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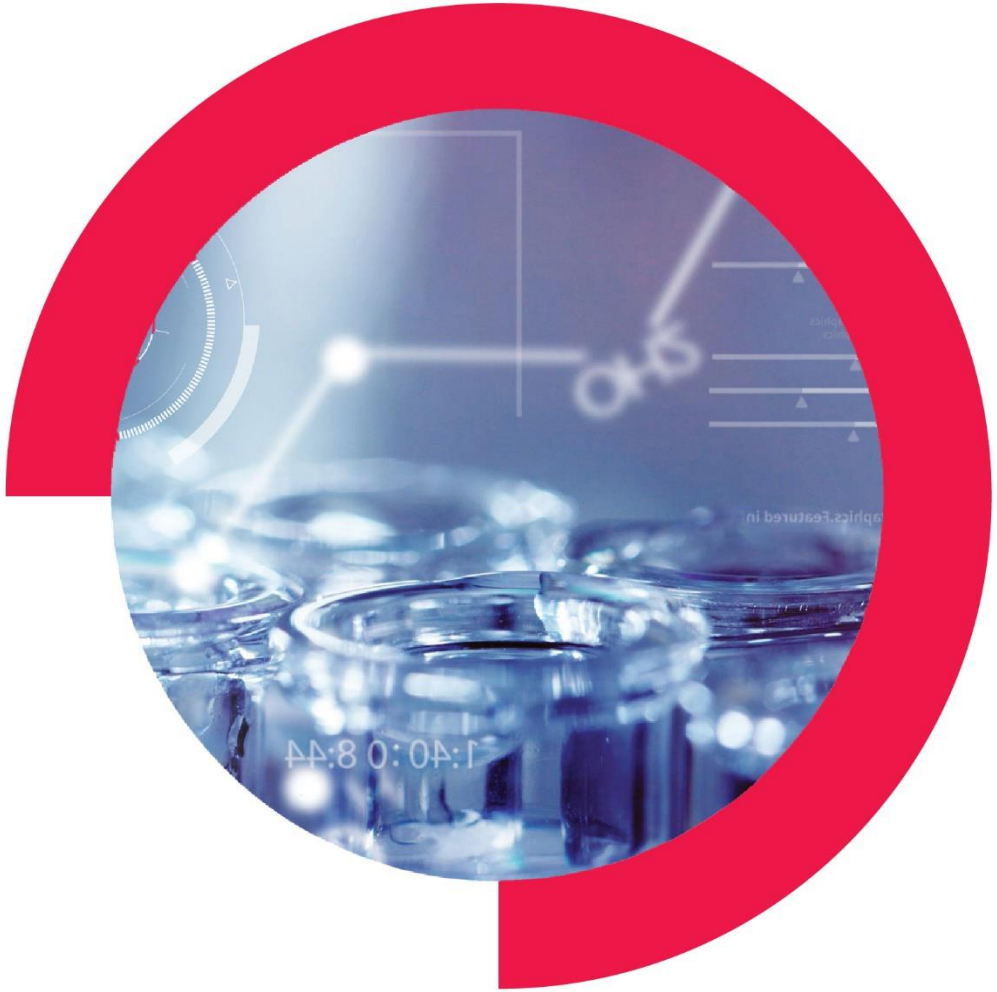
ESC GUIDELINES

2023 ESC Guidelines for the management of cardiomyopathies

Developed by the task force on the management of cardiomyopathies of the European Society of Cardiology (ESC)



Yishay Wasserstrum MD MHA

Division of Cardiology, The Heart & Vascular Center

Chaim Sheba Medical Center in Tel-Ha'Shomer

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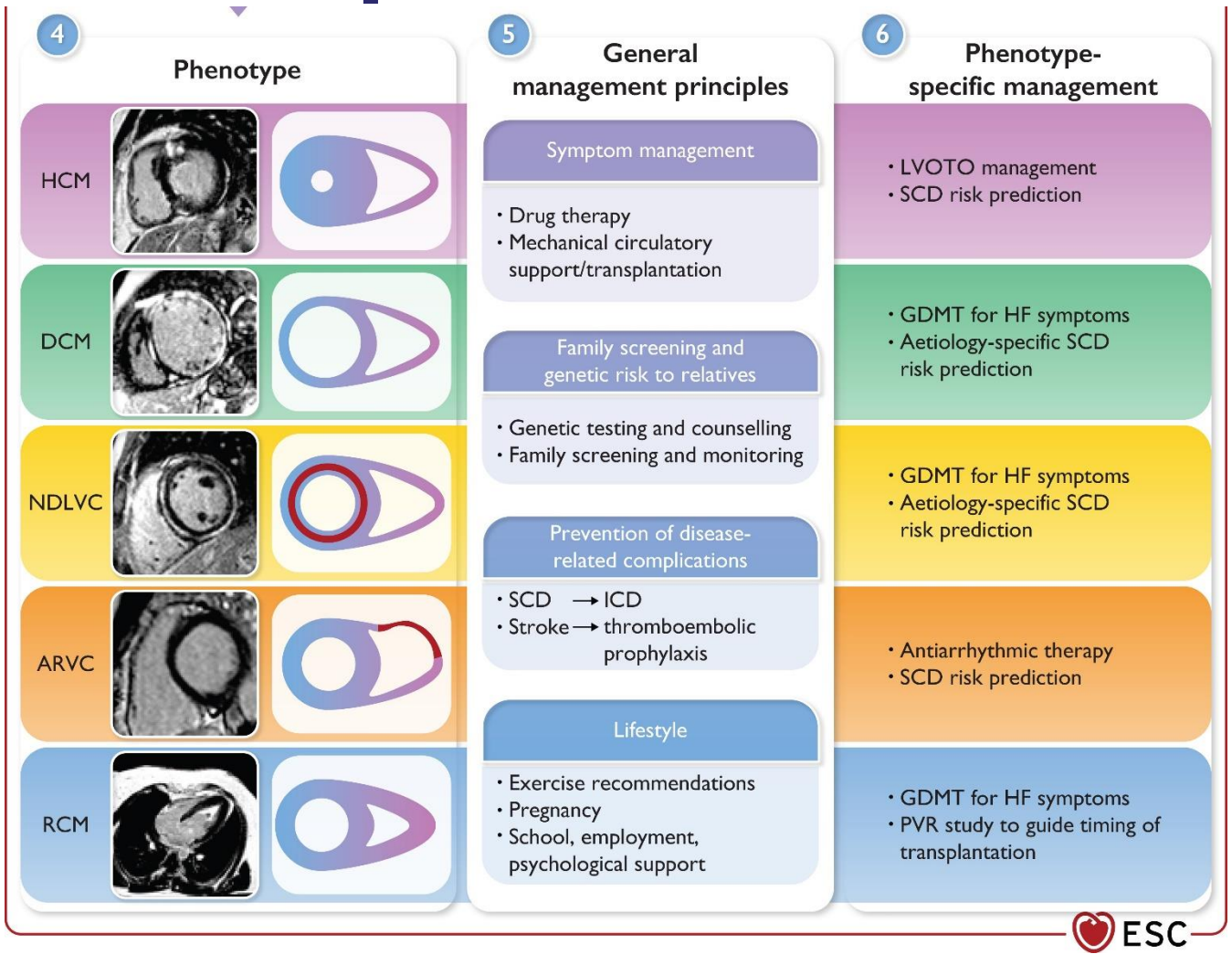
Framework

