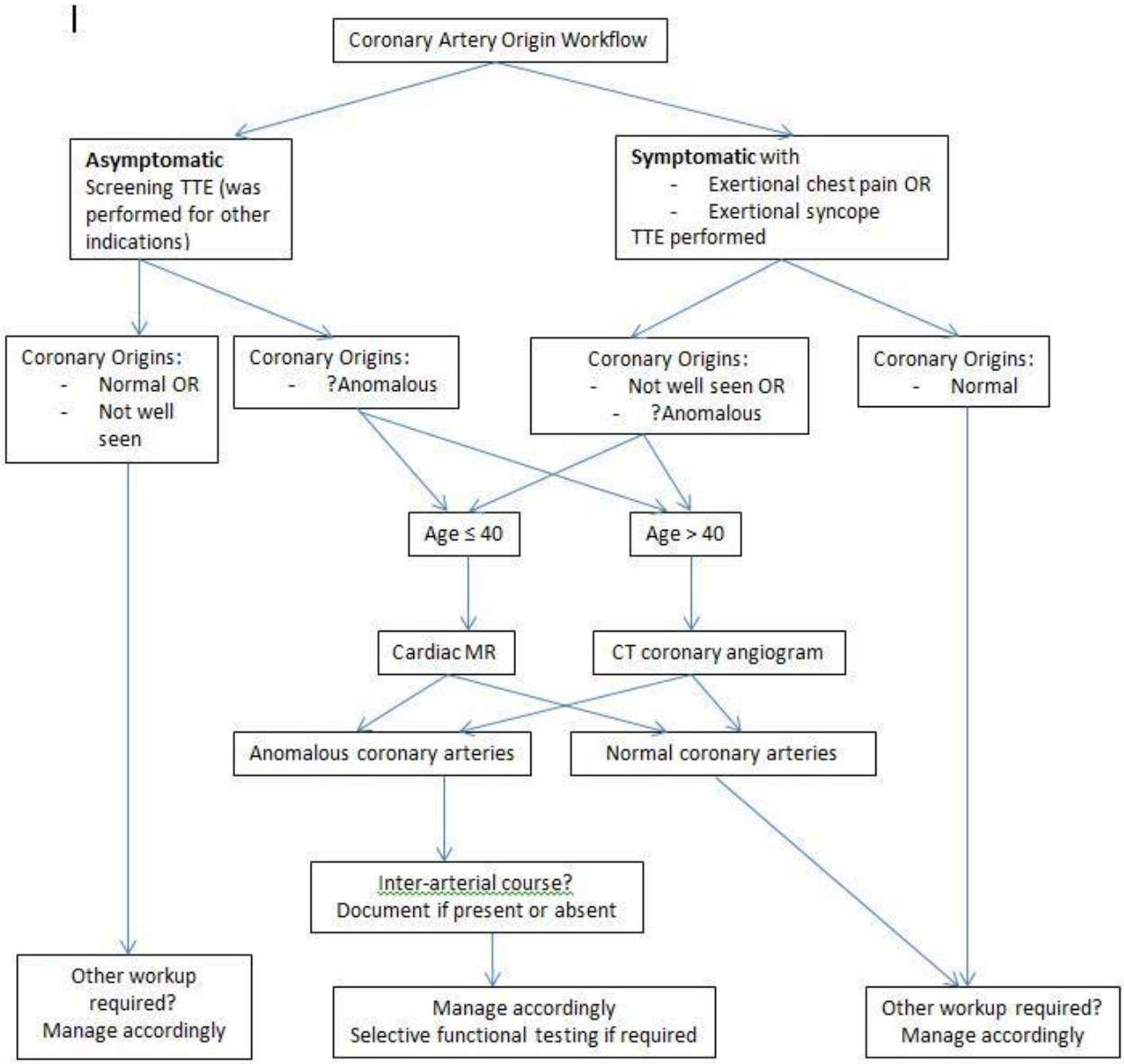
Myopia > 3 diopters	Y = 1, N= 0		
3 of 5 facial features	Y = 1, N= 0		
(Dolichocephaly, downward slanting palpebral fissures, enophthalmos, retrognathia, malar hypoplasia)			
Reduced US/LS (White <0.85, Black <0.78, Asian lower AND increased armspan / height > 1.05)	Y = 1, N= 0		
Reduced elbow extension < 170 degrees	Y = 1, N= 0		
Wrist AND Thumb sign	Y = 3, N= 0		
Wrist OR Thumb sign	Y = 1, N= 0	Skin striae (midback, lumbar, upper arm, axillary, thigh)	Y = 1, N= 0
Pectus Carinatum	Y = 2, N= 0		
Pectus Excavatum or chest asymmetry	Y = 1, N= 0	Flat foot (pes planus)	Y = 1, N= 0
		Hindfoot valgus deformity	Y = 2, N= 0
Scoliosis > 20 deg or thoracolumbar kyphosis	Y = 1, N= 0	Protubrio Acetabulae	Y = 2, N= 0
Pneumothorax	Y = 2, N= 0	Dura ectasia	Y = 2, N= 0
MVP	Y = 1, N= 0		