- Definitions
- Workup: Imaging, Genetics
- Disease-specific findings
- Risk stratification & SCD prevention
- Disease-specific recommendations
- Life-style and psychosocial support

Classification & case-specific focus



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Workup

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CMR

Contrast-enhanced CMR is recommended in patients with cardiomyopathy at initial evaluation.	I	B
Contrast-enhanced CMR should be considered in patients with cardiomyopathy during follow-up to monitor disease progression and aid risk stratification and management.	IIa	C
Contrast-enhanced CMR should be considered for the serial follow-up and assessment of therapeutic response in patients with cardiac amyloidosis, Anderson–Fabry disease, sarcoidosis, inflammatory cardiomyopathies, and haemochromatosis with cardiac involvement.	IIa	C
In families with cardiomyopathy in which a disease-causing variant has been identified, contrast-enhanced CMR should be considered in genotype-positive/phenotype-negative family members to aid diagnosis and detect early disease.	IIa	B
In cases of familial cardiomyopathy without a genetic diagnosis, contrast-enhanced CMR may be considered in phenotype-negative family members to aid diagnosis and detect early disease.	IIb	C

Biopsy

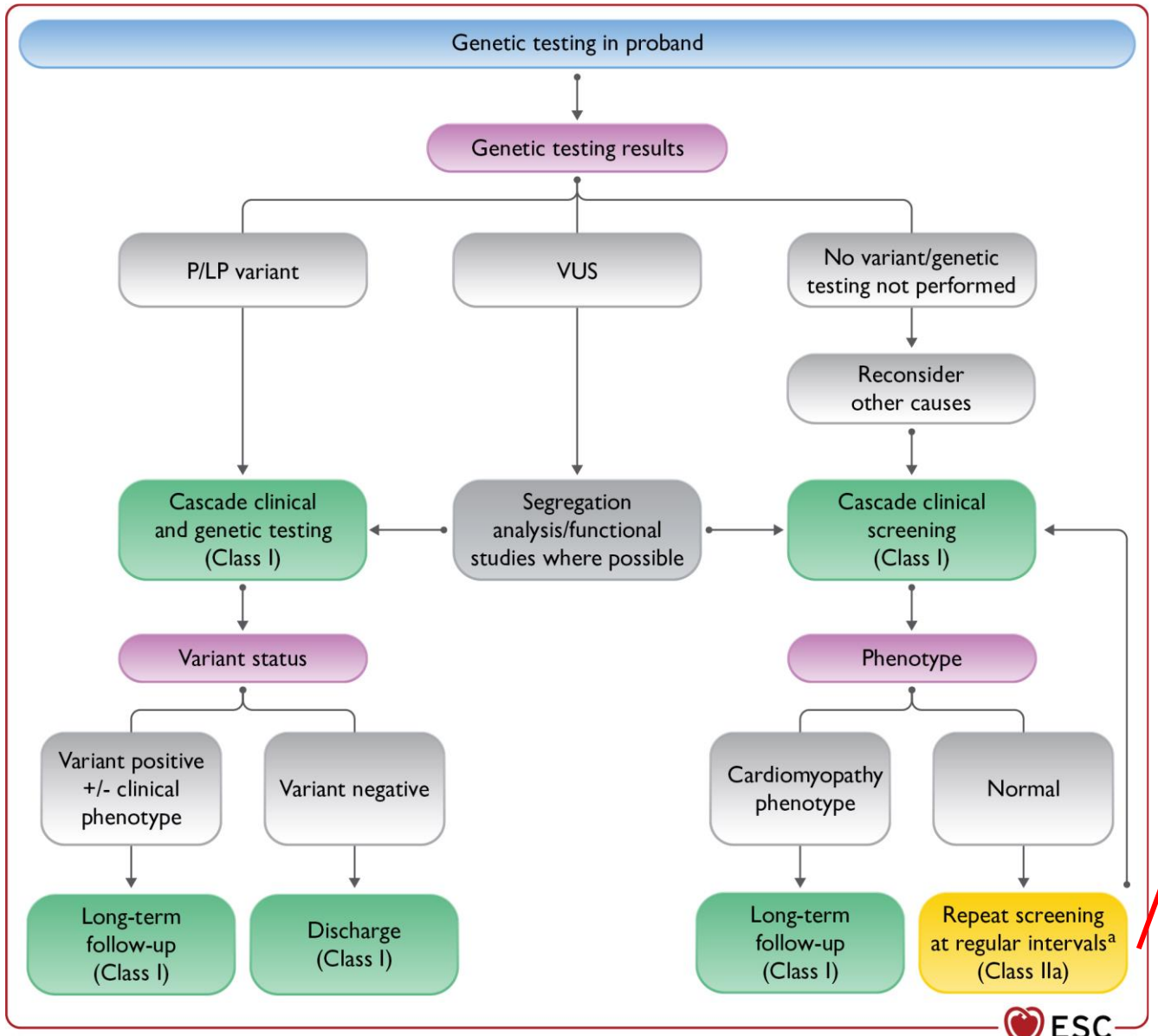
In patients with suspected cardiomyopathy, EMB should be considered to aid in diagnosis and management when the results of other clinical investigations suggest myocardial inflammation, infiltration, or storage that cannot be identified by other means.	**IIa**	**C**
Endomyocardial biopsy should be considered in patients with RCM to exclude specific diagnoses (including iron overload, storage disorders, mitochondrial cytopathies, amyloidosis, and granulomatous myocardial diseases) and to diagnose restrictive myofibrillar disease caused by desmin variants.	**IIa**	**C**

Genetic testing

Genetic testing is recommended in patients fulfilling diagnostic criteria for cardiomyopathy in cases where it enables diagnosis, prognostication, therapeutic stratification, or reproductive management of the patient, or where it enables cascade genetic evaluation of their relatives who would otherwise be enrolled into long-term surveillance.	I	B
If prenatal diagnostic testing is to be pursued by the family, it is recommended that this is performed early in pregnancy, to allow decisions regarding continuation or co-ordination of pregnancy to be made.	I	C
A discussion about reproductive genetic testing options with an appropriately trained healthcare professional should be considered for all families with a genetic diagnosis.	IIa	C

Genetic testing in family members

It is recommended that cascade genetic testing, with pre- and post-test counselling, is offered to adult at-risk relatives if a confident genetic diagnosis (i.e. a P/LP variant) has been established in an individual with cardiomyopathy in the family (starting with first-degree relatives if available, and cascading out sequentially).	I	B
Testing for the presence of a familial variant of unknown significance, typically in parents and/or affected relatives, to determine if the variant segregates with the cardiomyopathy phenotype should be considered if this might allow the variant to be interpreted with confidence.	IIa	C
Diagnostic genetic testing is not recommended in a phenotype-negative relative of a patient with cardiomyopathy in the absence of a confident genetic diagnosis (i.e. a P/LP variant) in the family.	III	C



Every 1-3 years OR 3-5 years @age>60:

- ECG
- Echo
- Other studies when appropriate

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Genetic counseling & testing in Israel

- Counselling by a geneticist or dedicated expert specialist
- Cardiologist can refer to testing for CMP gene panel (usually exome based) OR specific variant.
- Coverage for testing:
  - Known familial case.
  - Estimated probability for genetic finding >50%.

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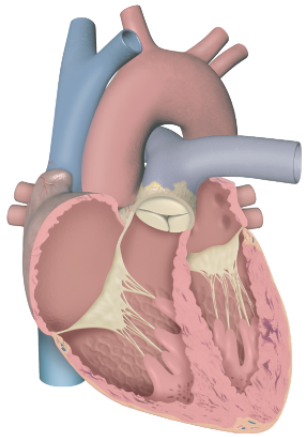
Amyloidosis workup



Left ventricular wall thickness ≥12 mm + ≥1 of

- Heart failure in ≥65 years
- Aortic stenosis in ≥65 years
- Hypotension or normotensive if previously hypertensive
- Sensory involvement, autonomic dysfunction
- Peripheral polyneuropathy
- Proteinuria
- Skin bruising
- Ruptured biceps tendon
- Bilateral carpal tunnel syndrome
- Subendocardial/transmural LGE or increased ECV
- Reduced longitudinal strain with apical sparing
- Decreased QRS voltage to mass ratio
- Pseudo Q waves on ECG
- AV conduction disease
- Possible family history of ATTR
- Chronically increased troponin levels
- Known multiple myeloma or MGUS

Signs and symptoms, ECG, ECHO, or CMR suggestive of cardiac amyloidosis

99mTc-DPD/PYP/HMDP scintigraphy with SPECT + Haematologic tests (serum free light chain quantification and serum and urine immunofixation)

- Scintigraphy grade 0, Haematologic tests -
  - AL/ATTR cardiac amyloidosis unlikely
    - If suspicion persists consider repeat CMR followed by biopsy
- Scintigraphy grade 1–3, Haematologic tests -
  - Grade 2–3: Cardiac ATTR amyloidosis
    - TTR genetic testing ATTRwt/ATTRv
  - Grade 1: Histological confirmation (cardiac/extracardiac) to diagnose
- Scintigraphy grade 0, Haematologic tests +
  - AL amyloidosis?
    - CMR -: Amyloidosis unlikely
    - CMR + or inconclusive: Histological confirmation (cardiac/extracardiac) to diagnose
- Scintigraphy grade 1–3, Haematologic tests +
  - Histological confirmation (usually cardiac) to subtype

General management considerations

Heart failure

- According to 2021 ESC HF GL.
- In early disease, anti-remodeling therapy may be considered (2b).
- Advanced therapies in selected cases.

Atrial fibrillation

Atrial fibrillation catheter ablation is recommended for rhythm control after one failed or intolerant class I or III AAD to improve symptoms of AF recurrences in patients with paroxysmal or persistent AF and cardiomyopathy.	**I**	**B**
Atrial fibrillation catheter ablation should be considered as first-line rhythm control therapy to improve symptoms in selected patients with cardiomyopathy and paroxysmal or persistent AF without major risk factors for recurrences as an alternative to class I or III AADs, considering patient choice, benefit, and risk.	**IIa**	**C**

Atrial fibrillation

Atrial fibrillation catheter ablation is recommended to reverse LV dysfunction in AF patients with cardiomyopathy when tachycardia-induced component is highly probable, independent of their symptom status.	I	B
Maintenance of sinus rhythm rather than rate control should be considered at an early stage for patients with a cardiomyopathy and AF without major risk factors for recurrence, regardless of symptoms.	IIa	C

Modification of unhealthy lifestyle and targeted therapy of intercurrent conditions is recommended to reduce AF burden and symptom severity in patients with cardiomyopathy.	I	B