3. Clinical protocols for specific conditions at CGH Cardiology Clinics

a) Bicuspid aortic valve and / or aortic root dilatation

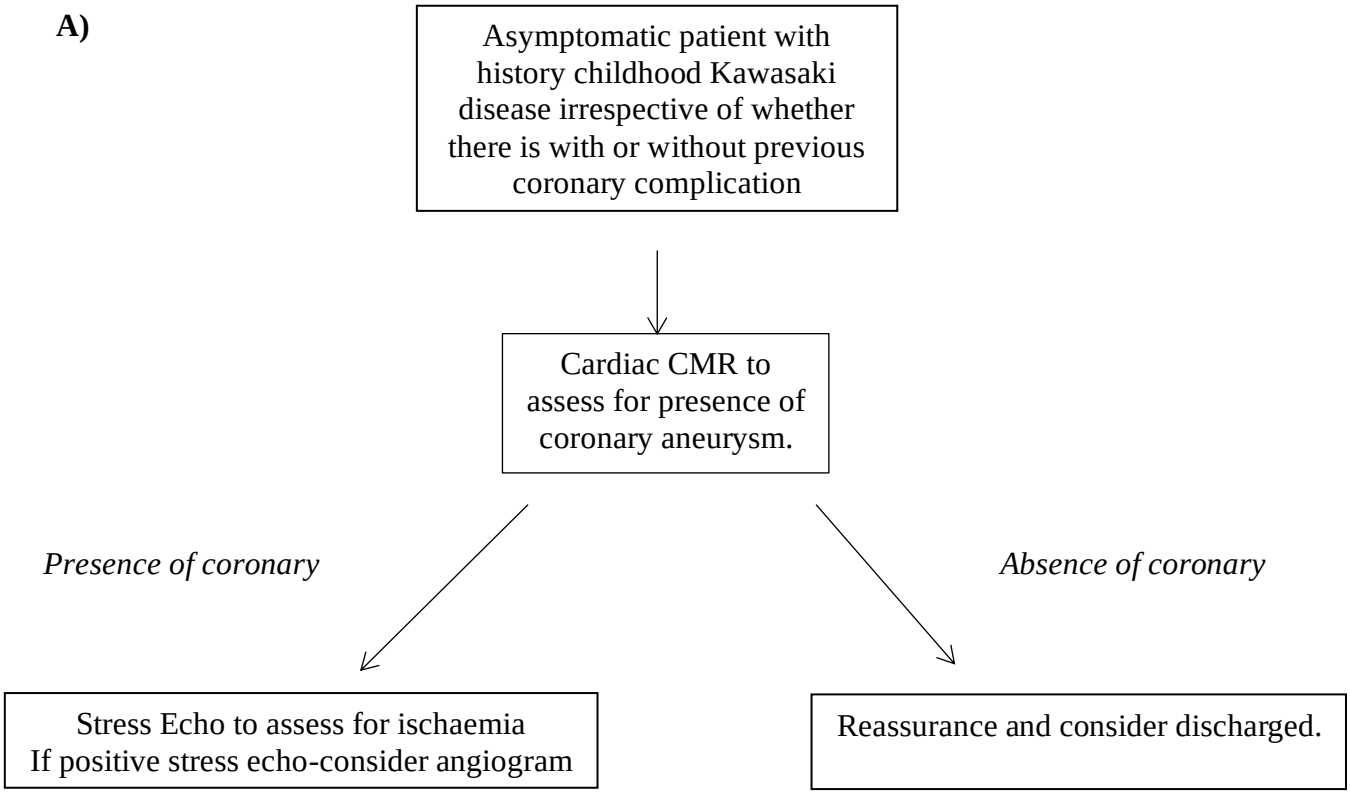


b) Coronary artery origin workflow:

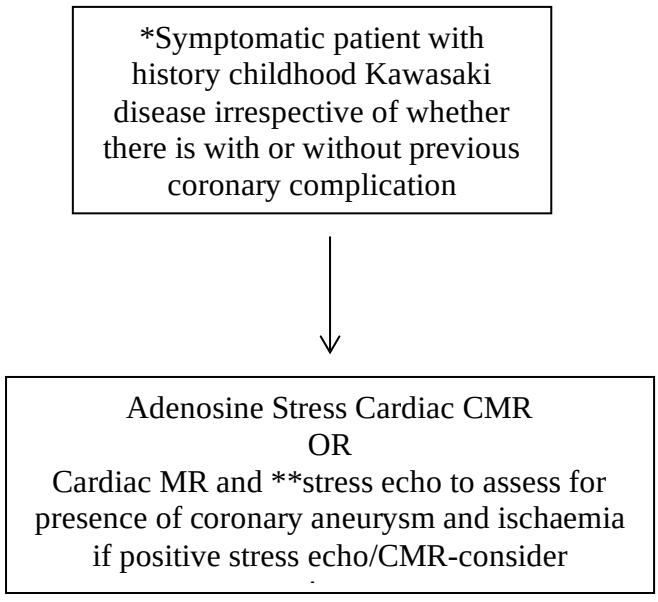


MHA Kawasaki Disease Flow Chart

A)