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Atrial fibrillation

Oral anticoagulation in order to reduce the risk of stroke and thromboembolic events is recommended in all patients with HCM or cardiac amyloidosis and AF or atrial flutter (unless contraindicated).	I	B
Oral anticoagulation to reduce the risk of stroke and thromboembolic events is recommended in patients with DCM, NDLVC, or ARVC, and AF or atrial flutter with a CHA_2DS_2-VASc score ≥2 in men or ≥3 in women.	I	B
Oral anticoagulation to reduce the risk of stroke and thromboembolic events should be considered in patients with RCM and AF or atrial flutter (unless contraindicated).	IIa	C
Oral anticoagulation to reduce the risk of stroke and thromboembolic events should be considered in patients with DCM, NDLVC, or ARVC, and AF or atrial flutter with a CHA_2DS_2-VASc score of 1 in men or of 2 in women.	IIa	B

HCM

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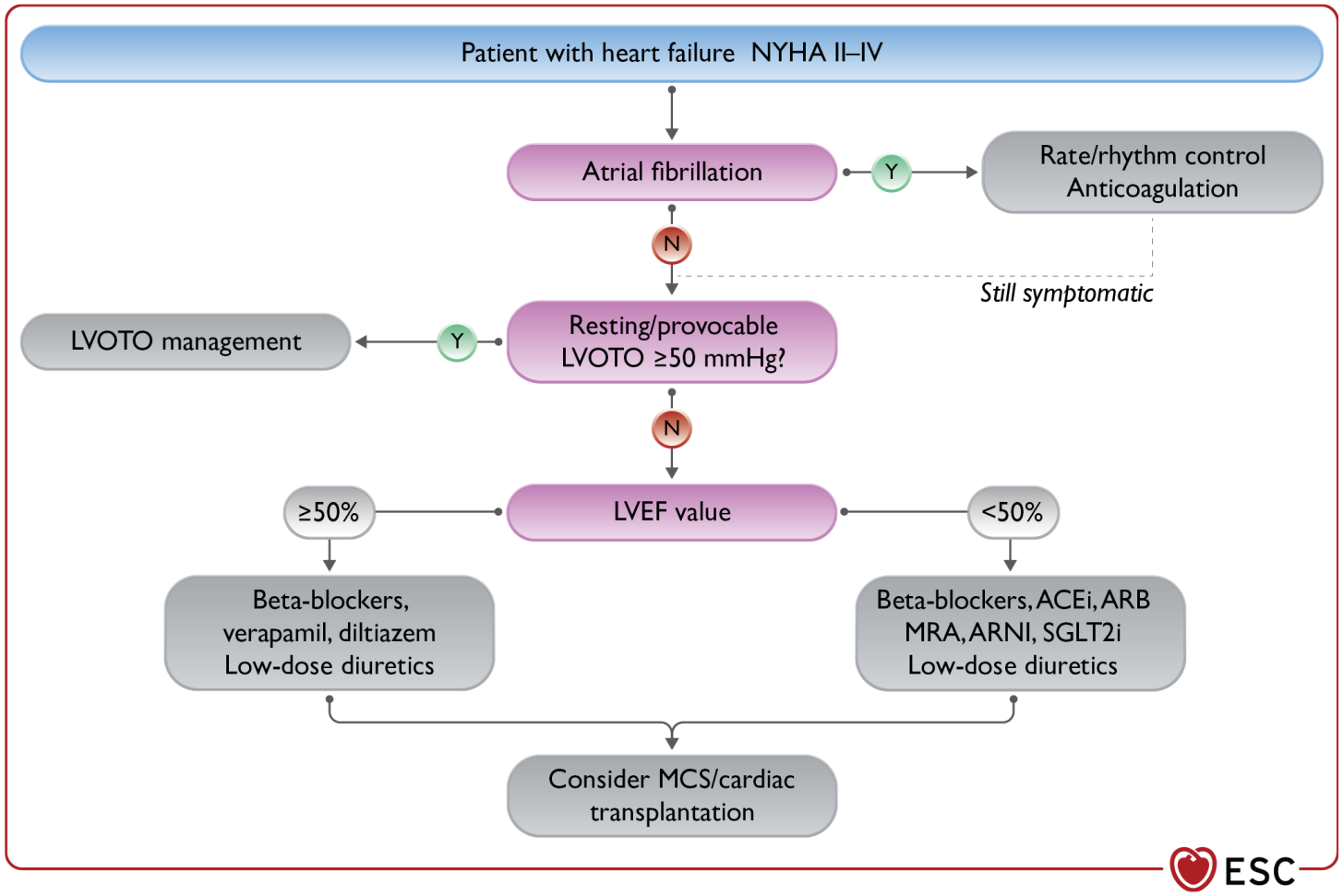
Symptomatic heart failure



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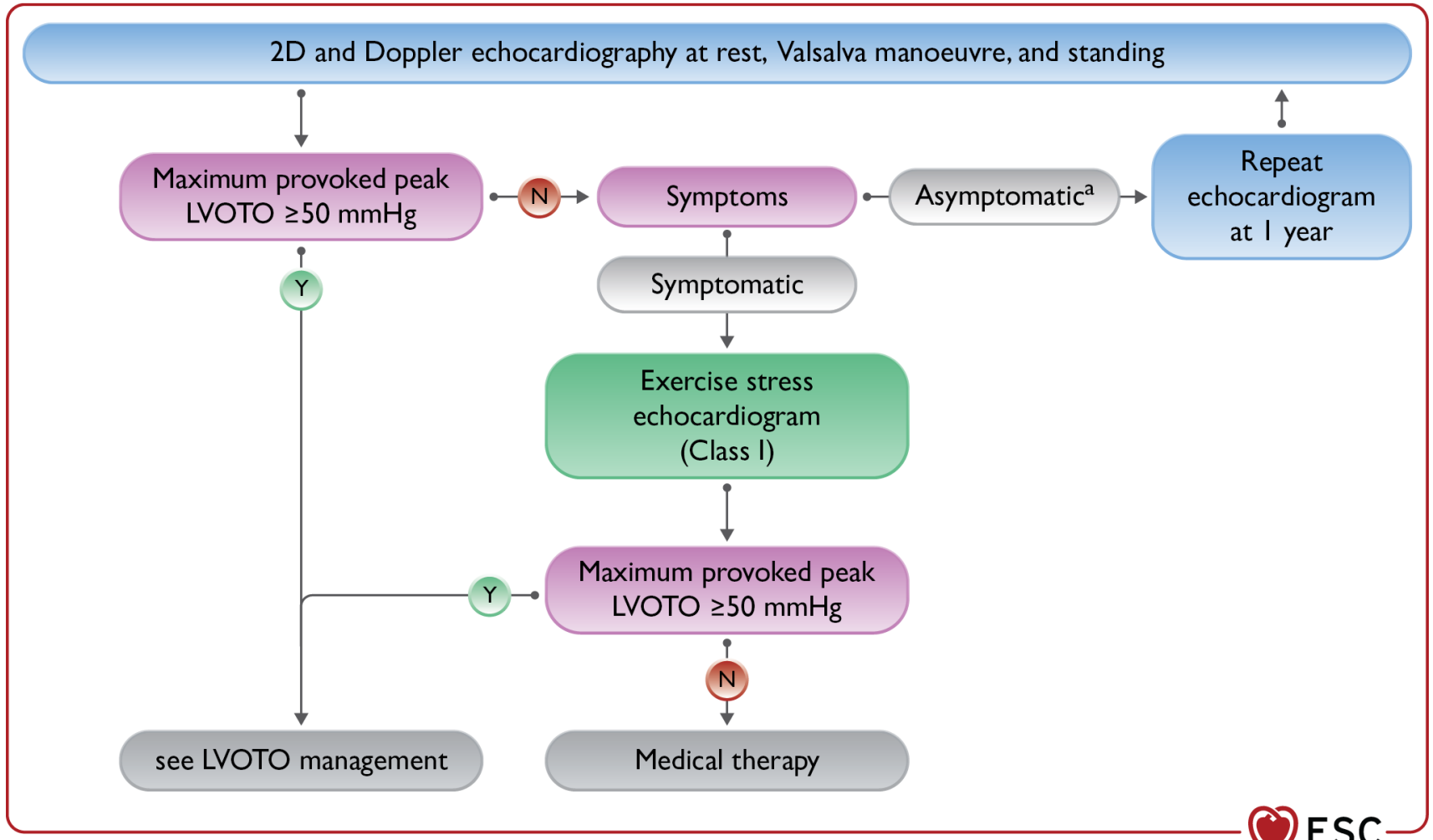
Angina

Beta-blockers and calcium antagonists (verapamil or diltiazem) should be considered to improve symptoms in patients with angina-like chest pain even in the absence of LVOTO or obstructive CAD.	**IIa**	**C**
Oral nitrates may be considered to improve symptoms in patients with angina-like chest pain, even in the absence of obstructive CAD, if there is no LVOTO.	**IIb**	**C**
Ranolazine may be considered to improve symptoms in patients with angina-like chest pain even in the absence of LVOTO or obstructive CAD.	**IIb**	**C**

LVOT obstruction workup



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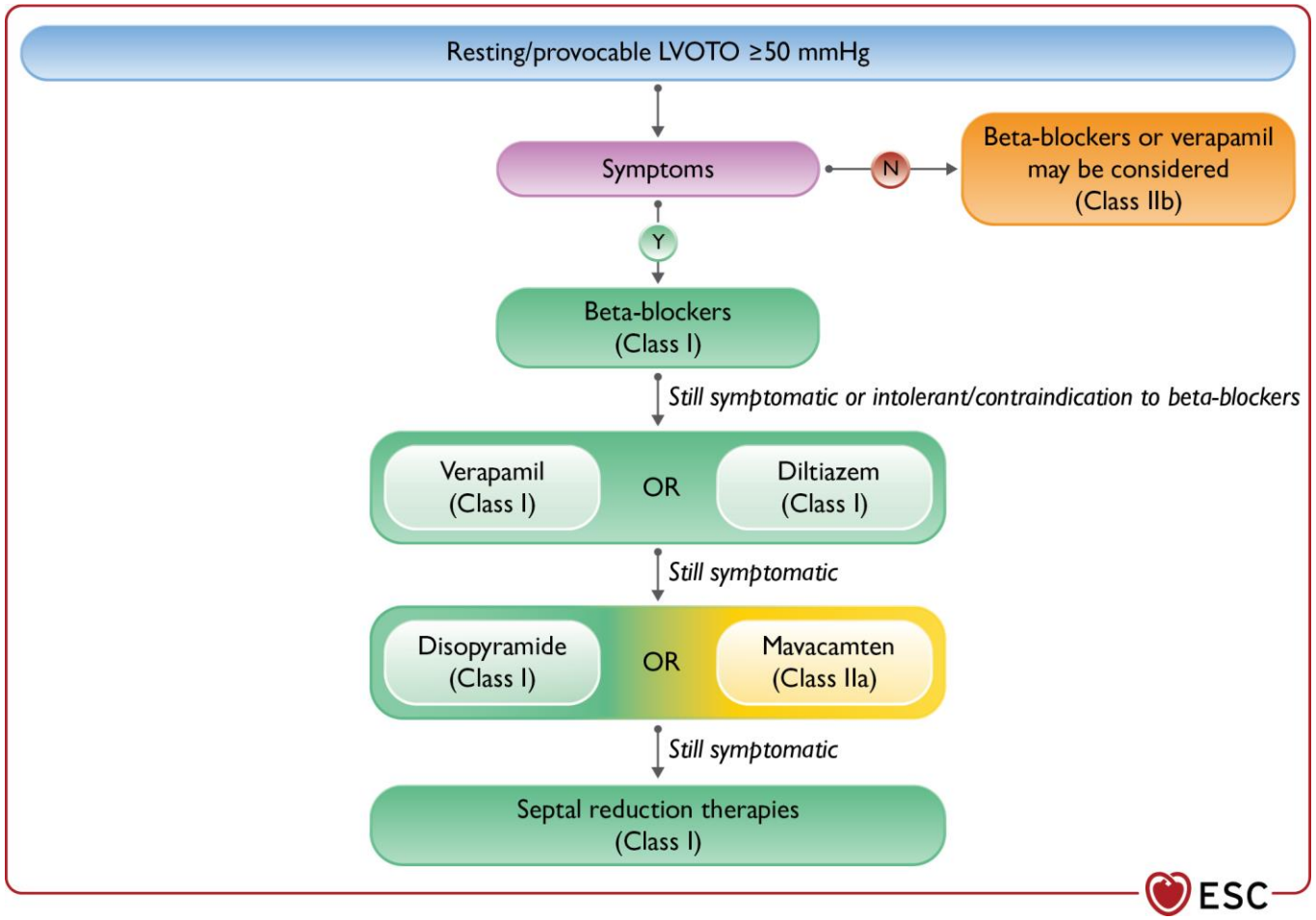
LVOT obstruction management