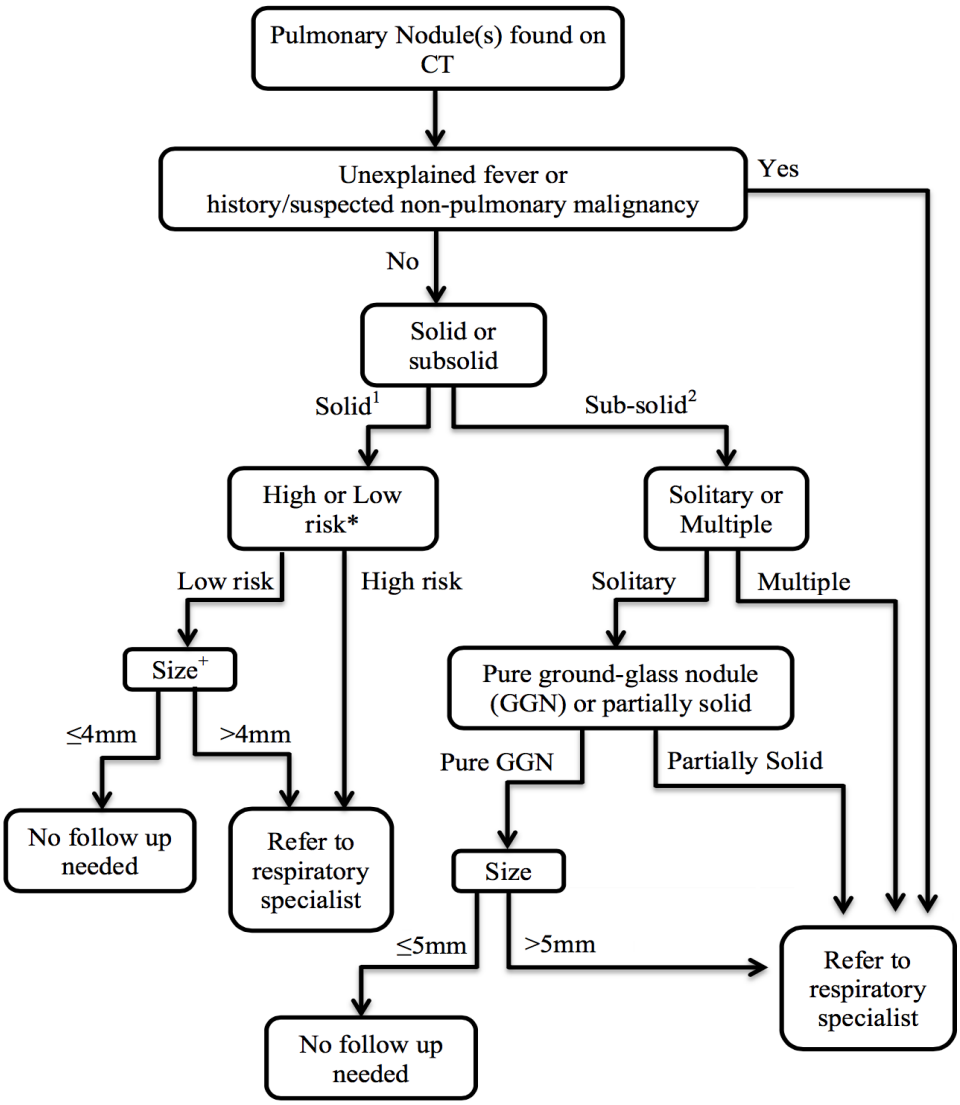


B)



* Symptomatic refer to symptoms that are suggestive of coronary artery disease.
** Consider stress echo if contra indicated for adenosine stress CMR
Note: Rarely if the CMR coronary arteries anatomy is sub-optimal, CMR consultant should arrange a CT angio prior patient to be reviewed in the clinic.

MHA Management of Lung Nodules during CACS



***LOW RISK** = Absent or minimal history of smoking or other known risk factors.
HIGH RISK = Positive history of smoking or other known risk factors

Risk factors = Lung cancer in a first degree relative; exposure to asbestos, radon or uranium.

ALL the following patients require referral

1. Suspected or history of non-pulmonary malignancy
2. Presence of unexplained fever

[+] **Size:** based on average of length and width

e) Asymptomatic bifascicular block on ECG

All patients with complete (QRSd>120ms) RBBB + LPHB :

- To have 1 year TCU to CGH Arrhythmia clinic, ECG OA
- After which the Dr running Arrhythmia clinic will decide on subsequent TCU/tests as required

f) Mild MR or mild AR on Echo

All patients with mild MR or mild AR on Echo:

- For repeat Echo in 3 years, TCU CGH CVM General clinic 1 to 2/52 after Echo
- After which the Dr running the clinic will decide on subsequent TCU/tests as required
  (more severe valvular heart lesions – to follow published ESC/ACC/AHA guidelines

Summary of PSPL Guide^

Investigation	Results	Actions by PSPL
Stress ECG	Normal	Fit for IPPT
	Abnormal	• Unfit for IPPT x 3 months temp • Refer for Stress Echocardiogram • Refer to Home Team Medical Board
Stress Echocardiogram	Normal (<40 years old)	Fit for IPPT
	Normal (>40 years old)	• Unfit for IPPT x 3 months temp (if not already given) • Refer for CT Coronary angiogram • Refer to Home Team Medical Board
	Abnormal	• Unfit for IPPT x 3 months temp • Refer to Home Team Medical Board • Refer to CGH Cardiology
CT Coronary Angiogram	Calcium <100	Fit for IPPT
	Calcium ≥100	• Unfit for IPPT x 3 months temp • Refer to Home Team Medical Board • Refer to CGH Cardiology