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Septal reduction therapy

SRT to improve symptoms is recommended in patients with a resting or maximum provoked LVOT gradient of ≥50 mmHg who are in NYHA/Ross functional class III–IV, despite maximum tolerated medical therapy.	I	B
Septal myectomy, rather than ASA, is recommended in children with an indication for SRT, as well as in adult patients with an indication for SRT and other lesions requiring surgical intervention (e.g. mitral valve abnormalities).	I	C
SRT should be considered in patients with recurrent exertional syncope caused by a resting or maximum provoked LVOTO gradient ≥50 mmHg despite optimal medical therapy.	IIa	C

SCD prevention

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SCD prevention

Primary prevention		
Comprehensive SCD risk stratification is recommended in all cardiomyopathy patients who have not suffered a previous cardiac arrest/sustained ventricular arrhythmia at initial evaluation and at 1–2 year intervals, or whenever there is a change in clinical status.	**I**	**C**
The use of validated SCD algorithms/scores as aids to the shared decision-making when offering ICD implantation, where available:		
• is recommended in patients with HCM.	**I**	**B**
• should be considered in patients with DCM, NDLVC, and ARVC.	**IIa**	**B**
If a patient with cardiomyopathy requires pacemaker implantation, comprehensive SCD risk stratification to evaluate the need for ICD implantation should be considered.	**IIa**	**C**

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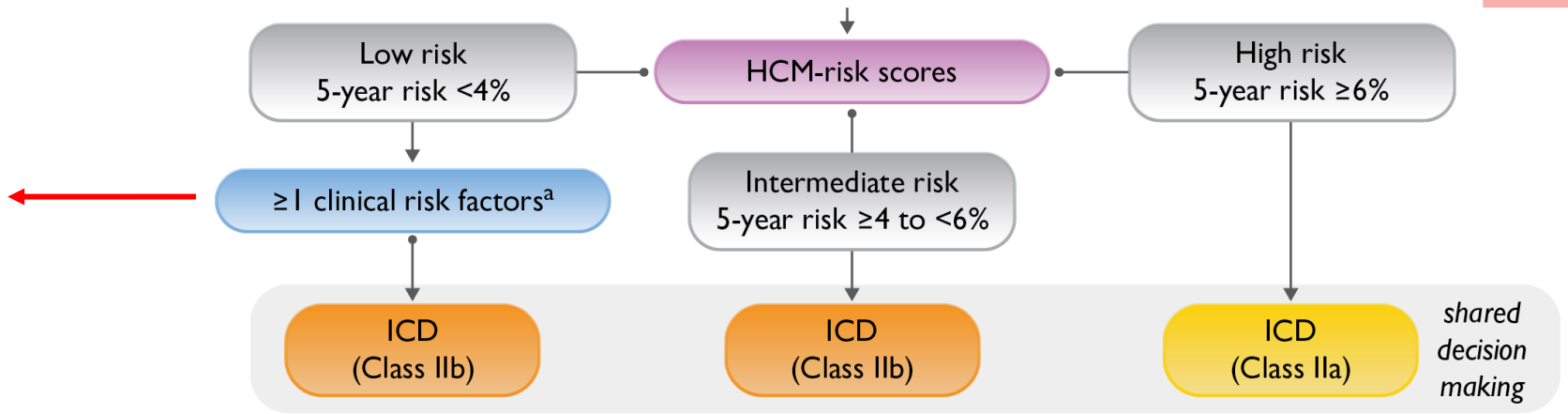
HCM: Primary prevention

- Risk factors:
  - LGE >15%
  - LVEF <50%



- Other factors NOT RECOMMENDED:
  - Apical aneurysm
  - Malignant mutation
  - Abnormal BP response to exercise

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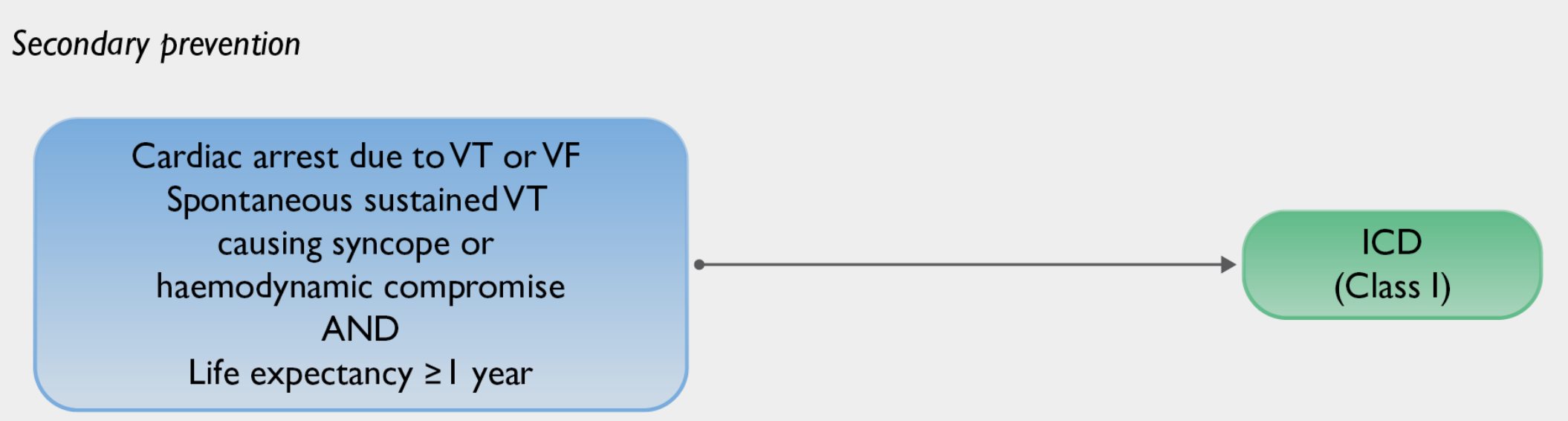
HCM: Secondary prevention