Resting ECG Characteristics		Plan
Axis	Left axis deviation (-30 to -90)	<u>If isolated</u> • No further workup needed <u>If two or more borderline findings are present[1]</u> • Unfit for IPPT x 3 months temp • Refer for CGH Cardiology, 2D echocardiogram • Refer to Home Team Medical Board
	Right axis deviation (≥120)	
Heart Blocks	1st degree AV block (PR interval 200-400ms), positive family history of IHD/heart block	<u>Without Family History</u> • Fit for IPPT <u>With Family History</u> • Unfit for IPPT x 3 months temp • Refer to Stress TMX, CGH Cardiology • Refer to Home Team Medical Board

	Profound 1st degree AV block (≥400ms)	Unfit for IPPT x 3 months temp Refer to Stress TMX, CGH Cardiology Refer to Home Team Medical Board
	2nd degree Mobitz type 1 AV block	Fit for IPPT
	2nd degree Mobitz type 2 AV block	Unfit for IPPT x 3 months temp Refer to CGH Cardiology Refer to Home Team Medical Board
	3rd degree AV Block	Unfit for IPPT x 3 months temp Refer to CGH Cardiology Refer to Home Team Medical Board
	Left anterior fascicular block/ Left posterior fascicular block ± incomplete RBBB	Unfit for IPPT x 3 months temp Refer CGH Cardiology for 2D Echocardiogram, Stress TMX Refer to Home Team Medical Board
	Complete RBBB + LAFB	Unfit for IPPT x 3 months temp Refer CGH Cardiology for 2D Echocardiogram, Stress TMX Refer to Home Team Medical Board
	Complete RBBB + LPFB	Unfit for IPPT x 3 months temp Refer CGH Cardiology for 2D Echocardiogram, Stress TMX Refer to Home Team Medical Board
	Incomplete RBBB (QRSD 90-119) **No Brugada features and no family history of sudden cardiac death**	Fit for IPPT
	Incomplete RBBB, with Brugada features or family history of sudden cardiac death	Unfit for IPPT x 3 months temp Refer to CGH Cardiology for 1-space up ECG, 2D Echocardiogram Refer to Home Team Medical Board
	Complete RBBB (QRSD≥120)	<u>If isolated finding</u> • Fit for IPPT and no further workup needed <u>If two or more borderline findings are present[1]</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology for 2D Echocardiogram, Stress TMX • Refer to Home Team Medical Board
	Complete LBBB (QRSD≥120)	Unfit for IPPT x 3 months temp Refer CGH Cardiology for 2D Echocardiogram Refer to Home Team Medical Board
	Profound non-specific intra-ventricular delay (QRSD≥140)	Unfit for IPPT x 3 months temp Refer CGH Cardiology for 2D Echocardiogram, Stress TMX Refer to Home Team Medical Board

Heart Rate	Sinus tachycardia (≥100bpm)	Repeat ECG 2/52: if persistent sinus tachycardia, for ambulatory blood pressure and thyroid function test If ABP shows persistent sinus tachycardia • Unfit for IPPT x 3 months temp • Refer to Home Team Medical Board • Refer for CGH Cardiology
	Sinus bradycardia HR 30-60bpm, asymptomatic	<u>If asymptomatic with good effort tolerance</u> • Fit for IPPT <u>If poor effort tolerance</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology for Stress TMX • Refer to Home Team Medical Board
	Sinus bradycardia HR<30bpm or sinus pause ≥3s	Unfit for IPPT x 3 months temp Refer CGH Cardiology for Stress TMX Refer to Home Team Medical Board
Intervals	Isolated short PR interval (<120ms) with no delta waves or palpitations	Fit for IPPT
	Short PR interval (<120ms) without delta waves, with palpitations	Unfit for IPPT x 3 months temp Refer CGH Cardiology for stress TMX, 2D Echocardiogram, Holter/TTECG Refer to Home Team Medical Board
	Short PR interval (<120ms) with delta waves	Unfit for IPPT x 3 months temp Refer CGH Cardiology for Stress TMX Refer to Home Team Medical Board
	Prolonged QTc (≥450ms) For both Male and Female	**PSPL to check electrolytes (Ca, Mg, renal panel, thyroid function tests). Include blood tests results in web portal.** Unfit for IPPT x 3 months temp Refer for CGH Cardiology Stress TMX long-QTc protocol Refer to Home Team Medical Board
	Short QTc	Unfit for IPPT x 3 months temp If QTcB≤330ms: Refer CGH Cardiology If QTcB 331-359ms AND positive family history of sudden cardiac death/personal history of palpitations/syncope: Refer CGH Cardiology Refer to Home Team Medical Board
Segments and Waves	ST segment depression (≥0.5mm in depth in 2 or more contiguous leads)	Unfit for IPPT x 3 months temp Refer CGH Cardiology for 2D echocardiogram Refer to Home Team Medical Board
	Left atrial enlargement (negative portion of P wave in lead V1≥0.1mV in depth and ≥0.04s in duration)	<u>If isolated finding</u> • Fit for IPPT and no further workup needed <u>If two or more borderline findings are present</u>[1]