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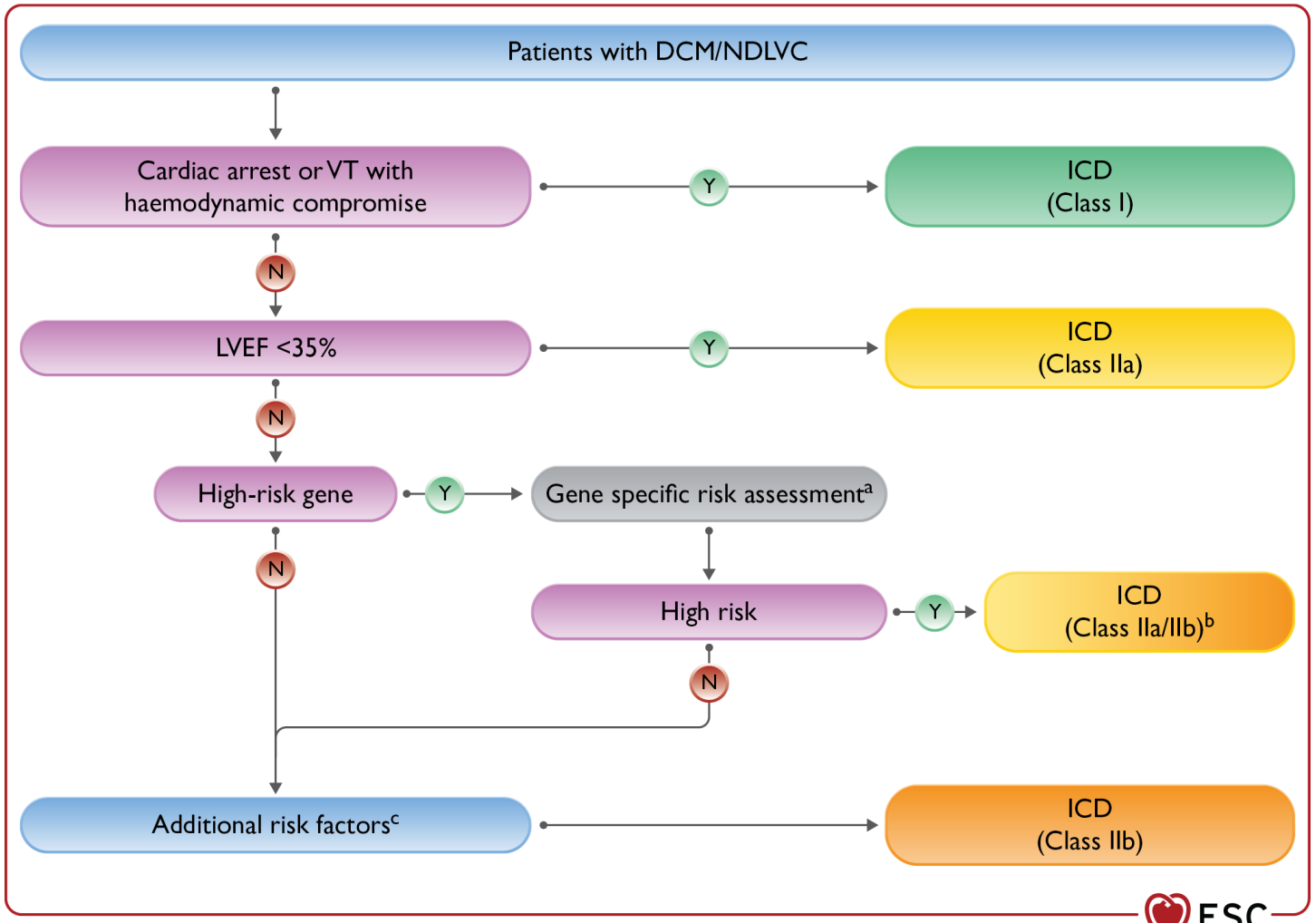
DCM/NDLVC



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SCD prevention: DCM/NDLVC, Gene-specific risk factors

Gene	Annual SCD rate	Predictors of SCD
LMNA	5–10%	Estimated 5-year risk of life-threatening arrhythmia using LMNA risk score https://lmna-risk-vta.fr
***FLNC*-truncating variants**	5–10%	LGE on CMR LVEF<45%
TMEM43	5–10%	Male Female and any of the following: LVEF <45%, NSVT, LGE on CMR, >200 VE on 24h Holter ECG
PLN	3–5%	Estimated 5-year risk of life-threatening arrhythmia using *PLN* risk score https://plnriskcalculator.shinyapps.io/final_shiny LVEF<45% LGE on CMR NSVT
DSP	3–5%	LGE on CMR LVEF<45%
RBM20	3–5%	LGE on CMR LVEF<45%