	Right atrial enlargement (peaked P wave in leads II and III or V1≥0.25mV in amplitude)	• Unfit for IPPT x 3 months temp • Refer CGH Cardiology for 2D Echocardiogram, Stress TMX • Refer to Home Team Medical Board
	Abnormal Q wave ≥0.04s in duration or ≥25% of the height of the ensuing R wave in two or more leads (Excluding III and aVR)	<u>If isolated finding</u> Fit for IPPT and no further workup needed <u>If two or more borderline findings are present[1]</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology for 2D Echocardiogram, Stress TMX • Refer to Home Team Medical Board
	T-wave inversions in two or more contiguous leads (Excludes leads aVR, III and V1) ➢ anterior V2-V4 ➢ Lateral I,AVL,V5-V6 ➢ Inferolateral II AVF,V5-V6 I AVL ➢ Inferior: II AVF	<u>If asymptomatic</u> • Fit for IPPT <u>If ≥25yo/poor effort tolerance</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology for 2D Echocardiogram, Stress TMX • Refer to Home Team Medical Board <u>If symptomatic with chest pain on exertion</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology for 2D Echocardiogram, Stress TMX • Refer to Home Team Medical Board
	Right ventricular hypertrophy – R/S in V1 >1, and R in V1 >0.5mV	Unfit for IPPT x 3 months temp Refer CGH Cardiology for 2D Echocardiogram Refer to Home Team Medical Board
Rhythm	Atrial fibrillation or Atrial Flutter	<u>Symptomatic</u> • Unfit for IPPT x 3 months temp • Refer to A&E <u>Asymptomatic</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology for 2D Echocardiogram, Stress TMX, Holter • Refer to Home Team Medical Board
	Premature ventricular complexes (PVCS) including couplets or triplets or non-sustained ventricular tachycardia	<u>Polymorphic</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology • Refer to Home Team Medical Board <u>Monomorphic (<1/10 on rhythm strip)</u> • Fit for IPPT <u>Monomorphic (>1/10 on rhythm strip)</u> • Unfit for IPPT x 3 months temp • Refer CGH Cardiology for 2D Echocardiogram, Stress TMX, Holter

		• Refer to Home Team Medical Board

Symptoms	Palpitations	Unfit for IPPT x 3 months temp Refer for CGH Cardiology, 2D Echocardiogram, Holter/TTECG Refer to Home Team Medical Board
	Chest pain	Unfit for IPPT x 3 months temp Refer for CGH Cardiology, Stress TMX +/- 2D Echocardiogram Refer to Home Team Medical Board
	Syncope	Unfit for IPPT x 3 months temp Refer for CGH Cardiology, 2D Echocardiogram +/- Stress TMX (Based on FAAINT Protocol) Refer to Home Team Medical Board

^Please note that fit for IPPT in this guide is purely cardiac fitness. Please do consider other aspects of IPPT screening before clearing the serviceman for IPPT fitness.

*In the presence of two or more borderline findings, refer for 2DE if the following is seen:

1. LAD or RAD
2. LAE
3. RAE
4. Complete RBBB

Family History:

Positive Family History of Sudden Cardiac Death (i.e. first degree relative aged 40 years and below that died or heart arrested suddenly and unexpectedly) – refer Cardiology