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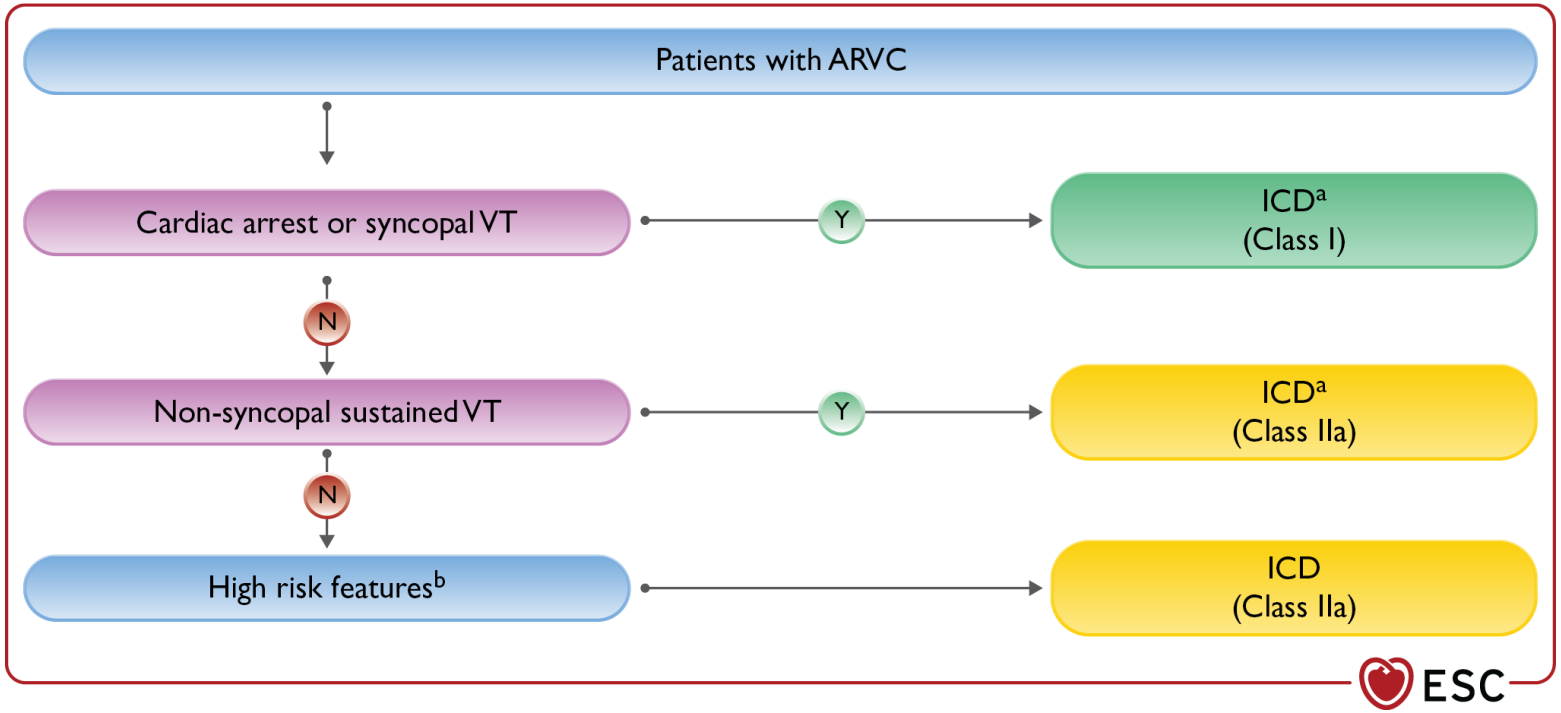
SCD prevention: ARVC

Beta-blocker therapy is recommended in ARVC patients with VE, NSVT, and VT.	I	C
Amiodarone should be considered when regular beta-blocker therapy fails to control arrhythmia-related symptoms in patients with ARVC.	IIa	C
Flecainide in addition to beta-blockers should be considered when single agent treatment has failed to control arrhythmia-related symptoms in patients with ARVC.	IIa	C
Catheter ablation with availability for epicardial approach guided by 3D electroanatomical mapping of VT should be considered in ARVC patients with incessant VT or frequent appropriate ICD interventions for VT despite pharmacological therapy with beta-blockers.	IIa	C

SCD prevention: ARVC

- Risk factors:
  - Cardiac syncope
  - NSVT
  - RVEF <40%
  - LVEF <45%
  - SMVT at PES
  - Per the updated 2019 ARVC risk calculator



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Exercise, life-style

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Exercise: HCM

High-intensity exercise and competitive sport should be considered in genotype-positive/phenotype-negative individuals who seek to do so.	IIa	C
High-intensity exercise and competitive sport may be considered in asymptomatic low-risk individuals with morphologically mild hypertrophic cardiomyopathy in the absence of resting or inducible left ventricular outflow obstruction and exercise-induced complex ventricular arrhythmias.	IIb	B
High-intensity exercise, including competitive sport, is not recommended in high-risk individuals and in individuals with left ventricular outflow tract obstruction and exercise-induced complex ventricular arrhythmias.	III	C

Exercise: ARVC

Avoidance of high-intensity exercise, including competitive sport, may be considered in genotype-positive/phenotype-negative individuals in families with ARVC.	IIb	C
Moderate- and/or high-intensity exercise, including competitive sport, is not recommended in individuals with ARVC.	III	B

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Exercise: DCM\NDLVC

Moderate- and high-intensity exercise should be considered in individuals who are gene positive and phenotype-negative (with the exception of pathogenic variants in *LMNA* and *TMEM43*) who seek to do so.	**IIa**	**C**
High-intensity exercise and competitive sport may be considered in a select group of asymptomatic and optimally treated individuals with a left ventricular ejection fraction ≥50% in the absence of exercise-induced complex arrhythmias.	**IIb**	**C**
Moderate-intensity exercise may be considered in asymptomatic and optimally treated individuals with a left ventricular ejection fraction of 40–49% in the absence of exercise-induced complex arrhythmias.	**IIb**	**C**
High-intensity exercise, including competitive sport, is not recommended in symptomatic individuals, those with a left ventricular ejection fraction ≤40%, exercise-induced arrhythmias or pathogenic variants in *LMNA* or *TMEM43*.	**III**	**C**

General recommendations for non-cardiac surgery

Peri-operative ECG monitoring is recommended for all patients with cardiomyopathy undergoing surgery.	I	C
In patients with cardiomyopathy and suspected or known HF scheduled for intermediate or high-risk NCS, it is recommended to re-evaluate LV function with echocardiography (assessing LVOTO in HCM patients) and measurement of NT-proBNP/BNP levels, unless this has recently been performed.	I	B
In patients aged <65 years with a first-degree relative with a cardiomyopathy, it is recommended to perform an ECG and TTE before NCS, regardless of symptoms.	I	C

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Thank you

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